no right to proscribe to an organisation that was not reliant on government funds. Ultimately, security consideration led to a reduction in the number of stakeholders represented on the board.\footnote{Disclosure G.J. van der Westhuizen: panel discussion on the history of Rand Water, held at Rietvlei on 2003.02.07.}

Illus. 7.2. The Zwartkopjes school was one of the major initiatives of the Rand Water Board to maintain a sense of balance in the years of extreme apartheid. This school, established in the 1920s, remained faithful to its task of educating the children of the board’s employees. It is still in operation today. Source: Rand Water

By the mid 1960s the state of alert on which the state had been placed, gradually started subsiding. In a gesture of support for its workers the board agreed to provide improved facilities. The school for black employees’ children at Zwartkopjes was rebuilt. The Methodist Church had started the old school in 1921. The status of the local congregation as a missionary initiative made it possible for the local minister and his helpers to stay on when measures were introduced in 1955 to enforce the new apartheid education laws of the government. The board also clearly tended to favour the presence of the school and the work that was being done. Consequently R20 000 was made available in 1965 for the construction of a new school with electricity and sanitary facilities.\footnote{RWA, Minutes 1965-6, pp. 597-8: 800e gewone vergadering van die Randwaterraad, hoofkantoor, Johannesburg 1965.10.29. Hoofingenieursverslag, nr 4159. R.J. Laburn.}
Since then the school has been a symbol of the dedication of the organisation to endeavour to work in the interest of the education and the upliftment of its employees’ families.

Illus. 7.3. Aerial view of Zwartkopjes pumping station in 1961. 
Source: Rand Water

Changes in the operations of the board

In the 1960s a number of changes took place in the operations of the board. It appeared as if the board as an institution was beginning to lose its personalised face. Attention was now focused on macro-
processes within a larger framework. Because of growth within the organisation itself more officials were appointed. This was partly because the government increasingly started playing a decisive role in the manner in which the board was functioning. It had much to do with the growth that was taking place within the organisation. The first real changes came in 1964.  

**Afrikaans as medium of communication:** Already in February 1957 there were plans afoot to change the dominance of the English language in the boardroom. S.J. Hattingh, a new representative for Germiston Town Council, asked for permission to talk about the question of conducting meetings of the board in both Afrikaans and English alternately, or at least having the agendas made available in both languages. The matter was then referred to the finance and executive committee. At the monthly meeting of May 1957 the chairman, Dr A.J. Bruwer, announced that a report was to be submitted at the next meeting of the committee – presumably the board in committee. On the occasion of the 703rd meeting of the board, in September 1957, the agenda was made available for the first time in both Afrikaans and English. Board member, J.P. Vorster, who represented Brakpan town council, expressed appreciation on behalf of the Afrikaans-speaking members of the board. It was also noted that he had requested a copy of the Afrikaans agenda to be circulated and signed by the board and staff members present to mark the occasion. The chairman was reported to have said that the issue of the agenda being available in both languages was the outcome of the sound common sense of the people of South Africa and their desire to live together.

Starting with the financial year in April 1964 the minutes of the monthly meetings of the board were alternately published in Afrikaans and English. One of the key figures responsible for the vast amount of translation work was Chris Heiberg, a senior assistant in the department of the secretary. He joined the services of the board on 1 May 1964 after serving in the department of justice for a number of years. Until the 1980s both Afrikaans and English were used in the meetings of the board. One of the accomplishments stemming from this practice was that it gave rise to a need for the Afrikaans language to be developed to an exceedingly high level in technical terms relating to hydrological science and engineering. In November 1981 two officials of the board, Messrs S.W. van der Merwe and W.S.K. Gerber were credited for their contributions to the compilation of the first South


African dictionary of water technology terms in Afrikaans and English.\textsuperscript{22}

Amendments to the statutes: The major changes of the 1960s were made possible when the statutes of the board were amended. The \textit{Rand Water Board Statutes (Private) Amendment Act} No. 29 of 1964 was the first substantive change since the previous amendment approved by parliament in 1950. In essence two major changes were introduced. In the first place the members of the board were reduced from 34 to nine. It implied that the representatives of the constituent local authorities, the mines and the railways were no longer directly represented.\textsuperscript{23} Forthwith all members of the board were to be appointed by the state president.\textsuperscript{24} It implied that the state had claimed for itself a considerable amount of influence on the board. It meant that the local authorities that had a stake in the operations of the board could no longer make direct representations to the management of the organisation. This matter was brought under the attention of the government at the time of the discussions with a commission of enquiry into water planning for South Africa.\textsuperscript{25} It was felt that the government was in the process of taking over control of the board. It was emphasised that the water utility had never in its history asked of the government for any funds. Neither did it rely on the state to secure its operations. Since 1964, however, it was as if the partnership that

\begin{itemize}
\item \textsuperscript{22} See COMMITTEE FOR WATER TECHNOLOGY TERMS, \textit{Watertegnologieterme/Water technology terms} (CSIR and the Terminology Bureau of the Department of National Education, Pretoria, 1981).
\item \textsuperscript{23} RWOH1, Interview Dr H.T. Ramsden, Farmsend Bergvliet, 2002.12.01. According to Dr Ramsden one of the factors that undermined the Rand Water Board’s resistance to the reduction of the number of board members proposed by the state, was the fact that there were 34 unpaid members. Many did not attend meetings. It was consequently difficult to get a quorum together. It was therefore of some advantage to reduce the number of board members and bring in experts who would be remunerated for their attendance.
\item \textsuperscript{24} RWA, Fifty-ninth annual report of the Rand Water Board to the State President. Financial year ended 31st March, 1964, p. 3.
\item \textsuperscript{25} RWA 31/0 Water Commission 1966-9. Getuienis afgelê deur die Randwaterraad voor die subkomitee van die waterbeplanningskommissie onder die voorsitterskap van professor S. du Toit Viljoen, gehou op 8 Desember 1966, p. 4-6. Evidence Dr A.J. Bruwer.
\end{itemize}
had developed over many years was changing. It no longer had
direct access to the board’s water supplies. The answer from the
government to this allegation was that it had to serve the interests
of all consumers – not only the board. The state, by implication,
considered itself to be in a much better position to establish an
overall plan for the manner in which the country’s water supplies
had to be used.\textsuperscript{26}

\textbf{Illus. 7.5. The 122 Mℓ reservoir at Meredale under construction in
1963. Source: Rand Water}

The second change to the statutes of the board in 1964 was that the
distinction that existed previously, between the revenue required to
meet working costs and interest and redemption, was removed.
The new act made provision that in future the entire revenue of the
board was to be obtained from levying rates.\textsuperscript{27} Because this

\textsuperscript{26}. RWA 31/0 Water Commission 1966-9. Getuïenis afgelê deur die Randwaterraad voor
die subkomitee van die waterbeplanningskommissie onder die voorsitterskap van
professor S. du Toit Viljoen, gehou op 8 Desember 1966, pp. 15-6. Response of the
chairman Prof. S.P. du Toit Viljoen.

\textsuperscript{27}. RWA, Fifty-ninth annual report of the Rand Water Board to the State President.
Financial year ended 31st March, 1964, p. 3.
arrangement was to have a far reaching effect in the years to come it is necessary to look at the historical developments of the board’s rates up to 1964.

**The evolution of the three-tier system of tariff rates of the board**

In a submission to the board the board’s secretary, A.J. de Witt, on occasion gave an historical overview of the rate system. When the board started with operations in 1905 all consumers of water paid a single rate. It was called the uniform rate. This rate covered the interest rate and redemption charges as well as the working costs of the board.\(^{28}\) If the revenue of the board proved to be insufficient at the time, it could take recourse to the local authorities and mines in order to make ends meet. This arrangement did not work properly. The local authorities were using about 80 per cent of the available water supply and the mines were using the remaining 20 per cent, according to De Witt.\(^ {29}\) The result was that the (domestic) consumers were in fact paying for the larger portion of the water supply at the time.\(^ {30}\) The matter was addressed with the passing of Act 22 of 1909, which changed the approach to fixed charges. It was accepted in the legislation that the mines and the local authorities were equal partners in the board’s undertaking. Consequently they had to assume equal responsibilities for the amount of the fixed charges levied by the board. In the legislation the fixed charges became a separate issue that was to be dealt with by making an equal division in which the local authorities and the mines paid equal shares. The existing uniform rate per 1000 gallons (4500 ℓ) then became limited to a charge making provision for covering working costs only.\(^ {31}\) In his report to the board, secretary A.J. de Witt described the significance of this measure in the legislation:


\(^{29}\) This was the result of a new trend in mining operations.


This was the turning point in the Board’s operations and the effect of this change was so revolutionary that by February, 1911, the Board had been called upon to supply nearly nine million gallons per day (as against the three million gallons per day two years previously), and the Board was compelled to make provision for substantially increased supplies of raw water, culminating in the building of the Barrage in the Vaal river and later still in obtaining further abstraction rights from the Vaal river out of the Vaal dam.\(^{32}\)

In 1914 the South African Railways was also admitted as a constituent authority of the board (with the passing of Act No. 18 of 1914 which made provision for the construction of the Barrage). The railway authority was now considered liable for 7,5 per cent of the fixed charges. The mines and local authorities were now respectively responsible for the remaining 46,25 per cent.\(^{33}\) In 1944 when Pretoria was admitted as a constituent authority of the board there were changes in the fixed percentages. The railways now only paid 5 per cent; local authorities paid 50 per cent; and the mines paid 45 per cent.\(^{34}\) The 1909 legislation made provision for the two-tier system of rates. Constituent authorities paid a lower rate than non-constituent consumers. The law however also ensured that the charge to consumers could not exceed the charge to constituent members by more than 100 per cent. This principle did not prevent the board from charging non-constituent customers from paying twice as much as constituent members.\(^{35}\)

At the time the rates paid by all consumers were still divided into two portions – a uniform rate to cover working costs and a special rate to cover the fixed charges. Essentially the constituent authorities were paying the fixed charges. In effect however the ‘special rate’ portion of the charge to non-constituent consumers

---


was credited to the fixed charges. The actual payment made by the non-constituent consumers, was relatively small. As late as 1935 when the three-tier system was introduced the constituent members of the board were still paying 94.25 per cent of the fixed charges of the board.  

Illus. 7.6. Laying a 475 mm pipeline between Selcourt and Wildebeestfontein in the Eastern Transvaal. Source: Rand Water

The three-tier system of tariffs that was introduced by legislation in 1935 made provision for the division of fixed charges into two categories. The first category was to be paid by constituent members on the fixed basis as before. Category two, which consisted of later loans apportioned by the board was to be paid for based on the amount of water consumed. At the time the basic fee

Chapter 7

of the board to constituent authorities was 14,62 cents per 4500 ℓ (alternatively 3.5 cents per 1000). Other consumers paid 25.42 cents per 4500 ℓ (alternatively 5.65 cents per 1000 ℓ). It was at the time considered that although the ‘other consumer’ tariff was reasonable for private consumption, it was not a favourable arrangement for the non-constituent member local authorities using the board’s water. Consequently a system of rebates was introduced. From then on the three-tier system of tariff became part of the price structure of water supplied by the board.

The first-tier rate was for the crushing mines and constituent authorities; the second tier was to non-constituent local authorities (preferred consumers); and the third tier of pricing was to other consumers.

It was considered at the time that the constituent authorities and the mines were part of the original establishment that had helped establish the board. Consequently they deserved to have a form of benefit and preferential treatment on the grounds of the investments they had made at the start of the century. There were also other considerations. With the construction of the Barrage the board incurred a heavy capital expenditure. This had to be paid. Consequently it was required of consumers to use as much water as possible. Furthermore it also implied that constituent local authorities were not permitted, without the consent of the board, to develop their own sources of water supply. This situation gave rise to considerable discontent within the board’s constituent membership and it explains why the mines instituted court...

37. I am grateful to E. Myburgh for making these and a number of other conversions following our panel discussion at Rietvlei on 2003.02.07.

248
progressions against the board for planning to develop the second
phase of the Barrage scheme to accumulate 23 Mℓ/d more.\textsuperscript{42} The
mines failed in their action at the time. It was however an
indication of how seriously some parties connected to the board,
felt about the system of fixed charges.\textsuperscript{43}

In the reconstitution of the board going back to 1963-4 the principle
of preference was still maintained with the former ‘constituent’
members being called ‘foundation’ members. Because the former
constituent members were no longer directly represented on the
board it was considered desirable to abolish the responsibility for
the payment of the fixed charges. Forthwith all the board’s revenue
was to be derived from the levying of rates on water sold.\textsuperscript{44}

The three-tier tariff system was maintained and the cabinet gave its
approval for the approach. It was felt that the former constituent
members were also given recognition for the role they had played
in establishing the board.\textsuperscript{45}

The new tariff structure was as follows:

a) Foundation consumers paid a rate sufficient to cover the costs
(working costs, interest on and redemption of loans and
appropriations), less the estimated revenue that was to be
derived from the charges for water supplied to preferred and
other consumers (4,44 cents per kilolitre in 1973);

b) Preferred consumers were to pay a tariff, not less than the
rate charged to foundation consumers, plus one twelfth of
that cost (4,81 cents per kilolitre in 1973); and

\textsuperscript{42} The case of relevance was: City Deep Gold Mining Co. \textit{v}s Rand Water Board. It was
heard in the Transvaal Provincial Division and in the Appellate division of the
supreme court in 1922 and 1923 respectively.

\textsuperscript{43} RWA, Minutes 1972-3, p. 345: 887th meeting of the Rand Water Board, Headquarters,

\textsuperscript{44} \textit{Ibid.}, p. 345: 887th meeting of the Rand Water Board, Headquarters, Johannesburg

\textsuperscript{45} \textit{Ibid.}, p. 345: 887th meeting of the Rand Water Board, Headquarters, Johannesburg
c) Other consumers were to pay not less than preferred consumers plus one fifth of the tariff of preferred consumers (5.78 cents per kilolitre in 1973).\textsuperscript{46}

In the management of Rand Water Board the opinion was that the privileged position of the foundation members be maintained on the grounds of the contributions that had made in the past to the board. This point was also specifically stated in the secretary’s report submitted to the board.\textsuperscript{47}

**The board and the water planning commission of 1966**

On 23 June 1966 the government appointed a water commission to investigate all aspects of planning in respect of the water supply in the Republic of South Africa.\textsuperscript{48} The commission was an important forum for the management of the board and the government to discuss problems in respect of the water supply system on the Witwatersrand. Representatives of the board were amongst the first to give evidence before the commission.\textsuperscript{49} They were also the first to propose water transfer from the Tukhela to the Vaal river basin.\textsuperscript{50} A great deal of time was spent by the commission in addressing the problem of the water shortage that resulted from the drought conditions since the early 1960s. In many respects the activities of the commission were aimed at finding alternatives to the increasing shortfall of water experienced under circumstances of development. It was realised that water had become a scarce, though ubiquitous, commodity. In future consumers were subject to paying more as more comprehensive central planning and

\begin{itemize}
  \item\textsuperscript{46} Ibid., p. 345: 887th meeting of the Rand Water Board, Headquarters, Johannesburg 1973.01.26. Secretary’s report, no. 6130, A.J. de Witt.
  \item\textsuperscript{48} RWA 31/0. Water plan commission. Copy government notice 1044 of 1 July 1966. Commission of inquiry into water matters.
  \item\textsuperscript{49} R.J. Laburn, The Rand Water Board 75 1903-1978: a treatise on the Rand Water Board with specific reference to its responsibilities achievements and policies during 75 years of operation, p. 26.
  \item\textsuperscript{50} Personal disclosure Dr R.J. Laburn, Blargowrie, 2003.02.08.
\end{itemize}
infrastructure had to be provided in order to cope with the demand of consumers in all parts of the country.

The board gave its full co-operation in all the investigations of the commission. It was in this manner able to exert substantial influence on the planning and implementation of the Tukhela-Vaal water scheme. The necessary plans were also made to make available the technological skills and data of the board.

In the negotiations of the commission it became evident to what extent the board had lost its favoured position. Previously it had the right to use the water flow at the Vaal dam to generate hydro-electrical power. Then, in 1966, under conditions of drought the chief engineer, R.J. Laburn, reported that the department would make available to the board an additional 450 Mℓ/d. In exchange the board had to give up its hydraulic power generating rights. At the time the board was under pressure to provide more water to its consumers. It frequently happened, especially in the months of October to November, that the board had to work under overload conditions. The offer of more water from the department of water affairs, in exchange for giving up the right to generating electrical

51. The Tukhela was previously the Tugela.
52. RWA 31/0 Memorandum: R.J. Laburn, Johannesburg 1944.06.13. Kommentaar op memorandum en aanbevelings van die ministerie van waterwese insake verskerpte waterinkortingsmaatreëls, p. 4.
power, must have been enticing.\textsuperscript{56} In the interest of maintaining sound relations with the department of water affairs the board consented to sacrificing the right to generate power. It was argued that if the board had more water in terms of its statutory rights, instead of the permit system, the shortfall could be addressed. The board’s management was however forced to take a strong stand after it became clear that its willingness to co-operate with the department of water affairs in terms of the electricity supply could be construed as the beginning of giving up its existing statutory rights to water from the Vaal dam.\textsuperscript{57} It was clear that the management was not prepared to accept a new dispensation that was not in its interest. The challenge of changing conditions in the 1970s, in any case, required of the board to be more progressive in its plans to provide water to all its consumers. It was also in the interest of the country, for all the authorities responsible for water supply, to work together.

At the time the board installed a large diameter gravity pipeline from Vaal dam to Zuikerbosch pumping station. This had at least two advantages. The water required no pumping. It was delivered to the treatment works directly. Secondly it afforded the board an opportunity to abstract water from the Vaal river, other than the Vaal Barrage, which was increasingly becoming a security risk.\textsuperscript{58}

**Supplying water in a rapidly developing environment**

Despite all the turmoil at the start of the 1960s, the decade is noted for strong and sustained economic growth. Because of the dynamic industrial and financial environment of the Witwatersrand most of

---


\textsuperscript{57} RWA 31/0 A.J. de Witt, Johannesburg – Sekretaris waterplankomissie, Pretoria, 1967.01.24.

\textsuperscript{58} Personal disclosure Dr R.J. Laburn, Blairgowrie, 2003.02.08.
the effects of the years of plenty were manifested in the area where the Rand Water Board supplied water. At the start of the decade it seemed as if the board would be able to cope with the demand. In 1960 the total length of the utility’s pipeline, with a diameter of more than 150 mm, extended over a distance of 972.8 km. In the water storage capacity in the reservoirs totalled more than 10,328 Mℓ. In order to cope with the growth, the supply had to be stepped up. At the same time it was apparent that economic prosperity varied in the different regions where water was supplied.

The East Rand: In 1961 chief engineer C.P. Robinson reported to the board that the East Rand was faced with a number of dying mines. Were it not for the opening up of the Eastern Transvaal mines in the Kinross region, it was thought, there would have been a dismal decline in water consumption. The future for increased water consumption on the East Rand was bleak. It was anticipated that the daily consumption of water in the region would only go up from 156 to 181 Mℓ/d in 1966 and then slightly higher in 1971. The storage sites for water on the East Rand and the Eastern Transvaal were at slightly lower elevations at the time. The new Wildebeestfontein reservoir for the Eastern Transvaal and a proposed storage reservoir at Brakpan could increase the available water supply to 157 Mℓ/d. Before the end of 1961 it was evident that in the East Rand region it was Heidelberg in particular that

59. RWA, Fifty-fifth annual report of the Rand Water Board to the His Excellency the Governor-General, Union of South Africa. Financial year ended 31st March, 1960, p. 51.
60. Ibid., p. 51.
Chapter 7

was running short on supplies and a 225 mm pipe was recommended for the Nigel-Heidelberg pipeline.63

Germiston-Pretoria: The growth in the Germiston-Pretoria region, the northern parts of the board’s supply area, was considerably better. According to available statistics it was calculated that the water demand would increase from 222 Mℓ/d in 1961, to 279 Mℓ/d in 1966 and then to 352 Mℓ/d in 1970.64 The anticipated growth areas for supply were singled out as being Isando, Modderfontein and Pretoria.65

In June 1963 the board approved R1,4 million for the laying of a 925 mm pipeline between Klipfontein and Pretoria to make it possible to provide 135 Mℓ/d.66 One of the components of the scheme was the construction of the Klipfontein reservoir at a cost of R1 030 000.67 The scheme also had to provide to a certain extent for the need for water in the North Rand. Amongst the large water consumers was the Modderfontein factory of African Explosives and Chemical Industries Ltd, which was also to be linked up to a 1130 mm diameter Northridge Klipfontein pipeline by means of a 725 mm diameter pipeline. Ultimately the intention was to work towards providing the North Rand with a greater water supply in the next summer peak period.68

The West Rand: The third area in the board’s supply region was the Central and West Rand region. About one third of the water supplied to this region was under the Yeoville head and another third was supplied to the high lying areas of Krugersdorp and Roodepoort. The Forest Hill head provided the remainder of the West and Central Rand with water. These areas in particular included the new black townships southwest of Johannesburg. It was anticipated that their water supply would increase from 252 Mℓ/d in 1961 to an estimated 368 Mℓ/d in 1970.\(^69\) The area singled out for the greatest anticipated increase in demand was the West Rand.\(^70\)

In terms of reservoir storage facilities the region was well provided for. According to the chief engineer the capacity storage for the region stood at 423 Mℓ.\(^71\) However, there was a need for increased reservoir storage at the proposed reservoir at Meredale. It had to provide water to the black townships to the southwest of Johannesburg as well as the Libanon and Blijvooruitzicht region in the west.\(^72\)

The most important requirement for water supply at the time was the installation of larger pipelines (900 mm pipes) between Butcher’s Hill and Phomelong as well as Butcher’s Hill and Moroka.\(^73\) Robinson’s proposals that were accepted by the board were considered an extension of the additional water supply (1959) scheme. It was to cost more than R1,9 million.\(^74\)


Chapter 7

By the end of 1961 it was evident that especially the region that would become known as Soweto was using a great deal of water. Also the consumption of the Libanon mining operation was considerably higher than earlier estimates. The problem was solved over the short term, by laying a 900 mm pipeline between Meredale and Moroka at a cost of R120 000.\textsuperscript{75} In September 1961 the construction of the Meredale reservoir with a capacity of 112,5 Mℓ was given approval by the board. The construction work cost R147 979.\textsuperscript{76}

In 1964 water was supplied to the Fochville Health Committee from the Libanon-Blijvooruitzicht pipeline. Requests for this had been made as early as 1947. The matter became urgent in 1963 when the borehole that supplied Fochville with water started drying up. The village’s chances of getting water were good because already in 1957 the minister of water affairs, in granting the board the right to abstract an additional 324 Mℓ/d from the Vaal river, stipulated that provision had to be made to supply water to Fochville. The cost of laying and supplying the 150 mm pipeline from the Libanon-Blijvooruitzicht mains, was estimated at around R115 000.\textsuperscript{77}

In the wake of the sinkholes that caused substantive disasters in 1964-5, many of the residents of the West Rand were relocated to Fochville.\textsuperscript{78} The board consequently had to step in at short notice and assist in the provision of sufficient water for the 500 houses then being built at Fochville. What had meanwhile happened was that the cost of steel pipes had risen substantially. The cost of the


\textsuperscript{78}. For a good overview of the sinkhole saga see E.S. VAN EEDEN, A. DE VILLIERS, H. STRYDOM AND L. STOCH, “Effects of dewatering and sinkholes on people and environment – an analysis of the Carletonville area in Gauteng, South Africa” in Historia, 48(1), May 2003, pp. 95-125.
work that was initially estimated to be at approximately R115 000 had risen, in the space of a few months, to R140 000. Moreover, the 150 mm pipelines were considered insufficient and the recommendation was that 225 mm pipelines would be more suitable. The cost of this upgrading was an additional R40 000. In view of the matter, it was decided that the board would do the work and that the village council of Fochville would pay only R140 000 towards the project. 79

Peri-urban consumers to the north of Johannesburg: In 1961 the Anglo American Corporation’s South African Townships, Mining and Finance Corporation Ltd, one of the major developers in the area to the north of Johannesburg informed its consumers who relied on water supplies from the Bryanston region that restrictions had to be introduced. Tests conducted by the Rand Water Board in conjunction with the company showed that 75 per cent of the peak consumption of water was used for gardening purposes. This was considerably higher than the planners had estimated earlier. In an effort to cope with the demand, restrictions were introduced with Northern Johannesburg local group, comprising _inter alia_ Athol and Sandown, allowed to water gardens on Mondays and Thursdays. The townships in the North Eastern and Western Johannesburg local area committee group (i.e. Lombardy and Northcliff) were allowed to water gardens on Tuesdays and Fridays. Gardens in Bryanston and Randburg could be watered on Wednesdays and Sundays. 80 The developers also requested owners of swimming pools to fill them before 30 September. It was determined that the swimming pools in Bryanston alone needed 9 Mℓ of water. Consumers were consequently requested in August to fill their


pools before the start of October. Restrictions were also announced in October 1961, November 1962, 1965 and 1966. In November 1963 the City Council of Johannesburg was given permission to supply, on a third party basis, water to the municipality of Randburg. At the time this arrangements was seen as a temporary measure. Although the demand for water on the West Rand was largely confined to the area south of the West Rand towns where the rapidly growing black townships were situated, a substantial demand for water also came from areas to the north of Johannesburg. With the towns of Sandton and Randburg emerging as growth points, it was increasingly necessary for more water to be supplied. At the time of planning the 1965 additional water supply scheme, attention was given to the needs of these new towns.

The Southern Transvaal: In 1963 the board started providing for a separate water supply system to the Vaal Triangle. It was anticipated that the existing daily consumption of 45 Ml/d could increase to 56 Ml/d by 1964 and 99 Ml/d by 1975. This was a cost effective arrangement. By laying pipelines directly off the mains to Vereeniging, Vanderbijlpark, Meyerton, Evaton and Residensia at an estimated cost of R965 000, it was thought that considerable savings would be affected. It was no longer necessary to make use

81. Ibid.
of the pressure system in the Vereeniging-Zwartkopjes pipeline. It implied that the board had to build a reservoir at Langerand from which the local authorities would satisfy their water needs. By 1967 the scheme was called the Vereeniging-Vanderbijlpark-Sasolburg regional water supply scheme. Upon its completion in 1986 the scheme cost R4 227 219.

**Water supply to the Northern Free State**

Discussions, in respect of a supply of potable water, were first conducted between representative of the Rand Water Board and the Sasolburg Village Board of Management in January 1958. The initial plan was to pump water from Vereeniging to Sasolburg. In February 1962 the Northern Free State Water Board (NFSWB) was established. The intention was to distribute water for urban, industrial or agricultural purposes within the district of Sasolburg. Shortly afterwards, in May, discussion were held between the Rand Water Board and the NFSWB regarding the supply of water to Sasolburg. The condition of the Rand Water Board was that it would be possible, provided that the limits of the supply of the board be extended to the Northern Free State.

In later discussions with the board the NFSWB indicated that it was interested in abstracting water from upstream of the Zuikerboschrand river. Then information reached the board that the NFSWB intended establishing their own water purification works above the confluence of the Zuikerboschrand river and the Vaal Barrage. In June 1963 it was made known that the minister of

---


Chapter 7

water affairs had authorised the NFSWB to negotiate with the Rand Water Board for a supply of 45 Mℓ/d to the Sasolburg area.93

![Illus. 7.7. Sasolburg from the air in the 1960s. Source: Meintjes.](image)

It was estimated that the new supply of water would require 13 Mℓ/d in 1964, rising to 34 Mℓ/d by 1978.94 In his recommendations to the board the deputy chief engineer, R.J. Laburn, was of the opinion that instead of a smaller pipeline with a maximum diameter of 575 mm, plans should be made for providing water by means of a 725 mm pipeline. It was estimated the whole project would cost R760 000.95 The board was eager for the service to be provided to the Northern Free State Water Board. Within a year the project was completed.96 There was an understanding that should it be possible for the board to provide


the water, the NFSWB was prepared to transfer to the Rand Water Board its right to the abstraction of water from the Vaal river. One of the major changes to the scheme that followed by 1967 was that Laburn suggested that in future the water supply to Sasolburg should come from the Vaaldam-Zuikerbosch pipeline or from the Barrage reservoir at Zuikerbosch. The water was then to be pumped to Vereeniging where it would be purified before being sent to Vereeniging itself, Sasolburg, Iscor and Vanderbijlpark.

**Extending the supply to the Eastern Transvaal**

The first talks between officials of the Rand Water Board and the Union Corporation in connection with a supply of water to the Kinross area took place in 1955. The region was situated on the watershed of the Vaal and the Olifants rivers and extended from Devon in the west to Bethal in the east. The discovery of gold in the area made it necessary to find water. In the process of supplying water for the gold mining operations, it was envisaged that the board could also supply water to Devon, Eendrag, Leslie, Kinross, Trichardt and Bethal. In the initial plans it was decided to provide the water connection from Selcourt in the Springs area. At the time the plan was shelved because it was considered to be too costly to supply only 9 Mℓ/d to the region.

In September 1959 there was again a request for water. The indications were that substantial quantities of water would be

---


consumed on a daily basis. By June 1960 the plans had been put in place and it was estimated that the scheme would cost more than £1 million, some £980 000 of which was to be paid by the Union Corporation. Moreover there was a fixed agreement that an amount of 14 Mℓ/d would be consumed. The project enjoyed priority because even before the governor-general had given consent for the board to enlarge its limits of supply the necessary agreement between the board and the Union Corporation was put in place. The water supply from the Selcourt reservoir of the board at Springs gravitated to the Bloemendal booster station, some 12,8 km south-east of Springs on the Endicott-Nigel road. From there it was pumped to the Wildebeestfontein reservoir, and over a distance of 59 km to Kinross against a total head of 120 m.

At first it was assumed that Bethal would not be incorporated into the proposed extension of service, but by January 1961 the municipality had been brought into the final plans that were up for government approval. When the project neared completion it transpired that costs were considerably less than the R1 810 000 originally estimated. Savings to the value of R250 000 had been affected. It was consequently decided that the half-yearly contributions of R80 000 that consumers were expected to pay would be reduced to R76 000. In the subsequent agreement between the board and consumers it was agreed that the necessary monthly payment of R76 000 would be made to the board, even if the consumers did not use up the water to that value. This

---

arrangement had to be maintained for 20 years. Evander Township Ltd, which was wholly owned by Bracken Mines Ltd, as well as Leslie Gold Mines Ltd and Winkelhaak Mines Ltd all accepted the stipulation.\textsuperscript{107}

By June 1963 the future of the Eastern Transvaal mines started looking considerably better. It was announced that General Mining had started with operations to prepare its Brakfontein Navigation Steam Collieries (Pty.) Ltd. with the intention of mining on a large scale. In the foreseeable future they were to use about 1 M$\ell$/d. The new mining operation was between 6,4 and 9,6 km from the board’s existing limits of supply. There were also prospects for an increased water supply once the railways started bringing into operation their transportation system between the mine and the Witwatersrand.\textsuperscript{108}

In other parts of the Eastern Transvaal there was also a need for water. Already in 1948 the local authority of Delmas requested the board to provide it with water. The board did not accede to the request in view of the fact that it was beyond the limits of supply. In 1963 the board once again received a request from Delmas. At the time there was also a request from Sundra in the Eastern Transvaal for a reliable water supply. The local authorities were in need of a daily water supply of respectively 360 000 and 90 000 \(\ell\) of water. Over and above that the Brakfontein Navigation Steam Collieries operating locally was also in need of 900 000 \(\ell\) of water daily. In view of this the board decided that it would request the government to extend its limits of supply to accommodate these consumers.\textsuperscript{109}

In January 1967 permission was granted by the government for the extension of the limits of supply of the board in the Eastern Transvaal.\textsuperscript{110}


Chapter 7

Transvaal region to incorporate Sundra. Earlier, the government was hesitant to give its approval for the extension of the water supply because it was of the opinion that local water resources had to be used if it was available. By 1967 it was apparent that the arrangement to provide Sundra with water was a basic necessity.\textsuperscript{110}

**Water for the Western Transvaal**

The first steps towards a water supply for Rustenburg were taken in 1952 when the municipality of Rustenburg requested the board for a supply of water to bolster the existing supply to the town and the local platinum mining operations.\textsuperscript{111} The board was unable to respond positively because of the limited amount of water required and the high costs. It was also feared that with the existing allocation of water the Rand Water Board had from the Vaal dam, would be insufficient to cope with the increased demand.\textsuperscript{112} It was accepted that if Rustenburg were to be incorporated, major alterations would have to be made to the West Rand supply system. Twelve years later, in June 1964, the board was once again asked by the Rustenburg municipality to provide a service. The conditions, because of drought and the requirements of the Rustenburg Platinum Mine, made it essential for the region to have a strong and reliable supply of water. At the time engineers were sceptical of the ability of the local Bospoort dam to provide a reliable water supply. The boreholes of the mine were constantly drying up. The situation was so critical that local farming operations were also being hampered by a shortage of irrigation water.\textsuperscript{113}

\textsuperscript{110} RWA, Minutes 1966-7, p. 344: 817th th meeting of the Rand Water Board, Headquarters, Johannesburg 1967.03.31. Secretary’s report, no. 5413. C.Q. Pitt.


\textsuperscript{113} RWA, Minutes 1965-6, p. 761: 804e gewone vergadering van die Randwaterraad, hoofkwartierkantore, Johannesburg 1966.02.25. Hoofingenieursverslag, nr 4222. R.J. Laburn.

264
Following representations to the government, it was decided that water of the board could be provided to Rustenburg and the Rustenburg Platinum Mine under certain conditions. For a start, the municipality had to act as the sole distributor of the water. This was estimated to be about 9 Mℓ/d. In exchange for the water supply from the board, the mining company had to halt its extraction of water from the Kroondal-Marikana subsurface water supply area. The water supply had to conform in all respects with the quality stipulations of the ministry of health.114

In the advanced planning for the water supply to the Rustenburg the board’s engineers predicted that by 1975 the water supply to the mines in the Randfontein region was to drop because of the exhaustion of the local gold mines.115 Chief engineer Laburn informed the board that if the water supply to Rustenburg had to be introduced, provision would have to be made for a comprehensive water supply scheme. It was also pointed out that the municipality of Rustenburg would have to pay the capital investment costs of installing the pipeline. In addition it was necessary for the board to have its limits of supply-area enlarged.116 The limits of supply of the board were substantially increased by government notice in June 1966,117 and work on the new pipeline immediately got underway.118 It was estimated that the R478 140 project, would be finished by June 1967.119


118. RWA, Minutes 1966-7, p. 104: 808e gewone vergadering van die Randwaterraad, hoofkwartierkantore, Johannesburg 1966.06.24.

Once work started it became apparent that there was a better route for the pipeline to be laid to Rustenburg. Consequently the board’s limits of supply had to be adjusted – only slightly – to accommodate the new arrangement. In the original plan the pipeline was to cross the Magaliesberg through either Olifantsnek or Breedtsnek. After careful inspection it was found that it was preferred to route the pipeline over the mountain range at Damhoek Pass.\textsuperscript{120} In the initial plans for the water supply to Rustenburg, the Town Council of Rustenburg was to act as a reseller of water to the local platinum mines. By 1974 this arrangement was no longer viable and in agreements between the board, the council and the mining companies respectively, it was accepted that in future supplies of water would go directly to the mines.\textsuperscript{121}

**Water for the homeland areas**

In November 1961 the board approved of the extension of a water supply to the black area northwest of Pretoria where the government intended starting up border industrial activities. The board approved the measure in view of the fact that, had the development not been outside Pretoria, it would have formed part of the industrial development within Pretoria.\textsuperscript{122}

An interesting situation developed in the next few months. While the board as well as the department of water affairs were prepared to work within the paradigm of an enlarged supply area, the cabinet decided that water sources inside the black areas had to be developed instead.\textsuperscript{123} It transpired that the cancellation of the application was the result of a misunderstanding and in July 1962


\textsuperscript{121}. RW, Committee of the whole board, 1974.01.25, pp. 2727-9. Secretary’s report, no. 6316, and recommendations.


266
the board once again decided that the government would be asked for an extension of the limits of supply.  

Subsequently an arrangement was made that the board was to supply water for the industrial activities in the region. However, water for domestic consumption was to be taken from other sources. The futility of this arrangement, a highwater mark in the development of the apartheid policy, became apparent when in May 1964 the board was asked also to provide water to the newly developed Ga-Rankuwa township.  

The need for water in the areas surrounding Pretoria rose sharply because of the development of the Rosslyn industrial township. At the start of 1965, in the wake of urgent requests, it was decided to link the region to the board’s system with a R450,000 pipeline that was capable of supplying up to 14 Mℓ/ d.  

**Coping with the future demand for water**

In the mid 1960s R.J. Laburn predicted that the board was expected to supply 2250 Mℓ /d by 1980, 3150 Mℓ /d by 1990 and 4500 Mℓ /d by 2000. This was a substantial amount of water that, it was known, the Vaal dam was unable to supply. This realisation gave rise to the creative search for new alternatives for additional water. In January 1962 the board in committee discussed a report written by C.P. Robinson on the future water needs of the Witwatersrand. It was then decided to keep the matter confidential and take it up in discussion with the government. In particular, the board members

---


125. RWA, Minutes 1964-5, p. 76: 783rd meeting of the Rand Water Board, Headquarters, Johannesburg 1964.05.22. Secretary’s report No. 5042, N. McMurray.

126. RWA, Minutes 1964-5, pp. 295-6: 791e gewone vergadering van die Randwaterraad, hoofkwartierkantore, Johannesburg 1965.01.29. Hoofingenieursverslag, nr 4058.

felt it would be important to have the ministers of health, water affairs and economic affairs take note of how the board intended coping with its water demands in the future. Because of the parliament going into session, it was not possible for the talks to take place. The content of Robinson’s report was made available to the government and by April it was decided the board would make the plan public in its minutes.128

In the report,129 it was pointed out that the supply of water from the Vaal river and the Vaal dam was limited. Estimates by authorities suggested that the maximum amount of water to be extracted from the Vaal river between the Vaal dam and the confluence with the Orange river was 2925 Mℓ/d.130 Already then the abstraction from the river was in excess of 1125 Mℓ/d. It could be accommodated temporarily because consumption patterns fluctuated. But severe shortages were predicted for the hot drought conditions.131

Table 7.1 Daily consumption trends of water in the Vaal river early 1960s132

<table>
<thead>
<tr>
<th>Consumer</th>
<th>Megalitres per day (Mℓ/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rand Water Board (For own use)</td>
<td>1125</td>
</tr>
<tr>
<td>Rand Water Board (Authorised users)</td>
<td>167</td>
</tr>
<tr>
<td>Permit holders (Excluding board)</td>
<td>513</td>
</tr>
<tr>
<td>OFS Goldfields</td>
<td>135</td>
</tr>
<tr>
<td>Kimberley</td>
<td>45</td>
</tr>
<tr>
<td>Riparian owners</td>
<td>135</td>
</tr>
<tr>
<td>Vaalharts irrigation</td>
<td>900</td>
</tr>
<tr>
<td>Total</td>
<td>3000</td>
</tr>
</tbody>
</table>


It was pointed out that the easiest method of limiting the use of water was to place restrictions on consumption. This was considered to be far from a solution because in 1960 some 5.5 million people of South Africa depended on the water from the Vaal river for their daily existence. In economic terms it meant that one third of the population was being stifled in terms of development needs. Consequently water was considered to be a basic component to ensure development.

In an extensive overview of all the rivers that could potentially be used to supply water to the Witwatersrand region in the early 60s, C.P. Robinson concluded:

(N)o additional water can be obtained from the area to the north of the Vaal basin while to the east, although it might be possible to develop a supply, the amount available is likely to be too small to justify the heavy cost. The only rivers that appear to have a reasonable amount of surplus water available are the Tukhela, the Caledon and the Orange. All these rivers rise at or near Mount Aux Sources, the highest mountain south of the Limpopo (river). It would appear that the Caledon can provide only temporary relief and that ultimately the Board will have to obtain any additional water required from either the Tukhela or the Orange.

Also his successor favoured the Tukhela option. R.J. Laburn stressed it in a report to the board in 1966. He had by then already started working on extensive plans. The best storage sites for water for the board’s supply, he explained, would be at Bergville or Winterton. He also felt that the water from the Tukhela


Chapter 7

had to be pumped to Vereeniging where it would be purified. Estimates at the time suggested that it would cost 24 cents per 4500 ℓ (5.3 cents per 1000 ℓ) to purify the water.\textsuperscript{136}

The 1965 additional water supply scheme

In March 1965 the chief engineer, R.J. Laburn, submitted a report with proposals for the new additional water scheme for the board that, when it was scheduled to reach completion by 1971, was to cost more than R46 million.\textsuperscript{137} It was capable of increasing the capacity of the existing water supply by 518 Mℓ/d.\textsuperscript{138} In many respects this submission was already precipitated by interim measures that had been introduced since 1959 to cope with the growing need for water. They were dealt with in the form of ‘interim additional water schemes’.\textsuperscript{139} In the first phase of the project it was anticipated that it would be possible for the board to supply as much as 1373 Mℓ/d over a seven-day maximum demand period by 1968/9.\textsuperscript{140} The first phase was ostensibly intended to increase the current capacity of the purification and pumping plant and pumping mains from 1035 to 1372 Mℓ/d. By making use of this approach it was estimated that it would be possible to provide in the maximum 28-day demand of 1283 Mℓ/d.\textsuperscript{141} The second phase of the 1965-scheme was intended to provide sufficient water –

\textsuperscript{136} Ibid., 813th meeting of the Rand Water Board, Headquarters, Johannesburg 1966.11.25. Annexure to minutes of 813th meeting. Chief engineer’s report, no. 4208. R.J. Laburn, 1966.02.16. (The report was published in the minutes in Afrikaans under the title of “Toekomstige waterbenodigdheid”), p. 5.


estimated to be 1530 Mℓ/d – by the end of March 1971.\textsuperscript{142} The effect of price rises and inflation, as well as additional work on the project, was that the estimated expenditure on the phase rose from R8,45 million in 1965 to R15,9 million in 1968.\textsuperscript{143}

**Upgrading Vereeniging and Zwartkopjes**

The growing demand for water by the mid-1960s forced the board’s engineers to make the maximum use of its existing water processing and distribution plants. By 1965 the argument of a former chief engineer, that the Vereeniging pumping station had reached its capacity,\textsuperscript{144} was simply no longer tenable.

\textbf{Illus. 7.8. The Daleside-Zwartkopjes 2100 mm diameter pipeline under construction in 1962. Source: Rand Water}


144. See previous chapter.
In order to increase the capacity the filtration plant, originally installed in 1922-3, was replaced. In the 1965 scheme it was envisaged that, with the construction of additional purification and filtration plant, as well as pumping equipment, it would be possible to get a nominal maximum output of 788 Mℓ/d.\textsuperscript{145}

Because of enlarged pipelines between Vereeniging and Daleside in terms of the 1965 additional water supply scheme, it was anticipated that it would be possible for the Vereeniging station to supply 698 Mℓ/d.\textsuperscript{146} The manually operated intake valves and penstocks were to be converted into hydraulically operated units. A new water treatment plant with a nominal capacity of 135 Mℓ/d was to be constructed. A new filtration plant and sedimentation tanks were all part of the first phase of the scheme.\textsuperscript{147} In the case of Vereeniging’s sedimentation system the engineers started with innovative plans to test improved designs for the new fashionable and highly effective vertical flow sedimentation tanks. It was pointed out, at the time that the board in the 1920s made use of the vertical sedimentation system. Subsequently there was a switch to horizontal sedimentation. It proved to be more effective and cheaper. By the 1960s there were a number of developments in sedimentation technology and it was consequently recommended that the option of vertical sedimentation be used. The board accepted the proposal.\textsuperscript{148}


272
By the end of the 1960s the steam turbine pumping system at Zwartkopjes was capable of pumping more than 75 Mt of water per day against a head of 383 m. Source: Rand Water

Also Zwartkopjes was due for an overhaul. By 1965 the nominal capacity of the Zwartkopjes pumping station stood at 968 Mt/d. Fifteen steam turbine and seven electric motor-driven pumps were used to distribute the water. In view of the persistent demand for more water, the plant had however supplied at an overload rate of 1058 Mt/d for a considerable period of time. In the course of the development of the interim water schemes the capacity of Zwartkopjes was substantially enhanced by the completion of the Daleside-Zwartkopjes pipeline. Ultimately, when all things were in place, it was anticipated that the plant would be able to pump 1057 Mt/d. Although the Palmiet pumping station was capable of relieving much of the pressure on Zwartkopjes, it was intended that the spread of pumping capacity was to be introduced gradually, in

order to save on costs in the interim.\textsuperscript{153} The decision to relieve Zwartkopjes was to a considerable extent, based on security considerations.\textsuperscript{154}

Many of the pumps used at Zwartkopjes had been in use for more than 30 years. Others were installed at the time of World War II and proved to be of an inferior quality. Consequently a number of pumps were replaced in terms of the 1965 scheme.\textsuperscript{155} Another project at Zwartkopjes was to begin with the replacement of the delivery pipeline system. In the more than 50 years that the plant had been in operation the work had been done in a piecemeal fashion. It was considered that it was necessary in the new scheme of supply to rationalise the system to the extent that it was capable of operating more efficiently.\textsuperscript{156}

**Diversifying the distribution system: Palmiet pumping station**

The first reference in the minutes of the board to Palmiet station, situated about six km to the north-east of Zwartkopjes pumping station,\textsuperscript{157} was made in January 1964 when chief engineer A.W. Linekar gave an exposition on why it was necessary for the board to start upgrading its existing system of water supply. It was also pointed out that the proposed pumping station – essentially a booster station – would provide water to the Meyer’s Hill and Forest Hill reservoirs.\textsuperscript{158} Palmiet was part of a more comprehensive scheme that was proposed at the time. It was directly linked to the new developments at the Zuikerbosch pumping station, costing

\begin{itemize}
  \item \textsuperscript{153} Ibid., p. 357: 793rd meeting of the Rand Water Board, Headquarters, Johannesburg 1965.03.26. Chief engineer’s report, no. 4080, R.J. Laburn.
  \item \textsuperscript{154} Disclosure Dr R.J. Laburn, Blairgowrie, 2003.02.08.
  \item \textsuperscript{156} RWA, Minutes 1964-5, p. 363: 793rd meeting of the Rand Water Board, Headquarters, Johannesburg 1965.03.26. Chief engineer’s report, no. 4080, R.J. Laburn.
  \item \textsuperscript{157} RWA, 75th annual report, balance sheet and accounts of the Rand Water Board. Financial year to 31st March 1980, p. 9.
\end{itemize}

274
R5,5 million, which were intended to increase the supply of water to the board’s consumers. The Zuikerbosch-Palmiet pipeline covering a distance of about 40 km cost R6,25 million, while the Palmiet pumping station itself cost R1,5 million.\(^{159}\) It was estimated that under the new arrangement it would be possible to increase the board’s supply of water from 1035 to 1305 M\(\ell\)/d.\(^{160}\) In the first phase of the 1965 additional water supply scheme, Palmiet was to pump 270 M\(\ell\)/d. Ultimately the plant had to pump 450 M\(\ell\)/d.\(^{161}\) In the intermediate phase of the scheme, the requirement was 360 M\(\ell\)/d.\(^{162}\)

Illus. 7.10. Palmiet pumping station’s prestressed concrete reservoir under construction in March 1965. Source: Rand Water

Four pumps with a combined capability of moving 270 M\(\ell\)/d were to be installed at the new pumping station in the first phase of the


\(^{160}\) RWA, Fifty-ninth annual report of the Rand Water Board to the State President. Financial year ended 31st March, 1964, p. 54


1965 scheme. A fifth pump was to be installed to increase the capacity to 360 Mℓ/d. Ultimately the engine room was designed to house seven pumps.\(^{163}\) It was to be supplied with Escom power.\(^{164}\) The people working at Palmiet pumping station were to reside at the Zwartkopjes pumping station. Four additional houses were built to accommodate them. They were to be transported to the pumping station on a daily basis.\(^{165}\)

In the same era the first plans were mooted for the establishment of a mild steel pipe reconditioning plant at Zwartkopjes. The first recommendations were made in 1965 when it was pointed out that the Zwartkopjes-Leeuwpooort pipeline covering a distance of some 10 km with a diameter of 600 mm had to be lifted for repair and reconditioning. The quotations the board received were so high that it seemed viable to start with the construction of a mild steel pipe reconditioning plant at Zwartkopjes.\(^{166}\) Ultimately it led to the establishment of the pipe manufacturing plant. By 1968 the 96 workers employed in the division had produced 1600 m of pipe and reconditioned a further 2500 m.\(^{167}\)

**Drought: the first major water restrictions**

Although the 1960s was a period of unlimited economic growth, it was also a decade that stands out historically for the severe drought conditions experienced by the country as a whole. For the Rand Water Board the period was marred by the fact that the first water restrictions since the 1920s had to be introduced. Between 1966 and 1974 the water utility and its wholesale consumers had to contend

---

166. RWA 550/A/B. Confidential report chief engineer, no. 4140. L.H. James, 1965.70.23.
with rapidly diminishing water supplies under conditions of unlimited industrial development.  

The board had firsthand experience of the drought conditions that were developing when in the summer of 1960-1 the manager of the board’s farm at Zwartkopjes reported serious crop losses. The season’s rainfall was 200 mm below the average. Reports coming in from all parts of the Witwatersrand indicated that a serious drought prevailed. In September 1961 the rainfall in Johannesburg’s Joubert Park was less than 25 mm – the lowest in more than 70 years. To make matters worse, as the summer temperatures rose, the consumption of the board’s water supplies also increased. The maximum water consumption rose from 972 Mt/d in 1960, to 1010 Mt/d in 1961.

At first it was possible for the board to cope with the demand over the short term, but as the drought dragged on the board’s plants were forced to work under conditions of overload. The chief engineer observed in October 1961:

> A quarter of an inch of rain spread over the Reef would probably be sufficient to relieve the situation. The position is nevertheless critical; as under present conditions there is very little standby plant available and no spare pipeline capacity.

After a period of respite there was once again concern over the water supply. At the August 1964 meeting of the board, the chairman, A.J. Bruwer, explained that the additional water scheme the engineers were working on required a considerably larger supply of water. Unless the government provided more rights, the amount of water at its disposal would be too small to cover running

---

168. RWA, Africana collection: J.L. Gardiner, “Some historical aspects of the water supply to the PWVS complex”, (undated manuscript), p. 7; RWA, 31/S. See for example a number of press releases issued by the board between 1966-70.


costs. This implied that the price of water had to be increased.\textsuperscript{172} Bruwer stated that the board provided water to the economic heartland of the country. It was essential to provide additional water to the region. He then suggested to the board that a letter be sent to the private secretary to the minister of health in which an interview was requested. A deputation of the board would then hold talks with the government. The board was unanimous in its support for the plan.\textsuperscript{173}

In the following month, September, the chief engineer, A.W. Linekar, outlined the crisis in a report to the board. It was essential, he explained, that the government be requested to make available to the board more water in the immediate future. The board had to comply in terms of the commitment to its consumers. There was a supply of 1710 M\textsuperscript{ℓ}/d in the Vaal river. Of this the board was entitled to use 1125 M\textsuperscript{ℓ}/d. Linekar argued that a greater amount of water had to be allocated to the board. One of the possibilities that deserved contemplation was enlargement of the Vaal dam.\textsuperscript{174} The indications were that the board would reach the maximum capacity of its water extraction by 1968.\textsuperscript{175}

There were numerous alternatives under consideration at the time. One was that the demand for water be relieved by the development of the Orange river development project. A substantial amount of water could be supplied to the confluence of the Vaal and the Orange river.\textsuperscript{176} Another alternative was to pump water from the Verwoerd dam (feeding on the Orange) to Vereeniging.\textsuperscript{177} Finally,

\textsuperscript{172} RWA, Minutes 1964-5, p. 176: 786e gewone vergadering van die Randwaterraad, hoofkwartierkantore, Johannesburg 1964.08.28.
\textsuperscript{173} Ibid., p. 176: 786e gewone vergadering van die Randwaterraad, hoofkwartierkantore, Johannesburg 1964.08.28.
\textsuperscript{175} Ibid., p. 186: 787th meeting of the Rand Water Board, Headquarters, Johannesburg 1964.09.25. Chief engineer’s report no. 4018.
\textsuperscript{177} Ibid., p. 185: 787th meeting of the Rand Water Board, Headquarters, Johannesburg 1964.09.25. Chief engineer’s report no. 4018.
one of the standard plans was for a limitation on the amount of water provided to the irrigation farmers further down the Vaal river.\textsuperscript{178} It was with these arguments that the management of the board prepared to negotiate with the government on a larger supply of water from the Vaal dam.\textsuperscript{179}

Meanwhile the drought conditions were becoming critical – especially in the Pretoria area. In a letter to the Transvaal provincial works department the Laerskool Uniefees, close to the Roodewal power station, reported that they were unable to provide water to the children. Several boreholes had been sunk at the school, but they rapidly ran dry. Once this report reached the Rand Water Board it was decided that water would be provided to the school as a matter of priority.\textsuperscript{180} The situation was worsening in all parts of the region served by the board.

In 1965 the board’s Zwartkopjes farm management reported that the maize crop was a disaster and consequently steps were taken to turn it into silage for the livestock. Markets were being flooded with cattle because of the drought.\textsuperscript{181} Conditions became worse and at one point the content of the Vaal dam dropped to 29 per cent.\textsuperscript{182}

It was evident at the time that the planning, done way back in 1960, was well off the mark. At the time it was predicted that the demand for water in the East Rand supply region would decline with the mines closing down. This did not happen. Instead the demand for


\textsuperscript{180} RWA, Minutes 1964-5, pp. 300-1: 791e gewone vergadering van die Randwaterraad, hoofkwartierkantore, Johannesburg 1965.01.29. Hoofingenieur se verslag nr 4069, A.W. Linekar.


One of the growth areas identified by the board’s engineer was the Meyer’s Hill-Germiston-Pretoria area where a substantial increase was being predicted. It was against this background that the 1965 additional water supply scheme was planned. It was aimed at coping with a maximum demand that could circumvent potential shortfalls in supply over the long term.

The demand for water – despite a public awareness of the situation – did not decrease in 1965. In the course of one day the contents of the board’s reservoirs dropped by as much as 108 M$l$. At that point the total contents of the board’s reservoirs were 1481 M$l$. In October 1965 consumption peaked at 1386 M$l$/d. This was more than 113 M$l$/d in excess of earlier estimates. One major boon was that the department of water affairs had acceded to the request for the abstraction of 450 M$l$/d more from the Vaal river. That outcome lay in the future.

In an effort to cope with the crisis over the short term, restrictions were announced at the start of 1966. The government had as objective to keep the industrial sector of the country unaffected for as long as possible. Consequently primarily domestic consumption was targeted when curbs were introduced. The objective was to

---

189. RWA, 31/S. Notice to all consumers of Rand Water Board water, Secretary to the board, Johannesburg, 1966.01.13.
190. Ibid.
secure a saving in consumption of about 25 per cent.\textsuperscript{191} The department of water affairs, in conjunction with the board, monitored the monthly consumption patterns to determine how water could be saved.\textsuperscript{192} The board experienced even greater pressure. By mid-1966 consumption in the PWV-area had been reduced by 30 per cent.\textsuperscript{193} In addition the curbs affected the irrigation farmers further downstream in the Vaal river, at Vaalharts.\textsuperscript{194} Restrictions still did not apply to the industries.\textsuperscript{195} In fact, supply to industry was developed even further. For example, at the request of the government the board had to supply water to Rosslyn industrial township, the homeland territory of Ga-Rankuwa, as well as the platinum mines at Rustenburg.\textsuperscript{196} In some circles the measures were seen as political on the side of the government in an effort to boost the development of the homelands at the cost of the existing industrial development that took place in the urban centres of the Witwatersrand.\textsuperscript{197}

When the restrictions were lifted at the start of 1967 there were questions about the success factor.\textsuperscript{198} In particular it was argued that the Rand Water Board, which paid for its own water supply and did not rely on the state for support, had to cut down its water

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{191} R.J. Laburn, The Rand Water Board 75 1903-1978: a treatise on the Rand Water Board with specific reference to its responsibilities achievements and policies during 75 years of operation, p. 26.
\item \textsuperscript{192} RWA, 31/S, W.A. Murray, Pretoria – Secretary to the Rand Water Board, Johannesburg, 1966.03.21.
\item \textsuperscript{193} ANON., “Nywerhede nie geraak: waterbeperking nou 30 p.s.” in Die Transvaler, 1966.07.08; ANON., “Further water cuts: plea to end all garden watering” in Rand Daily Mail, 1966.07.08.
\item \textsuperscript{194} ANON., “Farmers’ Vaal water will be cut too” in Rand Daily Mail, 1966.07.08.
\item \textsuperscript{195} ANON., “Nywerhede nie geraak: waterbeperking nou 30 p.s.” in Die Transvaler, 1966.07.08.
\item \textsuperscript{196} R.J. Laburn, The Rand Water Board 75 1903-1978: a treatise on the Rand Water Board with specific reference to its responsibilities achievements and policies during 75 years of operation, p. 26.
\item \textsuperscript{197} T. Stirling, “What water means to South Africa” in Rand Daily Mail, 1967.02.10.
\end{enumerate}
\end{footnotesize}
consumption from 1350 to 810 Mℓ/d. It was a loss of income amounting to an estimated R150 000 per day.\textsuperscript{199} This had a ripple effect on the revenue of local authorities on the Witwatersrand.\textsuperscript{200} Arguments against water restrictions did not stop there.

One positive consequence of the situation was that consumers were spontaneously forced to reduce the amount of water they were using. When in 1968 the board’s wholesale consumers (the municipalities) were asked to make predictions on the anticipated demand for water in the future the effect of water restrictions was apparent. Literally all the local authorities predicted that they would be consuming less water.\textsuperscript{201} The major problem for the board’s engineers was, however, to secure that the supply of water was consistent – despite a shortage from the Vaal dam, in the critical months between August and October before the summer rains came.\textsuperscript{202} When the expected rains did not come at the end of 1968 there was once again mounting anger.

At the start of 1969, shortly before new curbs were announced,\textsuperscript{203} it was argued in the press that restrictions were particularly hard on the industrial development in the Vaal Triangle region.\textsuperscript{204} This argument was increasingly used, also by local authorities, to pressure the government into stepping up plans for a more consistent supply of water.\textsuperscript{205} For the Rand Water Board it was important to find a solution. The effect of water restrictions on the board’s revenue was apparent when, by the end of the 1969-70, the


\textsuperscript{200} Ibid.


\textsuperscript{203} RWA, 31/S Memorandum: Chief engineer, Rand Water Board, Johannesburg – Chairman of the board, 1969.02.28; C. Kriek, Kroonstad – Chief engineer, Rand Water Board, Johannesburg, 1969.02.28.

\textsuperscript{204} Anon., Water crisis: Trouble ahead?” in Financial Mail, 1969.01.10, p. 77.

\textsuperscript{205} RWA, 31/S. Report to the management committee of the Johannesburg city council, by the city engineer’s department, 1970.09.14, p. 9.
daily consumption of the board’s water had dropped on average from 1044 to 999 Mℓ.\(^{206}\) One of the favourite arguments at the time was that the water supply to irrigation farmers had to be reduced in favour of a more consistent supply to the industrialised urban areas of the Witwatersrand.\(^{207}\) Another alternative considered was to start with the active recycling of water, especially effluent in the process of cooling power stations.\(^{208}\) The government however chose to start with pre-emptive plans by introducing early summer restrictions in September 1970 with a view to securing sufficient supplies for the winter of 1971, if the drought did not end.\(^{209}\) One consequence of the measure was that officials of the Rand Water Board had to contend with irate organised consumer groups who were determined to secure for themselves a better dispensation under circumstances of limited water supply.\(^{210}\)

The responsibility to save water was spread over a wide spectrum of consumers at the start of the 1970s. Whilst domestic consumers were prevented from watering their gardens with sprinklers, there was a tendency to be more lenient in respect of the watering of public areas such as sports grounds and municipal parks.\(^{211}\) There were indications that consumers had become hardened in their attitude towards restrictions. They had become cynical of the measures applied by local authorities and the board to save water.\(^{212}\)


\(^{208}\) Ibid., p. 12.


\(^{211}\) RWA, 31/S A.J. de Witt, Johannesburg – Notice to all consumers, Johannesburg 1970.08.27.

According to a report by the chief engineer, R.J. Laburn, it was possible for the board to realise savings of up to 20 per cent under conditions of drought.\textsuperscript{213} His reference framework was the period 1965-6 when the Witwatersrand, like many other parts of the country, experienced severe drought conditions. What is important to bear in mind is that the board, in the 1960s, operated with the objective of providing a generous water system in which consumers had unlimited access to water. This was a transitory stage. Later in the century consumers were made aware of the scarcity of the ubiquitous substance.

In conclusion, the 1960s, despite the setbacks on the political front, proved to be years of progress for South Africa. It was reflected in the development of the Rand Water Board. In the planning for the future funds were made available for enlarging the head office in Johannesburg.\textsuperscript{214} The board even invested in real estate to add on to its existing building complex.\textsuperscript{215} The situation of staff accommodation had been critical since the late 1950s when head office staff had to be accommodated in the recreational area of the complex.\textsuperscript{216} The board increasingly became part of the government’s plans for boosting the South African economy by means of industrial development. This made the exploitation of trans-national frontier water essential. Internally however the Rand Water Board was able to excel in many areas of its operations. The expertise of its technical staff was used to provide water from the


\textsuperscript{216} RWA, Minutes 1958-9, p. 67: 712th meeting of the Rand Water Board, Headquarters, Johannesburg 1958.06.27.
department of water affairs to numerous areas previously considered well beyond the limits of its capabilities.
Chapter 8

Increasing sophistication in the activities 1968-1974

When he became chairman of the Rand Water Board at the end of October 1969, H.C. Stegmann assumed responsibility for an organisation that had been placed on a sound course of economic progress by his predecessor, Dr A.J. Bruwer. Stegmann was familiar with the operations of the organisation. He had been appointed to the board five years before as representative of the department of water affairs. He had a considerable record of accomplishment as official at the department. His background had been that of an engineer with the department since graduating from the University of Cape Town in 1937. After retiring as managing engineer, he devoted all his attention to the board’s operations. It was a good appointment at the time. He was familiar with the planning both within the department of water affairs and at the Rand Water Board. Along with the board’s chief engineer, R.J. Laburn, one of the leading engineers in the field of hydrological engineering in South Africa at the time, it was possible to contribute substantially to the development of the Rand Water Board in a period of growth.

At the end of the 1960s the board’s water supply appeared to be in a good position. A water supply of 1174 Mℓ/d was available over a seven-day period. Previously, in terms of the 1959 additional water supply scheme, as well as the subsequent 1965 scheme, the amounts available were respectively 979 Mℓ/d (over a 28-day

Increasing sophistication 1968-1974

period) and 1618 Mℓ/d (over a seven-day period). By the early 1970s there was once again a shortfall in the supply of water and additional water supplies had to be explored. Internally there was talk of looking across the borders of the country. However, the chief engineer was hesitant to make any definitive proposals to the board on the matter. The economics of the day dictated that the sources closest to the centres of demand be exploited first. Secondly it was suggested, that the political situation did not justify transnational frontier water before the available local resources had been completely exhausted.

Institutional identity

The late 1960s was a time for the Rand Water Board when the first steps were taken to promote a formal institutional identity. The management committee of the board commissioned two heraldic artists – S.W. Pienaar of Potchefstroom and Alan Woodrow of Durban – to design plans. They were provided with details of the board’s activities, the nature of the organisation, its history, creation and constitution and in November 1969 the board was asked to decide among six designs. The management committee was in favour of the work of Woodrow. However, it was felt that one of the elements in the design, a female nude, “La Source”, had to be fittingly draped. Ultimately the board approved the revised coat of arms. It also gave its approval for submissions in respect of the board’s seal and house flag. The coat of arms was subsequently registered in terms of the Heraldry Act, no 18 of 1962 in Government Notice 1507 of September 1970. In December 1971 the
coat of arms was used for the first time on documentation circulated at board meetings.\textsuperscript{8}

ILLUS. 8.1. The coat of arms of the Rand Water Board was officially taken into use in September 1970. Source: Rand Water

The board’s seal was officially taken into use on 1 July 1971. The original seal had been in use from 13 January 1905.\(^9\) In the 1980s the South African Mint manufactured a new copy of the seal.\(^10\)

Apart from its formal institutional identity there was also by the early 1970s an interest in the historical roots of the Rand Water Board. In 1973 the board approved a proposal by the National Monuments Council that the pump house at Zuurbekom be declared a national monument.\(^11\) Nothing came of it at the time, but in May 1975 the board decided, because of the approaching 75\(^{th}\) anniversary of the utility, that the national monuments council would be requested to declare the Zuurbekom pump house a national monument.\(^12\) An official unveiling ceremony of the bronze plaque of the monuments council took place in December 1976.\(^13\)

Within the organisation, as was fashionable overseas at the time, environmental awareness in a diversity of activities received much attention. The Rand Water Board had over a period of many years been involved, indirectly by means of its employees, in the management of numerous conservation organisations. In November 1972 the board agreed to rent, at a nominal rate, a portion of its farm Rietvlei 101 IR in the district of Johannesburg to the Wild Life Society of South Africa. The society was interested in developing the property as a nature reserve.\(^14\) The agreement was concluded at the end of 1973.\(^15\) For the board this was a valuable investment in the preservation of an interesting and scenic part of

---

the Highveld. It was, at the time, threatened by potential urban sprawl in the wake of rapid economic development.

**Tukhela water supply**\(^\text{16}\)

The Tukhela-Vaal water scheme was conceived in the 1950s as a means of augmenting the Vaal river to supply the ever-increasing demand for potable water.\(^\text{17}\) In January 1969 the board chief engineer, R.J. Laburn, estimated it would cost 2,2 cents per kℓ to pump water from the Tukhela river to the board’s purification works.\(^\text{18}\) He had spent some time on the potential of the project and made numerous recommendations to management. Laburn had also participated in the planning by the department of water affairs.\(^\text{19}\)

\[\text{Illus. 8.2. The Tukhela-Vaal pipeline under construction. Engineers of the Rand Water Board helped the government engineers with the construction of the pipeline and pumping plant. Source: Rand Water}\]

\(^{16}\) The Tukhela was previously the Tugela.


The Tukhela scheme was at the time of its development, considered one of the most imaginative initiatives to secure a reliable and substantive supply of water for the Witwatersrand region.\textsuperscript{20} It was in fact one of a few alternatives left to planners to secure the continued growth of the region.

The first scheme used for transfer to the Vaal river system, was the Tukhela-Vaal Scheme, which started with operations in 1974 when water was pumped from the Tukhela river to the Sterkfontein dam. The board acted as consultants to the department of water affairs. It was responsible for the design and construction of all the pumping, pipeline and ancillary plant for the scheme.\textsuperscript{21} The scheme was designed to supply 330 to 440 Mℓ/d from the Tukhela river to the Sterkfontein dam.\textsuperscript{22} The dam had an initial storage capacity of 1 196 752 Mℓ, which was increased in the second phase to a capacity of 2 656 000 Mℓ.\textsuperscript{23} A number of dams, pipelines and canals were constructed subsequent to the Tukhela-Vaal system to provide support in the process of pumping water across the Drakensberg into the Sterkfontein dam against a head of up to 500 metres.\textsuperscript{24} Originally water was pumped from the Jagersrust pumping station to the Sterkfontein dam. Later Eskom’s 1000-megawatt Drakensberg pumped storage project formed an important component of the transfer scheme.\textsuperscript{25}

\begin{footnotes}
\item[22] Estimated daily quantity rates suggested by J.L. Gardiner, panel discussion Rietvlei, 2003.02.07.
\end{footnotes}
Illus. 8.3. Complex pipe laying techniques were employed in the construction of the Tukhela-Vaal pipeline. Source: Rand Water

The minister of water affairs, S.P. Botha, officially opened it on 8 November 1974. By 1975 experts pointed out that the Tukhela ensured that water restrictions could be averted in the Witwatersrand region for the foreseeable future. There were perhaps other forecasters, especially amongst the engineers at the Rand Water Board, who were not completely in agreement. They felt that other additional schemes had to be developed in due course. The scheme was designed to convey 330 Mt/d from the upper reaches of the Tukhela river in Natal to the Sterkfontein dam

28. Personal disclosure Mr. V.H. Bath, Westcliff, 2003.03.07.
in the Free State. Ultimately the water of this dam, situated in the Nuwejaarspruit, flowed into the Vaal dam.\textsuperscript{29}

**Regional growth in water demand**

*North of Johannesburg:* By 1968 the region to the north of Johannesburg was classified for planning purposes as the Germiston-Pretoria area. In many respects it made basic sense in that the water supply for the region, comprising the area northeast of Johannesburg, Edenvale, Kempton Park, Modderfontein, Halfway House and Verwoerdburg, was in any case to come from the eastern supply mains. It was evident that the board had made substantial plans to supply considerably more water to the region than had previously been anticipated.\textsuperscript{30}

By 1973 the northern region of the board’s supply was described for planning purposes as the area to the north of the Klipfontein reservoir.\textsuperscript{31} There was a phenomenal growth in the region at the time. It comprised Verwoerdburg (Centurion), Pretoria and the industrial as well as black townships northwest of Pretoria. It was estimated that the demand for water would increase from 235 Mℓ/d in 1973 to 410 Mℓ/d in 1979-80.\textsuperscript{32} In an effort to contend with the increase in demand a more direct supply of water from the Klipfontein reservoir to Esselen Park was planned. This was to be enhanced by the Zuikerbosch-Benoni-Pretoria supply line. One of the major features of the latter line was the construction of a 50 Mℓ reservoir at Airfield in Benoni.\textsuperscript{33}

\textsuperscript{29} RWA, 75th annual report, balance sheet and accounts of the Rand Water Board. Financial year to 31st March 1980, p. 6.


\textsuperscript{32} Ibid., p. 173: 894e gewone vergadering, hoofkwartier, Johannesburg, 1973.08.31. Hoofingenieursverslag, nr 4992, R.J. Laburn.

\textsuperscript{33} Ibid., pp. 173-4: 894e gewone vergadering, hoofkwartier, Johannesburg, 1973.08.31. Hoofingenieursverslag, nr 4992, R.J. Laburn.
Randburg and Sandton storage facilities: Randburg and Sandton, to the north of Johannesburg had their origins in the peri-urban health board system of the Transvaal board for the development of peri-urban areas. One consequence was that before these local authorities were created no provision had been made in advance for water storage facilities.\textsuperscript{34} In 1971, after these municipalities had come into existence, they were provided with water directly by the board. It was then determined that Sandton would draw its water from the Waterval reservoir, to the west of the town. It was also accepted that from this points of supply water would be provided to Randburg. At the time plans were also made to provide Sandton with water from the Palmiet-Klipfontein pipeline. It was agreed that once this line had been established it would replace the supply the town received from Waterval. The Waterval supply was then to be redirected to Randburg. The pipeline between Palmiet and Klipfontein was expected to come into operation in November 1975.\textsuperscript{35}

The Central and West Rand: One of the major growth areas in the board’s distribution system remained the central and West Rand region. It was anticipated in 1968 that the water supply to this region would increase from 95 to 171 M\textsuperscript{3}ℓ/d by 1975. One of the major lines that had to be upgraded was the Butcher’s Hill-Baragwanath supply line. It formed part of the supply to the rapidly developing black townships. This area’s water distribution system also had to provide the area to the north of Johannesburg with water.\textsuperscript{36} Closely related to this area was the water supply to the Far West Rand and Randfontein. It was expected that one of the two pipelines serving this particular area, the Meredale-Diepkloof region, would have to increase its supply of water from 158 M\textsuperscript{3}ℓ/d in

\textsuperscript{35} RWA, Committee of the whole board, meeting 1975.05.30, p. 3015.
Increasing sophistication 1968-1974

1968 to 292 Mℓ/d in 1974.\(^{37}\) The other pipeline in the region, the Witpoortjie-Randfontein-Rustenburg route, which in itself was responsible for supplying the platinum mining operations in the Western Transvaal and the town of Rustenburg with water, was ostensibly also intended to supply water to Soweto.\(^{38}\) There was thus a substantial development situation in the West Rand region, which the board had to address. In many respects it was one of the major challenges to the existing technology and engineering skills at the disposal of the board.

By 1973 the chief engineer recommended to the board that R2,25 million be expended on the pipeline between Maraisburg and Krugersdorp, as well as a booster station to increase pressure on the pipeline between Roodepoort and Krugersdorp. Closely linked to the project, was the low-pressure water supply serving Soweto, Randfontein and the southern and western parts of Krugersdorp. It formed part of the supply line to Rustenburg where mining operations were on the increase. In the near future, the board was informed, there would be a substantive increase in demand.\(^{39}\)

Southwestern areas: In the southwestern areas of the Rand the board had to contend with an anticipated growth in demand from the gold mines. There were indications that since 1969 the natural water supplies of these mines were beginning to dwindle.\(^{40}\) It had also become essential for the board constantly to keep an eye on the possibility of sinkholes on the Far West Rand, where at Blijvooruitzicht the pipelines had been fitted with lead sockets to minimise leakages in the case of geological shifts. As a whole the southwest region required the highest expenditure. An amount of R6,97 million was necessary for the construction of four pipelines, a

---

40. Ibid., p. 177: 894e gewone vergadering, hoofkwartier, Johannesburg, 1973.08.31. Hoofingenieursverslag, nr 4992, R.J. Laburn.
booster station and an additional reservoir at Libanon to serve the Carletonville-Fochville mining region.\textsuperscript{41}

The East Rand: By 1973 there was once again, after a period of relatively slow growth, a substantial demand for more water in the region to the east of Boksburg. It was anticipated that consumption would increase from 160 Mℓ/d in 1973 to 270 Mℓ/d by 1979-80.\textsuperscript{42} An amount of R1,5 million was budgeted for the construction of two new pipelines in the region that were to serve the area to the north of Springs and south of Nigel.\textsuperscript{43} By 1975 the shortfall in the water supply had the effect that residents in a town like Brakpan went without water for long spells in the peak days of October. Angry local councillors lashed out at the board for not delivering water, only to be informed that plans were on the cards for services to be rendered by 1976.\textsuperscript{44}

Townships to the north and west of Pretoria: In April 1968 the limits of supply of the board were further expanded in order to accommodate the new black township of Mabopane, along with Ga-Rankuwa, which had earlier been linked to the board’s water supply.\textsuperscript{45} By 1971 a new system was developed in conjunction with the department of Bantu administration and development. The consolidated scheme which comprised a water supply to Rosslyn, Ga-Rankuwa, Hebron and Mabopane cost R4,85 million.\textsuperscript{46} By 1973 an additional R1,4 million was set aside to replace the existing

\textsuperscript{41} Ibid., p. 176: 894e gewone vergadering, hoofkwartier, Johannesburg, 1973.08.31. Hoofingenieursverslag, nr 4992, R.J. Laburn.
\textsuperscript{42} Ibid., p. 174: 894e gewone vergadering, hoofkwartier, Johannesburg, 1973.08.31. Hoofingenieursverslag, nr 4992, R.J. Laburn.
\textsuperscript{45} RWA, Minutes 1968-9, p. 29: 830e gewone vergadering van die Randwaterraad, hoofkwartierkantore, Johannesburg 1968.04.26.
\textsuperscript{46} RWA, Minutes 1971-2, p. 119: 870e gewone vergadering, hoofkwartier, Johannesburg, 1971.08.27. Hoofingenieursverslag, nr 4769, R.J. Laburn.
Increasing sophistication 1968-1974

pipeline between Gomsand and Mabopane with a 900 mm in order to improve the supply of water.\textsuperscript{47} In 1974 the government was requested to grant permission for the expansion of the limits of supply to different parts of the districts Brits and Pretoria to the townships of Kosmos, Schoemansville and Meerhof as well as the “Melodie” (sic) agricultural holdings.\textsuperscript{48} In 1979 the board approved of the construction of a 100 M\textsuperscript{ℓ} reservoir at Hartebeesthoek to the value of R3,5 million.\textsuperscript{49}

**Introduction of the 1970 additional water supply scheme**

The completion of the Bloemhof dam and the first stage of the Tukhela-Vaal that came into operation formed the nucleus of the scheme that was approved by the board in June 1970.\textsuperscript{50} Already in January 1970 the board gave its approval for an interim scheme for urgent extensions to the distribution system of the board. The interim scheme was scheduled to form part of a more comprehensive additional water scheme to be announced later in the year.\textsuperscript{51}

The estimated value of the scheme was to be R67,2 million. It made provision for increasing the daily water supply of the board from

\begin{itemize}
\item \textsuperscript{47} RWA, Minutes 1973-4, p. 168: 894e gewone vergadering, hoofkwartier, Johannesburg, 1973.08.31. Hoofingenieursverslag, nr 4992, R.J. Laburn.
\item \textsuperscript{49} RWA, Minutes 1979-80, pp. 447-8. 971st ordinary meeting of the board, headquarters, Johannesburg, 1980.01.25. Chief engineer’s report no. 6131. L.H. James and approval.
\end{itemize}

297
1200 to 3000 Mℓ/d by the year 1982.\textsuperscript{52} One important facet of the 1970 project was to increase the purification and supply of the Zuikerbosch plant by 1200 Mℓ/d. It was envisaged that the water would be supplied in units of 600 Mℓ/d to two booster stations, Palmiet and Eikenhof.\textsuperscript{53} Another aspect of the project was the construction of additional pumping and distribution pipelines. Nine additional reservoirs with a total storage capacity of 1350 Mℓ/d were envisaged.\textsuperscript{54}

The board’s engineering division assisted the state in the project by undertaking the detailed design and supervision of the construction of the pumping installations and pipelines associated with the scheme.\textsuperscript{55} In March 1973 the board gave permission for its personnel to assist in the urgent reinforced construction work at Jagersrust pumping station at an estimated cost of R150 000 to the department of water affairs. One implication was that the construction workers of the board were then to leave the site of the Sasolburg reservoir. It also affected other construction work of the board on the Randfontein-Rustenburg pipeline. Consequently the work that could not stand over was given out on contract to a private construction company.\textsuperscript{56} All the raw water to be used in the scheme was to be pumped from the Vaal dam. The second phase of this project was launched in 1975.\textsuperscript{57} The government water scheme was designed to augment the water resources of the Vaal river.\textsuperscript{58}

\textsuperscript{52} R.J. Laburn, The Rand Water Board 75 1903-1978: a treatise on the Rand Water Board with specific reference to its responsibilities achievements and policies during 75 years of operation, p. 27.

\textsuperscript{53} Ibid., p. 27.

\textsuperscript{54} Ibid., p. 27.


\textsuperscript{57} See next chapter.

Pollution

In the 1970s environmental consciousness was, internationally a popular rallying issue. There also appeared to be substantial institutional support for the trend when the United Nations Conference on the Human Environment took place in Stockholm in June 1972. 59

The board’s chief engineer, R.J. Laburn, had been aware for a considerable period of time of the threat of pollution. Already in 1969 he stressed the fact that many household detergents contained chemicals that were not cleared from the water in the sewage disposal plants. It formed a thick foam layer on the effluent. Bacteria were unable to break down most of these compounds. 60

Sewage also posed a problem. In June 1969 it was estimated that about 450 Mℓ/d of sewage effluent was released in the region served by the Rand Water Board. Large industries and power stations consumed a substantial amount of the effluent that was either treated to a limited extent or used in an untreated form. 61

In addition other officials of the board felt strongly about environmental issues. In 1970 Dr R.J. Wells the chief chemist of the board, and E. Myburgh, the assistant chief engineer of operations visited the USA to attend a conference of the International Association of Water Pollution Research. 62 After returning they reported extensively to the staff on their findings. 63 They appeared to be enthusiastic about environmental consciousness and promoted it in all fields of the board’s operations. Dr Wells was for example convinced that, as was the case in the USA, there had to be a constructive approach to river protection. The time would come,

60. RWA, Minutes 1969-70, p. 83: 844e gewone vergadering, hoofkwartier, Johannesburg, 1969.06.27. Hoofingenieursverslag, nr 4586, R.J. Laburn.
61. Ibid., p. 83: 844e gewone vergadering, hoofkwartier, Johannesburg, 1969.06.27. Hoofingenieursverslag, nr 4586, R.J. Laburn.
he warned, that it would not be economically possible to provide in the demand for water.\textsuperscript{64}

In 1970 major steps were taken to control pollution in the Barrage area. In terms of its statutes the board had the responsibility to see to the control and management of the Barrage. It also had to see to it that pollution was minimised. In the \textit{Water Act} of 1956 standards were laid down for standards of effluent discharged in rivers and streams in South Africa. Officials of the board and the department of water affairs frequently worked together in combating pollution threats.\textsuperscript{65} The monitoring of the state of pollution was an important component of activities. In 1951 four points on the main tributaries of the Vaal Barrage were sampled monthly. By 1968 there were 14 sampling points for 18 different types of tests.\textsuperscript{66}

In 1970 it was estimated that it cost the board about R30 000 annually to keep an eye on the Barrage, recording the tributary flow, maintaining six weirs and recorders, and analysing water samples.\textsuperscript{67} Plans were stepped up to acquire more testing equipment and once it was in place Laburn recommended to the board that attention be given to checking up on local authorities whose effluent flowed into the tributaries of the Vaal river. By doing the tests, he explained, it would be possible to reduce the pollution threat in the Barrage reservoir.\textsuperscript{68}

The plan was simple. A number of weirs had to be built in the Blesbokspruit, Elsburgspruit, Klipspruit and Klip river as well as Natalspruit and then fitted with meters to check the flow and create

\textsuperscript{64} Ibid., pp. 6-7.
\textsuperscript{68} Ibid., p. 319: 853rd meeting of the Rand Water Board, Headquarters, Johannesburg 1970.03.25. Chief engineer’s report, no. 4640, R.J. Laburn.
In June 1970 the board gave its approval for the construction of a comprehensive central laboratory complex at the Vereeniging pumping station. It was from here that the pollution in the Vaal river catchment area was to be monitored. Of particular significance at the time was the fact that with the development of a number of new industries in the region, the nature of pollution and pollutants had changed considerably over the years. Consequently, Laburn felt, it was necessary to start with more sophisticated tests to ensure that the water quality of the Barrage area remained high. At the time there were also increasing fears of potential radioactivity in the water. Steps were consequently done to monitor the threat to the Barrage environment. The laboratory was also to conduct a number of tests on the purification of sewage effluent. Tests were to be conducted on the analysis of oxygen demand and the isolation and characterisation of organic compounds.

By the 1970s it had become standard practice to do advanced tests on bacteriological quality control. With the new laboratory complex the objective was to conform to the guidelines laid down in the latest edition of the authoritative *Standard methods for the examination of water and wastewater*. It was envisaged that with the development of the new laboratory complex it would be possible for the board to undertake extensive fundamental research in conjunction with the CSIR and the universities.

---


In 1971 steps were taken to check up more accurately on flow measurements and the sampling of streams.\textsuperscript{75} Two years later the board approved regulations for sanitary requirements in respect of developments on the banks of the Barrage, Vaal Dam and the tributaries of the Vaal river.\textsuperscript{76} In July 1974 the board was asked to give its approval for the first legal actions to be taken against property owners in the Barrage reservoir area who had houseboats on the water.\textsuperscript{77}

One matter of concern to the chief engineer was the poor quality of the effluent of Vanderbijlpark-Sebokeng that flowed into the Barrage. It had been agreed earlier that no local authority would be allowed to place untreated effluent in any of the streams flowing into the Barrage. As a means of overcoming the problem Vanderbijlpark opted to let its effluent flow into the Vaal river below the Barrage. The board was amenable to the plan, but it still did not solve all the problems. Consequently, when proposals were made for the first sewage purification systems in South Africa to be installed at Vanderbijlpark, there was considerable interest in the scheme. At the time the purification of sewage was a keenly debated issue.\textsuperscript{78} In an effort to make a constructive contribution to the matter the board gave its full support for the construction of an effluent purification plant for Vanderbijlpark as a pilot project, when a feasibility report of the consulting engineers Stewart, Sviridov and Oliver had been completed.\textsuperscript{79} By the early 1970s mining and industrial effluent accounted for a considerable percentage of the polluted water that flowed into the Barrage from


\textsuperscript{77}. RWA, Committee of the whole board, meeting 1974.07.26, p. 2867.


the Witwatersrand, but ultimately sewage effluent proved to be by far the largest pollutant.\footnote{RWA, Minutes 1972-3, p. 331: 887th meeting of the Rand Water Board, Headquarters, Johannesburg 1973.01.26. Chief engineer’s report, no. 4929, R.J. Laburn.}

As the Vaal river’s Barrage area became a popular leisure area the board was increasingly faced with problems in respect of landowners building properties close to the banks of the river. Not only was it a danger in the case of floods, it also posed a pollution threat. In January 1972 the board took a property owner to the supreme court for the construction of a number of houses and structures on board property on the river strip at Vanderbijlpark. On the advice of the board’s legal counsel, it was decided that the owner of the property would be subject to the payment of R100 per month as from February 1972, until all the structures had been removed from the board’s property. The matter was resolved out of court.\footnote{He was Dr J.P. Backeberg. See RWA, Minutes 1971-2, p. 396: 876e gewone vergadering, hoofkwartier, Johannesburg, 1972.02.25. Report submitted by the chairman to the board; RWA, Committee of the whole board meeting, 1974.01.25, p. 2579.}

In August 1973 the chief engineer submitted a comprehensive set of proposals to combat pollution coming from properties close to the waterfront of the Vaal dam, Barrage reservoir and the tributaries of the Vaal river under the control of the board. Recommendations were made in respect of sanitary arrangements, seepage systems and garbage.\footnote{RWA, Komitee van die algehele raad, 1973.08.31, pp. 2637-8. Hoofingenieursverslag, nr 4991, R.J. Laburn.} Local authorities on the Witwatersrand were also beginning to introduce strict measures against dumping and unwarranted refuse disposal in municipal areas.\footnote{ANON., “Council guns for dumpers” in The Star, 1978.03.18.} Included in the plans were guidelines for measures that had to be taken into consideration when townships were developed on the banks of the river and the tributaries of the Vaal in the Barrage area. It was agreed, in line with government thinking, that a green strip of at least 100 metres would be kept open on the banks of the river. The directors of local government in both the Transvaal and the Orange
Free State were asked to conform to this ruling. The measures introduced were a direct result of the rapid development of holiday villages in the tributaries of the Vaal river and on the banks of the Vaal dam and Barrage reservoir.

A further arrangement that was approved by the board was that building restrictions would be imposed on all structures within a distance of 110 metres of the water’s edge if and when subdivisions of property were under consideration. It was, at the time an open question as to whether the board had the right to issue regulations in respect of sanitary requirements and the right to access of properties of third parties for the purposes of inspection. Only in the next decade would they become empowered to assert more authority. It happened at a time when the government realised that the board was in an extremely good position to make authoritative and informed decisions on threats to pollution in the region.

The quality of water

In 1961 it was decided that a new laboratory block and additional equipment would be purchased. This however stood over on several occasions in view of more urgent work that needed to be done. In the course of the decade the board made some important appointments in respect of laboratory staff. Dr R.J. Wells, an organic chemist, was appointed in August 1968 and was soon promoted to chief chemist to the board. He was a graduate of the University of Pretoria but had spent considerable time overseas before he joined the South African Medical Research Institute. After his appointment he was posted at the board’s head office. Among his responsibilities was to check up on the purification of water at

84. RWA, Komitee van die algehele raad, 1973.08.31, p. 2639. Hoofingenieursverslag, nr 4991, R.J. Laburn.
85. Ibid., p. 2639. Hoofingenieursverslag, nr 4991, R.J. Laburn.
86. Ibid., p. 2640. Hoofingenieursverslag, nr 4991, R.J. Laburn.
89. Personal disclosure E. Myburgh, panel discussion, Rietvlei, 2003.02.07.
Vereeniging and Zwartkopjes. He also had the responsibility to check up on the pollution of the Barrage reservoir. The laboratory facilities, at the time, were inadequate. There were laboratories in one of the filter buildings and the old recreation building at the pumping station. There was also at Zuikerbosch a small laboratory. In the old headquarters of the board, on the fourth floor, there was a comprehensive laboratory, but because of the lack of office accommodation, some of the work that had previously been done there had to be transferred to Zwartkopjes. In view of the important investigations on the pollution of the Barrage, the result of sewage and industrial effluent in the Vaal Triangle, laboratory facilities had to be improved. There was a small laboratory at Zuikerbosch, but it was insufficient.

Chief engineer Laburn then urged the board to give its approval for the construction of a main laboratory at Vereeniging where the routine testing of the Vaal river and tributary water could be done. These findings, he explained, could be used as a useful guideline to determine in what direction to move in respect of water purification. Laburn also expressed concern about the state of bacteriological tests. Modern testing techniques were not being used. It was suggested that the old recreation hall and a pair of old semi-detached houses be demolished to make space for the new laboratory that was estimated to cost about R510 000. At that point the board still did not give its approval. The report was referred

93. Personal disclosure E. Myburgh, panel discussion, Rietvlei, 2003.02.07.
back with the instruction that additional information be provided. Only in June 1970 did the project get the green light.

From the outset comprehensive plans were made to provide the best equipment possible and R100 000 (a substantial amount of money at the time) was made available for immediate purchases. The processes that were subjected to scrutiny included water purification, bacteriological checks, pollution inspections and a variety of applied research projects. The new laboratory had all the necessary equipment to conduct tests on turbidity, hardness, pH-levels, solvents, alkalinity, colour and chlorine residue in the water. Many of the outdated methods of testing of the board were phased out in an effort to speed up the work performance of the laboratory. For the identification of organic pollutants a gas chromatograph, electronic integrator and an infrared spectrophotometer was purchased. Furthermore, a sequential automatic sampler and analyser were also ordered to do inorganic analyses of the board’s pollution monitoring programme. Starting in 1973 a number of staff appointments were made to cope with all the work that the laboratory had to do. First a senior research official, grade seven, was appointed. In November 1974 two further posts for senior scientific assistants were created following favourable reports in which it was pointed out how well the laboratory staff and the operating personnel were working together in performing important tasks related to water purification.

103. RWA, Committee of the whole board, 1974.11.29, p. 2914. Secretary’s report no. 6467.
The re-use of water

On 21 January 1969 the chief engineer, R.J. Laburn, visited Windhoek for the official opening of the local water reclamation works. In his report to the board Laburn explained that authorities throughout the world were faced with the problem of reclaiming sewage effluent and making it fit for human consumption.\footnote{RWA, Minutes 1968-9, p. 245: 839th meeting of the Rand Water Board, Headquarters, Johannesburg 1968.12.31. Report by chief engineer. R.J. Laburn.} One of the first experiments to reclaim sewage effluent was that conducted by the CSIR at Pretoria. The Windhoek purification plant was at the time of its inauguration the largest of its kind in the world. It was launched initially in 1954 with the objective of providing 5 Mt/d. At the time it was an expensive exercise. It cost 3,5 cents per kℓ to purify and sterilise the water. At the time it cost 0,3 cents per kℓ to treat Vaal river water.\footnote{Ibid., p. 245: 839th meeting of the Rand Water Board, Headquarters, Johannesburg 1968.12.31. Report by chief engineer. R.J. Laburn.} The nitrate levels of Windhoek’s water in the purification system were higher than the maximum permissible for potable water, but this was substantially reduced by means of dilution.\footnote{Ibid., p. 245: 839th meeting of the Rand Water Board, Headquarters, Johannesburg 1968.12.31. Report by chief engineer. R.J. Laburn.} Commenting on the Windhoek project, Laburn explained that local building costs and materials were expensive. He felt that a project of that nature could be undertaken at a considerably lower price in the Republic of South Africa. It was clear to him that the Windhoek project was important step in the direction of a trend that was to be the order of the day in the future. But, more research had to be conducted in the field.\footnote{Ibid., p. 246: 839th meeting of the Rand Water Board, Headquarters, Johannesburg 1968.12.31. Report by chief engineer. R.J. Laburn.} He observed:

As water demands increase, because of increase in population and higher standards of living, so more and more towns and cities will find that their solution to water shortage, for a period at least, will be the reuse of sewage effluent, if it is available: in most cases more than half the water used could be recycled after proper treatment.\footnote{Ibid., p. 245: 839th meeting of the Rand Water Board, Headquarters, Johannesburg 1968.12.31. Report by chief engineer. R.J. Laburn.}
There had already been substantial planning towards the reuse of sewage water. Laburn told the board that as much as one half of the daily water supply was used with the intention of accommodating sewage. There were also industries, such as power stations and paper manufacturers who had been using quantities of purified sewage effluent. There even was one instance where the entire flow from a sewage works was being used by a major industry. One good example was the sewage effluent of Pretoria that was being used to cool the local power station.\footnote{109}

The Vaal river was the major source of the accumulation of the sewage effluent from the Klip and Zuikerboschrand rivers. As a rule the ratio of sewage and Vaal river water was 1:10. At times it rose to 2:10 or even 3:10. It was then difficult to supply water of a good quality. This state of affairs was one of the major reasons for the board developing the Vereeniging-Vanderbijlpark-Sasolburg regional water scheme at a cost of R3,9 million.\footnote{110} Laburn predicted that the amount of effluent in the Vaal river was destined to increase, while the water released from the Vaal dam to the area below the Barrage was also destined to be reduced. He added:

Consequently the quality of water in Vaal river Barrage will deteriorate and every feasible step should be taken to improve the quality of the water flowing into it. The reclamation of sewage effluent will move in this direction.\footnote{111}

The major factors that were ultimately to determine whether the board would produce recycled water were, according to Laburn, the relative cost of purification and the availability of alternative supplies of water.\footnote{112}
In an effort to keep abreast of the latest developments in the field of recycled water, Laburn gave the board the assurance that the board’s engineers and the Johannesburg city council’s engineering division were constantly in discussion. They were also of the opinion that it would be a good option to undertake a combined research project to treat sewage effluent in order to produce treated water in varied phases of treatment. The intention was to look at production costs, re-use cycles, and comparisons between industrial and domestic effluent. The proposed research project had a number of advantages. Johannesburg municipality treated more sewage effluent than any other local authority in South Africa. The available treatment plants were of a high quality and the engineers were well trained. Johannesburg’s effluent treatment system was geographically ideally situated for the board’s engineering team. Both the engineers of the board and Johannesburg municipality were eager to undertake the project.

The chief engineer also proposed that a technical research committee be created in which the board and the municipality would be the major partners. The National Water Research Institute and the department of water affairs were also to be brought into the project. It was estimated that about R100 000 would be necessary to conduct the research. The board gave its approval for the project to be undertaken, but stipulated that the project and its cost estimates should be outlined in conjunction with the CSIR and then be submitted to the board for its approval.

113. Ibid., p. 84: 844e gewone vergadering, hoofkwartier, Johannesburg, 1969.06.27. Hoogingenieursverslag, nr 4586, R.J. Laburn.
114. Ibid., p. 84: 844e gewone vergadering, hoofkwartier, Johannesburg, 1969.06.27. Hoogingenieursverslag, nr 4586, R.J. Laburn.
115. Ibid., p. 84: 844e gewone vergadering, hoofkwartier, Johannesburg, 1969.06.27. Hoogingenieursverslag, nr 4586, R.J. Laburn.
116. Ibid., p. 85: 844e gewone vergadering, hoofkwartier, Johannesburg, 1969.06.27. Hoogingenieursverslag, nr 4586, R.J. Laburn.
117. Ibid., pp. 85-6: 844e gewone vergadering, hoofkwartier, Johannesburg, 1969.06.27. Hoogingenieursverslag, nr 4586, R.J. Laburn.
Following a report by Laburn in May 1970 it was resolved to consider the potential of reclaiming certain, if not all, the sewage effluent coming from the Vanderbijlpark-Sebokeng townships. In addition consideration had to be given to conducting an investigation on effluent emanating from Johannesburg. The board was to give the firm of Stewart, Sviridov and Oliver an appointment to report on the feasibility of reclaiming sewage effluents in the Witwatersrand in general. The CSIR was to be kept informed on all aspects of the reclamation processes. The board was to collaborate with the department of water affairs and all the universities in the area.\textsuperscript{118} Stewart, Sviridov and Oliver recommended to the board that the sewage reclamation project should be confined to Vanderbijlpark-Sebokeng. A large-scale experimental complex had to be developed near the Vanderbijlpark works adjacent to Rietspruit. It was furthermore recommended that a plant of 13.7 M\(\text{\ell}\) be developed at a cost of R1,93 million. The estimated cost of processing the water was put at 1,5 cents per k\(\text{\ell}\), or 7 cents per 1000 gallons.\textsuperscript{119}

In January 1973 the chief engineer reported to the board that the consulting engineers were of the opinion that the most viable proposition for the development of an effluent purification plant would be at Zwartkopjes where the effluent of Johannesburg, emanating from the municipal sewage works at Olifantsvlei and Klipspruit could be processed. This source of supply accounted for about 16 per cent of the board’s total raw water requirements. In total the effluent discharge of the municipalities on the Witwatersrand into the tributaries of the Barrage constituted about 26,5 per cent of the board’s raw water requirements.\textsuperscript{120}


It was pointed out at the time that the purification of water remained a considerably more expensive process than merely taking water from the river and then cleaning it. The objective was consequently to develop a scheme on a large scale and ensure that effluent be processed at the lowest possible rate. In this respect there was considerable progress. By 1973 it was estimated that it would cost about 14,1 cents per kℓ to turn the effluent into potable water that could be pumped from the Zwartkopjes and Palmiet pumping stations. According to the engineers, once the first phase of the purification plant had been completed, the cost could be reduced to as little as 6,2 cents per kℓ. At that time it cost three cents per kℓ to extract raw water from the Vaal river and pumping it to the pumping stations of Zwartkopjes and Palmiet. They were confident that it was possible to produce clearly healthy-looking water, free from smells and tastes of effluent. It was not possible under all circumstances to keep the dissolved solids of the water below 200 particles per million. Furthermore it was not possible to clear the water of bacteriological and viral content.

International research findings suggested:

The reluctance of many water authorities to put renovated effluents directly into potable supply stems from the fears that all viruses have not been eliminated and because of the very limited knowledge of trace elements in effluents, which are not necessarily eliminated in the renovation process.

The consulting engineers of the board, in their second report, suggested that the direct reclamation of wastewater was not an economical proposition. The board was nevertheless advised to give attention to the improvement of the standard of treatment of wastewater at local treatment plants. It also had to investigate the


Consumers as a rule were not very impressed with predictions that purified sewage water would in the near future be part of their daily water consumption. In May 1977 the Water Research Commission in a report that was tabled in parliament predicted that consumers would, in the not too distant future be drinking sewage water. A project at Daspoort, which had been in operation since 1972, had made considerable progress. Similar projects were being conducted in other parts of the country. The information led to reports in the press that residents of Pretoria, would in the near future be drinking their coffee that was made with sewage water.\footnote{POLITICAL CORRESPONDENT, “Pretoria sal rioolwater drink” in Oggendblad, 1977.05.10.} Reports of this nature had to be refuted by the Water Research Commission, stating that sewage water would be used for purposes other than domestic consumption.\footnote{ANON., “Pretoria kry nie gou rioolwater” in Die Transverls, 1977.05.11.}

There were also at the time a number of innovative proposals for dealing with effluent. In March 1975 it was suggested to the board that consideration be given to making use of effluent water to transport coal slurry by means of a pipeline from the Eastern Transvaal to Richard’s Bay for export purposes. In the board it was noted that the point where the effluent was to be released was beyond the board’s area of control. Consequently the responsibility for the water would rest with the minister of water affairs, and that no steps therefore be taken. In negotiations the department of water affairs indicated that it was, subject to certain conditions, not averse to the plan. A consortium had appointed the Shell oil company to do the planning on its behalf. The board made one point clear. If the effluent was not available, alternative sources of water would have to be used. It was also indicated that the board had no
intention of designing, installing or operating a scheme to supply and pump effluent water for the purposes of the pipeline.\textsuperscript{128}

**The capacity of the board’s reservoirs**

When the board’s operations started the mains were laid along routes best suited to provide its consumers with the maximum service. Because of the unique topographical features of the area served by the board, as well as the demands of consumers, the board’s supply developed into a direct pumping scheme with covered service reservoirs.\textsuperscript{129} The system of reservoirs was developed in such a manner that consumers would have a constant supply of water, at least for a period of 36 hours at the time of year when rainfall was normal and the consumption of water was at its highest.\textsuperscript{130} This undertaking made specific demands on the board’s system of pipelines and reservoirs.

With the growth in demand for water in the wake of the rapid development of the Witwatersrand, there was at times a lack of an even flow of water under pressure in the pipelines. One way of solving the problem was to have the local authorities provide sufficient reservoirs for storage of water from the board’s supply. By the 1970s many consumers had already complied with this arrangement.\textsuperscript{131} Some even purchased storage space from the board’s reservoirs.\textsuperscript{132} Others purchased space in the reservoirs of neighbouring consumers.\textsuperscript{133} The functions of the reservoirs were simple. For the greater part of the year the reservoirs secured a

\textsuperscript{128} RWA, Committee of the whole board, meeting 1975.07.25, p. 3039.
\textsuperscript{133} ANON., “Vereeniging buys space in tower” in Vereeniging and Vanderbijlpark New, 1975.08.15.
system of storage that could provide water in a uniform and efficient manner for a period of at least 36 hours.\textsuperscript{134}

Initially it was required of consumers to extract water at an even rate, for at least 20 hours. This proved to be an inefficient and impractical system. It could not be monitored properly and many consumers did not conform. Consequently the plans were altered so that by November 1970 it was required of local authorities to extract water at an even rate over a 24 hour period. For the plan to be put into effect consumers had to provide sufficient storage facilities for 36 hours to meet the variable demand. There had to be an unhindered flow of water from the board’s mains to the consumers’ storage facilities. The flow of water had to be controlled by a meter that could clock up consumption over 24 hours. Finally, special conditions had to be laid down in the case of consumers who needed less than 450,000 litres per day.\textsuperscript{135} The right type of reservoirs, situated in the proper places, proved to be the ultimate solution. In 1969 Laburn noted:

\begin{quote}
The provision of reservoirs at relatively high elevations is the only means whereby the board can ensure continuity of supply to consumers in the event of pipeline or plant breakdown. Furthermore, reservoirs are a practical and economic means of meeting the inevitable fluctuating demands imposed on the board’s pumping and distribution system.\textsuperscript{136}
\end{quote}

It was at the same time difficult to find suitable sites for new reservoirs. Consequently the search for suitable sites had to be kept up and steps had to be taken in order to ensure that these facilities would be able to supply sufficient water in the future.\textsuperscript{137} In January 1970 the board agreed to a number of policies in respect of its

\begin{itemize}
\end{itemize}
Increasing sophistication 1968-1974

supply of water to consumers. Sufficient storage and supply were essential foundations of the policy structure:

1. In the first place the board was to continue making provision to provide total storage in the system equivalent to the 36 hours average demand for water during the highest month under normal conditions.

2. The board’s system was to be designed in such a manner as to meet the maximum day demand of all consumers, provided such demand was drawn off at a uniform rate at least for 20 hours of each day.

3. Consumers were to design their particular systems in such a manner that it peaked in excess of average demand during the highest day of demand. The consumer was to pay for the provision of the storage facilities.

4. If it was necessary to make available additional storage facilities, and consumers were unable to provide in the need, the consumers had to pay to the board an additional fee for the provision of the storage facilities.

5. The number of supply points to consumers was to be limited.

6. The existing conditions applicable to supplies coming from pumping mains were to be maintained. The only alteration was to be that consumers had to draw water at a uniform rate over a 20-hour period of time in order to prevent undue variation in pumping conditions.138 At the time the storage facilities of the board were comprehensive.

Table 8.1 Rand Water Board reservoirs 1970

<table>
<thead>
<tr>
<th>Region</th>
<th>Locality</th>
<th>Capacity in Mt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Springs-Brakpan</td>
<td>Modder East</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Selcourt</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Brakpan 1</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Brakpan 2 (Under construction Jan. 1970)</td>
<td>68</td>
</tr>
<tr>
<td>Eastern Transvaal</td>
<td>Wildebeesfontein</td>
<td>23</td>
</tr>
<tr>
<td>Boksburg-Benoni</td>
<td>Benoni</td>
<td>58</td>
</tr>
<tr>
<td>Germiston</td>
<td>Signal Hill</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Germiston</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Northridge</td>
<td>89</td>
</tr>
<tr>
<td>Central</td>
<td>Forest Hill</td>
<td>226</td>
</tr>
<tr>
<td></td>
<td>Meyer’s Hill</td>
<td>260</td>
</tr>
<tr>
<td>Pretoria-Modderfontein-Kempton Park</td>
<td>Klipfontein</td>
<td>198</td>
</tr>
<tr>
<td>West Rand</td>
<td>Meredale</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>Waterval</td>
<td>106</td>
</tr>
<tr>
<td>Randfontein-Rustenburg</td>
<td>Witpoortjie 1</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Witpoortjie 2</td>
<td>68</td>
</tr>
<tr>
<td>Roodepoort-Krugersdorp</td>
<td>Roodepoort</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Krugersdorp</td>
<td>16</td>
</tr>
<tr>
<td>Libanon-Blijvooruitzicht</td>
<td>Libanon</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Blijvooruitzicht</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Carletonville (Not complete)</td>
<td>0</td>
</tr>
<tr>
<td>Vereeniging-Vaal Triangle</td>
<td>Langerand</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>Daleside</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Sasolburg (Under construction in Jan. 1970)</td>
<td>90</td>
</tr>
</tbody>
</table>

By January 1970 the board’s reservoirs had a total capacity of 1704 Mt. A further four reservoirs under construction, at the time, had a capacity of 765 Mt. The total storage capacity of the board’s consumers, such as the municipalities and other large consumers, then amounted to 123 Mt.

The changing role of welding in the labour dispensation

For many years it had been the board’s policy to acquire welding equipment and maintain the necessary human resources to perform the work. By the start of the 1970s the nature of welding technology had changed considerably. The work of welding, which had been a basic operational and non-qualified technical form of labour, had

---


Increasing sophistication 1968-1974

become extremely specialised. Consequently the board’s engineering section recommended that the board appoint specific firms that had welders on their payroll to do welding work on the pipelines that were being laid. The cost of the labour, at daily tariffs, was more expensive than the board’s salary structures but, it was pointed out, the work was usually completed in a much shorter time span. The board agreed to invest an amount of R18 000 additional to its original budget for the pipe-laying activities that had to be completed before the next peak season of consumption.

In July 1973 further contracts for welders to the value of more than R42 000 were approved. By September 1974 the contract system was still in place. In later years it became a regular feature of the planning landscape in the engineering division. These developments opened the way for the introduction of innovative measures over a broad spectrum of social developments. One area was the opportunities that welding created for bringing in people of colour to work as skilled labourers. Mr. Foxy Louw, who joined the Rand Water Board in 1978, was the first coloured welder to be employed. Many years later he recalled:

In those days it was very difficult for a black man to get a job in welding. White people used to do the job. When I applied for the job, the first thing they tested me with was to weld the pipeline. They were quite impressed with what I was doing. There was a foreman by the name of Hansie van Rensburg. There was a site

141. See for example a memo in respect of welding work at the mild steel pipe manufacturing plant. Memorandum R.J. Laburn, 1969.06.09: Memorandum: Employment of unskilled labour at the board’s pipe plant.
agent Jan Nagel. It was not easy for a black man to pass the tests in welding. I learnt to weld at Dorman Long. Then I went on to other sites and then I came to Rand Water. When I met them there they were busy laying pipes in Soweto. Johan Kraukamp was the lead welder. I welded a pipeline for them. They were impressed. They were all looking at me when I worked.

The organisation was clearly managed along the lines of workers’ participation in the process of introducing change in the workplace. By getting the workers’ co-operation it was possible to introduce progressive measures aimed at gradually phasing out discriminatory practices in the workplace.

**Recognition of female permanence in the workplace**

Since its inception the status of women in the labour dispensation at the Rand Water Board was in line with standard practice in public organisations in South Africa. Women had performed important tasks when the men were called up for military service during the world wars of 1914-8 and 1939-45. They were in many respects not considered a permanent component of the labour dispensation. After World War II females started playing an active and more permanent role. At the Rand Water Board the recognition of their permanence was set out in policy stipulations for the provident fund in 1957. The status was still one of servitude. Woman’s status as married person altered her apparent value to the organisation. For example, a female pension fund member had to retire from the provident fund on marriage, but she could be re-engaged as a member.  

Married women were unable to get permanent appointments.

This situation only changed in November 1965 when the finance and executive committee of the board agreed in principle that it would be possible for married women to be appointed to the permanent staff and become members of the pension scheme of the superannuation and provident fund. It was furthermore agreed

---


318
that the lump sum payment to a female staff member on her marriage would fall away once she was brought into the pension scheme. Provision was also made for a pension annuity for the children of female staff members who passed away while in the service of the board. The board accepted this arrangement in December 1965.\textsuperscript{147} The change was due to the worldwide trend to recognise women’s rights on all levels of society. In the years to follow the board consistently followed the prescriptions of government on the status of women in the workplace. It was only in the 1990s that more innovative policies would be introduced with the objective of offering women the prospect of a rightful place as equal partner.

**The creation of a research base for water**

From the late 1960s there was an increased accent on the introduction of research programmes to improve the manner in which water was being processed and distributed. In 1971 the *Water Research Act*, No. 34 of 1971, was passed. It came into effect on 6 August 1971 with the objective of promoting research in connection with water affairs. It also made provision for the establishment of a Water Research Commission and a Water Research Fund.\textsuperscript{148}

Technical staff at the Rand Water Board was also participating, in conjunction with overseas experts in research projects. In March 1971 a research project was initiated under the guidance of Professor K.J. Ives of London University to do tests on the filtration of water. Among the alternatives investigated were: the use of anthracite coal instead of sand, to filter water and backwashing sequences. Because of the project the existing filters at Zuikerbosch were modified and tested.

\textsuperscript{147} RWB, Minutes 1965-6, pp. 702-3: 802nd meeting of the Rand Water Board, Headquarters, Johannesburg 1965.12.22. Secretary’s report, no. 5268. C.Q. Pitt.

Chapter 8

Illus. 8.4 In the 1970s Rand Water Board engineers were at the forefront when they pioneered new spiral flocculation technology. Source: Rand Water

The next phase of the project was the running of tests on the flocculation system at Zwartkopjes. The research findings were incorporated into planning when the board approved, in

November 1971, stepping up the capacity of the sedimentation and tanks and filter at the Zuikerbosch station from 660 to 900 Mℓ/d.\textsuperscript{150}

The board was aware that well-managed research could be profitable over and above its contribution to expanding the existing fields of knowledge. In 1962 it was realised that the survey section of the board was insufficient. Numerous pipelines had been laid, but there was a shortage of reliable maps of where the pipelines had been laid. Consequently the chief engineer recommended to the board that consideration be given to appointing draughtsmen who would then systematically go through the office of the surveyor-general and start with the compilation of a reliable set of documents in respect of the pipelines of the board. It was estimated that the project of about R36 000 would take some three to four years to execute. The board was to do the work in conjunction with Escom and the South African railways administration. They were in a similar situation as the board and were to undertake similar projects. Moreover they had sufficient staff to do the project.\textsuperscript{151} This initiative marked the start of the board’s survey section. The staff who had undergone special training had become specialists in their field by 1970, by which time they were able to compile advanced cadastral plans on a geographical one-degree square. The chief engineer reported:

The standard of proficiency attained by the board has drawn favourable comment from government departments and various other bodies. The result was that in 1963 the surveyor general of Transvaal accepted and used for the first time as far as can be ascertained, cadastral maps compiled outside his own department.\textsuperscript{152}


In July 1964 the board approved of a comprehensive aerial survey of the Barrage area. This was considered necessary in view of the fact that a marginal strip of land from the Barrage up to the confluence of the Vaal and Taaiboschspruit became the property of the board in 1923 when the Barrage was formed. The engineering division did not have an accurate description of the area. Consequently the chief engineer, A.W. Linekar, recommended to the board that a photogrammetric aerial survey be done of the region. It was also decided that topocadastral maps be compiled.\textsuperscript{153}

By 1970 the mapping section was a valued division of the board. The accurate maps could provide information when investigations were conducted in respect of conflicts of rights; the planning of new routes for services and the development of construction projects; and finally for deeds searches when it was necessary to establish ownership of land.\textsuperscript{154}

Because of its investment in developing the division, valuable contacts had also been established with the responsible government departments and other authorities involved with the drawing up of cadastral maps. The department of mines even started making use of the board’s specialists and before too long a representative of the board served as member of a technical advisory committee that had to assist the registrar of mining titles.\textsuperscript{155} Because of the fact that the board’s area of operations covered the essential Witwatersrand mining region the registrar of mines had been provided with the first 97 transparent transmission copies of the board’s cadastral plans of the Witwatersrand complex.\textsuperscript{156}

By 1970 a total of 660 plans had been completed of all the areas traversed by the board’s pipelines. About 60 plans of the most


Increasing sophistication 1968-1974

densely populated areas were still to be completed. The work was scheduled for completion within the next year. In October 1971 the board agreed that its copyright on the maps could be transferred to the surveyor general of Transvaal at a price of R100 per sheet.

The board’s investment in building up an efficient survey section paid handsome dividends. It was possible for the first time to locate important installations of the board on detailed maps. Moreover the information could be used in other planning sectors. It was even possible to redeem some of the investments made in generating the knowledge and skills, by selling the expertise to external consumers.

Water tariffs and water demand

As pointed out in a previous chapter, the history of the tariff structure can be traced back to the early years of the board. Apart from the cosmetic change to the name of ‘constituent’ to ‘foundation’ members there were few changes to the structure in the 1960s. In the 1970s there were plans to make some alterations to the system. One potential adjustment up for discussion in 1973 was an altered tariff structure, based on the geographic localities of consumers. It was also felt that this approach would not be viable. Consequently the board decided to accept the existing policy of applying tariffs uniformly throughout its area of supply.

A more successful and viable adjustment to the tariff structure was explored in February 1972 when the chief engineer submitted a report on managing water demand in times of drought. In the report it was indicated that in the last three weeks of February the board faced severe problems because of the high demand for water.


Chapter 8

This situation prevailed despite the public awareness of the general water shortage that prevailed. At times a maximum daily demand of 1500 M\( \ell \) was the order of the day in the 7-day demand cycle. The purification plants at Zuikerbosch and Vereeniging were working under great pressure and coal supplies at the coal-fired stations were running in short supply. The chief engineer expressed his doubts about the ability to maintain the extremely high demand for water.\(^{161}\)

In a memorandum to the board the chairman reported that up to the end of January 1972 the board had supplied on average 1122 M\( \ell \) per day. This amount was exceeded by more than 40 per cent when on 16 February 1972 it was required of the board to supply 1592 M\( \ell \). In terms of the planning framework of the board it was considered essential that the board should be able to supply at least 50 per cent more than the average daily demand. This implied higher costs.\(^{162}\) In view of the prevailing situation the board decided that an investigation be conducted into the viability of increasing water tariffs at peak times.\(^{163}\)

On several occasions the board in committee dealt with the matter of additional water that was needed in order to cope with the demand of its consumers. Towards the end of 1973 the board took note of phase II of the Tukhela water scheme that was being planned. The crucial issue was the availability of water for immediate usage. Consequently, following talks held between representatives of the board and the minister of water affairs in November 1973, the government made available to the board additional abstraction rights of 800 M\( \ell /d \) from the Vaal river.\(^{164}\) In March 1978 the Johannesburg city council was one of the first large

---

164. RWA, Committee of the whole board, 1973.11.30, p. 2718.
local authorities to give its complete support to the plans of the board to charge more for water consumption at peak times.\textsuperscript{165}

There was also substantial support for these water restriction methods from the side of the government. In October 1973 the minister of water affairs announced that the consumption of water from the Vaal river was to be reduced by 10 per cent. The consequence was that the board called a meeting of all its consumers at its headquarters in Johannesburg on 15 October and a number of uniform restrictions were announced.\textsuperscript{166} These were a new form of restrictions that appeared to be more direct and effective in the sense that the information was passed on to all the consumers of the board, irrespective of their geographical location or membership status. In some cases water restrictions that were introduced by the local authorities were not the result of the inability of the board to supply consumers. Instead, it was because local authorities did not have sufficient storage facilities to secure for their consumers an even supply of water over a period of at least 20 hours.\textsuperscript{167} The board’s problem was one of creating the right environment for an efficient distribution system.\textsuperscript{168}

\textsuperscript{165} ANON., “Call for water waste crackdown” in \textit{The Star}, 1978.03.30.
\textsuperscript{168} ANON., “Vanjaar is die dors baie groot” in \textit{Beeld}, 1975.10.21.
Since the decolonisation of Africa started at the end of the 1950s it had been possible for South Africa to function in relative isolation from the rest of the continent. Part of the country’s colonial legacy had been a ‘buffer’ spanning the subcontinent from east to west. The Portuguese colonies of Mozambique and Angola, Southern Rhodesia (Zimbabwe) and Southwest Africa (Namibia) were firmly under white control. The newly independent Botswana (formerly Bechuanaland), with a relatively low population density, did not tend to interfere in the domestic matters of South Africa. Consequently the South Africa’s isolation enabled the government and business sector to carry on as if nothing could deter it from maintaining a strong Euro-centric socio-economic and political household.

In the early 1970s there were a number of strikes in different parts of the country, starting with labour unrest at the Durban docks in 1969 and gradually spreading to a number of sectors of the
Africanisation 1974-1984

economy where migrant labour played a vital role.¹ On the whole, however it appeared as if the South African government was in control. It took care of influx control measures and laid great stress on the development of the black homelands. This proved to be a chimera. The country was in a state of economic recession caused by a flagging gold price and the energy crisis of 1973 when the international price of crude oil from the Middle East rose sharply.² How fragile the order in South Africa was became apparent with the collapse of the Portuguese empire in 1974. Following a coup’d état in metropolitan Portugal the empire that had been in existence for more than a half a millennium literally collapsed in the face of a popular socialist opposition in the country’s politics. In Mozambique and Angola nationalist governments with strong socialist agendas came into power and almost overnight placed southern Africa’s regional balance of power in jeopardy.³ South Africa was forced to reconsider its support for the white controlled South West Africa (Namibia). In Southern Rhodesia (Zimbabwe) the government of Ian Smith was confronted with an intensified civil war. The liberation struggle of the Zimbabwe African National Union (ZANU) under the leadership of Robert Mugabe had been a substantial threat to the economy of the country ever since the white government in 1965 had issued a unilateral declaration of independence.

The effect of the changes taking place in the region became apparent with the Soweto uprising that started on 16 June 1976. It soon spread to all the major urban centres of South Africa. For the first time since the 1960s, black South Africans made a political statement of intent that the white controlled government could not ignore. The accumulated anger of many years of being disadvantaged also in respect of social services, boiled over. What had originally been a protest of school children against the use of

Afrikaans as a medium of instruction soon became a way of making white South Africans aware of the plight that their fellow citizens had been subjected to as a result of the racially discriminatory policy of apartheid. A number of adjustments were made across the socio-economic and political spectrum to the manner in which the country was being governed. Particularly on the Witwatersrand changes were the order of the day and more recognition was given to the plight of the black people in the urban environment. In this respect the Rand Water Board was also to play a central role.

A security-conscious institutional identity

As a result of the prevailing political dynamics of the 1970s southern Africa enjoyed international attention. The country was still experiencing intense political isolation, but there were indications of a thaw as international political trends of détente tended to usher in a period of international negotiations. Outside the political sphere, humanitarian and socially minded international organisations continued to communicate, even if only indirectly, with related institutions in South Africa. When, in 1975 the World Health Organisation (WHO) of the United Nations held an international conference in Swaziland, representatives of the Rand Water Board attended. They reported back that L.A. Orihuela, head of the WHO’s division for community water provision and sanitation, was impressed with the measures introduced by the board to take steps against pollution. As an organisation the Rand Water Board had become a leader in many fields. Its research capacity was picking up and it was set to become one of the largest water utilities in the southern hemisphere as a result of the vast area it had to supply with water.

4. RWA, Minutes 1975-6, p. 151: 916e gewone vergadering, hoofkwartier, Johannesburg, 1975.06.27.
It was however in the sphere of stepped up security operations that an institutional change was beginning to take place. Since the 1960s there had been awareness in the management structures of the Rand Water Board that it was essential to safeguard the board’s property. The supply of water was an essential service and the board had the responsibility to secure that it was not disrupted. It could lead to confusion and undermine the confidence of an orderly regional society. A collapse in the water supply could also affect the important industrial and commercial activities of the board’s consumers. It thus came as no surprise when in February 1976 it was recommended to the board that it appoint additional staff at its pumping stations. These employees were used in many areas of the board’s operations, but they were especially trained to deal with security matters. Members of staff were as a rule also allowed to join the police reservists. Also, the South African defence force had been active in providing training to members of the civilian population since 1974. In the community at large there

---

6. RWA, Committee of the whole board meeting, 1976.01.30, p. 3139.
was a growing security consciousness. Residents living in the proximity of the Vaal dam were concerned that the dam was not well protected. It was feared that the dam or some of the pipelines could be damaged in acts of terror.\(^8\)

When the Soweto uprisings started in June 1976 the board was in effect ready to cope with potential security threats. More importantly, it was possible, for the duration of the uprisings, to supply water to all areas within its limits of supply without any interruption. As peace was gradually restored further measures were taken to introduce greater security. In August 1977, R10 000 was made available to step up the security at the board’s headquarters.\(^9\) Highly trained staff was appointed in strategic areas of the board’s operations.\(^10\)

Within the broader community there was also support for improved security measures. For example, in 1977 a branch of the Security Association of South Africa was established in the Vaal Triangle. This non-profit organisation had, as its major objective, the provision of the necessary skills to industries to ensure the efficiency of their security systems.\(^11\) Similar initiatives were the order of the day in other parts of the Witwatersrand. For the board these developments were a boon. It synchronised effectively with the stepped-up security measures that had been introduced at all the board’s stations.

On 1 June 1980 members of *Mkontho we Sizwe* (MK), the military arm of the African National Congress, attacked the Sasol plant at Sasolburg, one of the major consumers of the board’s water. After what was described as one of the most dramatic attacks on a strategic installation in South Africa up to that time, security measures were further stepped up.\(^12\) In 1982 a chief security official

---

10. RWA, Committee of the whole board, meeting 1977.09.30, p. 3517.
was appointed to act as advisor to the chief engineer.\textsuperscript{13} Furthermore, persons who had held senior positions in the defence force were appointed in strategic operational areas of the board.\textsuperscript{14} In May 1983 a plan was submitted in which provision was made for the training and development of security for the Rand Water Board. The board accepted the proposals.\textsuperscript{15} The new system was in line with that of all strategic installations in the Republic of South Africa at the time.

Although the safety of the undertaking and its operations was a dominant factor in the manner in which the Rand Water Board presented itself, there were also other dimensions of activities that reflected the identity of the organisation in a significant manner. In preparation for the 75\textsuperscript{th} birthday celebrations of the Rand Water Board, steps were taken well in advance to ensure that the event was celebrated with the necessary finesse.

In May 1975 plans were made to have a commemorative postage stamp or series of stamps issued by the department of posts and telegraphs to celebrate the 75\textsuperscript{th} anniversary.\textsuperscript{16} The board also approved the purchase of 1000 Rand Water Board ties and 180 scarves. The ties were maroon in colour to distinguish them from the blue ties that had already been issued to the staff of the board. It was also agreed that a tie and a scarf were to be donated to the Africana museum in Johannesburg.\textsuperscript{17}

An institutional pride in the history and traditions of the Rand Water Board was evident in many spheres of the board’s operations in the 1970s. This led to a praiseworthy conservation consciousness.

In May 1975, as a result of spatial changes that had taken place at the Vereeniging pumping station there were plans to relocate the main entrance to the station. H.C. Stegmann informed the board that it appeared essential to relocate the entrance and make

\textsuperscript{13} RWA, Komitee van die algehele raad, vergadering 1982.02.26, p. 139.
\textsuperscript{14} RWA, Komitee van die algehele raad, vergadering 1982.04.30, p. 18.
\textsuperscript{15} RWA, Committee of the whole board meeting, 1983.05.27, pp. 20-5.
\textsuperscript{16} RWA, Minutes 1975-6, p. 97: 915th meeting of the Rand Water Board, Headquarters, Johannesburg 1975.05.30.
\textsuperscript{17} RWA, Committee of the whole board meeting, 1978.05.26, p. 47.
adjustments to the fencing. Personally he was not in favour of it. The major concern was the historic and architectural value of the structure. The board was in agreement with him. Consequently alternative plans were made to keep the entrance in place. It ensured that a valued part of the board’s architectural heritage was preserved.

The management in the 1970s also endeavoured to create a healthy pride among employees in the organisation. It also actively promoted the idea of getting the outside stakeholders of the organisation to become familiar with the comprehensive nature of its activities. In 1978, for the first time in many years board meetings were held at places other than the headquarters in Johannesburg. In January for example the board held its meeting at the Mapleton pumping station. The February meeting was held at the clubhouse of the Zwartkopjes pumping station. The objective of holding the meetings at different venues was that it offered an opportunity to keep in touch with the progress of the board’s activities. At the same time these events created awareness with the board’s employees that they formed part of a system that as a result of the ubiquitous nature of service rendered, permeated through to many areas of society.

**Supplying water in the era of Soweto 1976-7**

Before the uprisings of 1976-7 there were frequent reports in the press to the effect that water was in short supply in Soweto. Residents of black townships as a rule paid only a relatively small amount for services such as electricity and water. The authorities used profits made on the sale of alcohol at community bottle stores and drinking places to generate funds to provide the residents with

---

water and electricity. When the riots started at Soweto in June 1976
the consumption of alcohol along the West Rand declined
significantly. Local liquor stores and beer halls had been gutted in
the riots.\textsuperscript{22} As a consequence additional funding for many of the
services was no longer readily available.\textsuperscript{23}

By 1978, once tranquillity had been restored and the government
started propagating home ownership, a new type of civic pride
began to develop. One of the spin-offs was that the residents of
South Africa’s largest black city started consuming more water.
Within the space of a year the township’s consumption had
increased by 10,2 per cent. According to the West Rand
administration board (WRAB), the trend was a direct result of a
sense of domestic-pride once home ownership had been
introduced. Other factors also played a role. Many of the new
houses had kitchen sinks and water basins. At the time a water-
borne sewerage system for the region was in the process of being
completed.\textsuperscript{24} A concerted effort was made by the authorities to put
an end to the leaking pipelines of Soweto. Previously there had
been half-hearted attempts at providing sound infrastructure. The
government’s policy implied that the townships on the edge of the
white cities would eventually disappear as black people were
expected to return to their homelands.\textsuperscript{25} This never happened.
Following the events of 1976 black South Africans were at least
considered as people who also had rights to remain in the country’s
urban centres.

Along with the increased consumption of water came the
responsibility for the residents of Soweto to pay more for water.
This announcement by the authorities gave rise to a sense of anger.
There were claims that it was a method used by the government to
try and force the black people back into the homelands. Some
residents threatened to go to work with dirty faces and clothes
because they were unable to pay for expensive water. Local leaders

\begin{itemize}
\item 22. P. BONNER and L. SEGAL, Soweto a history, p. 86.
\item 25. J. CLARKE, Coming back to earth: South Africa’s changing environment, p. 121.
\end{itemize}
warned that the increases were too much for the residents. House rentals had gone up three times in a short period of time.\textsuperscript{26} Chairman of the Soweto council, David Thebahali, recommended that a deputation be sent to the Rand Water Board to explain the predicament in which the residents found themselves.\textsuperscript{27} Many residents of Johannesburg had sympathy for the plight of the Sowetans. It was consequently suggested in the media that the Rand Water Board take heed of the situation and hold talks with the township’s residents.\textsuperscript{28}

Another problem facing the black townships on the Witwatersrand was that there were warnings of an imminent collapse of basic services. Soweto’s infrastructure, for example, had been designed in the late 1950’s for sub-economic development purposes. By the 1970s it was no longer able to cope with the increased demand. West Rand administration board technical director, P.A. du Plessis, told a conference on black housing in August 1978 that water consumption in Soweto had increased by 60 per cent in the space of 10 years. It was consequently essential for more mains to be added to the supply service. At the time the main sewers of Soweto were running at near-maximum capacity. There was an urgent need for some form of relief.\textsuperscript{29}

In March 1979 it was reported that the water reserves of Soweto were running low. The region’s reservoirs had an advance supply of only 12 hours. It was consequently considered necessary to improve the system, which had to cope with a 17 per cent increase in demand. A substantial part of the shortfall was ascribed to unclosed taps and defective plumbing. A firm of consultants that had earlier produced a guide plan for improving services in the area under the jurisdiction of the black local councils in the Soweto region warned that water shortages were becoming critical.\textsuperscript{30}

\begin{flushleft}
\textsuperscript{26} ANON., “Woede oor duur water” in Die Transvaler, 1978.07.28.  \\
\textsuperscript{27} Ibid.  \\
\textsuperscript{28} CORRESPONDENCE: Optimis, Johannesburg – Editor, “Water vir Soweto” in Die Vaderland, 1978.08.10.  \\
\textsuperscript{29} ANON., “Expert warns of Soweto collapse” in The Star, 1978.08.22.  \\
\textsuperscript{30} D. SMITH, “Soweto water reserves plunging” in Rand Daily Mail, 1979.03.26.  \\
\end{flushleft}
Illus. 9.2. A pipeline with a diameter of 1.8 m was constructed between New Canada and Deep Meadow in the early 1980s to cope with the increasing demand of domestic consumers in Soweto. Source: Rand Water

Also in the Vaal Triangle talks had taken place between officials of the Vaal Triangle administration board and the Rand Water Board to ease the pressure on the sewage effluent of the region’s black townships.\(^{31}\)

\(^{31}\) RWA, Minutes 1978-9, p. 519. 960e gewone vergadering, hoofkwartier, Johannesburg, 1979.02.23.
In 1984, as the government started preparing the way for comprehensive regional structures of government, the water supply to the black townships of the Witwatersrand came up for discussion by the Rand Water Board. It was maintained that many of the townships were enjoying the same benefits as foundation members of the board because they were receiving water from the white municipal authorities. With the creation of new municipalities, the question was whether these areas were entitled to the same low tariffs. The board after a discussion on the matter resolved that legal counsel’s opinion was to be obtained to find out whether it was possible for the new authorities to become foundation members. A report was to be submitted on the matter in due time.\(^{32}\)

The board and the water supply to Bophuthatswana

In the second half of the 1970s the government started making adjustments to the macro-apartheid policy framework. However, it remained determined to develop the Bantu homelands. This meant that the Rand Water Board, as one of the largest and most effective water suppliers in the country, had to become part of the development plans. Legally it posed new challenges to the operations of the board. It primarily affected the principle of the board’s limits of supply. In January 1977 plans for the independence of Bophuthatswana enjoyed priority in government circles. At the time the board was providing water to Mabopane, Ga-Rankuwa and Hebron, northwest of Pretoria. By implication it was argued that the board would be supplying water to a neighbouring state.\(^{33}\) In March 1977 the board approved urgent steps to have amendments passed in parliament as part of a private bill submitted by the board. In principle the board had to agree to deliver water to a neighbouring state. J.J.B. van Zyl, the MP for

---

32. RWA, Committee of the whole board meeting, 1984.01.27, p. 173.
33. RWA, Committee of the whole board meeting, 1977.01.28, p. 3337.
Sunnyside, introduced the bill in parliament. In May 1977 the board in committee made further adjustments to an agreement that was to be signed with the government of the independent Bophuthatswana. It stipulated that the board had the right to supply water to Impala Platinum Ltd., Rustenburg Platinum Mines Ltd., and Western Platinum Ltd. The board also acknowledged its responsibility to continue with its supply of water to these mining companies.

The position of the board’s black employees

Circumstantial evidence suggests that the era of Soweto created conditions that were favourable to the black employees of the board. As a rule the board had always been accommodating in its approach to black employees. As an organisation that was capable of financing itself, employees in all areas of operations tended to have better opportunities than their counterparts employed in other sectors of the economy. After the riots of 1976 the government stepped up plans to provide housing and home ownership to the residents of the black townships. This was a change in an approach that started in the 1960s when the authorities no longer provided more housing and infrastructure in the black townships in an effort to get the residents to return to the homelands. Once the policy had been reversed the management of the Rand Water Board immediately stepped in to provide its black workers with housing opportunities. Already in August 1976 the chairman, H.C. Stegmann, told board members that housing development was to be stepped up in the black townships. He recommended that consideration be given to means, other than the usual financial assistance, to help the board’s employees in acquiring their own homes. Another possibility, he pointed out, was for the board to

34. RWA, Committee of the whole board meeting, 1977.03.25, p. 3364. Secretary’s report 6809. A.J. de Witt.
35. RWA., Committee of the whole board, meeting, 1977.05.27, p. 3424. Secretary’s report no. 6847. A.J. de Witt.
build houses for its employees in the townships. For those black employees who had to reside at the point of their work, provision was to be made for an allowance.\textsuperscript{38}

One of the practical implications of the new dispensation was that in August 1977 the West Rand administration board scrapped the ethnic classification of townships into for example Xhosa, Sotho, Zulu, Tswana, Venda or Swazi-language areas.\textsuperscript{39} The arrangement had been maintained for many years. Consequently, it was now possible for employees of the board to reside in all parts of the townships. If the board wanted to, it could develop its own residential area for employees within the black townships. The way towards corporate housing loans received a further boost when the \textit{Financial Institutions Amendment Act} of 1977 was passed by parliament. This legislation opened access to pension fund contributions for the repayment of members’ debts to employees.\textsuperscript{40}

It was consequently possible for the board to legally support its black employees interested in buying their own homes.

In June 1978 the board gave its approval for the introduction of a housing scheme for its black employees on the West Rand, East Rand and the Vaal Triangle. In the Vaal Triangle alone there were 17 254 houses available to buyers in Sebokeng, Zamdela and Deneysville. The requirements laid down by law were: that the monthly payment could not be more than 25 per cent of the buyer’s monthly income, and that the buyer had to be in possession of permission to be resident in terms of the \textit{Bantu (urban areas) Consolidation Act}, No. 25 of 1945. It implied that the house owner had to have been a resident for 15 years and in the employ of an undertaking for at least 10 years.\textsuperscript{41}

Officials of the administration boards recommended to the board that the employees contribute towards the deposit for their homes.

\textsuperscript{38} RWA, Komitee van die algehele raad, vergadering 1976.08.27, p. 3234.
\textsuperscript{40} \textit{Finance Reporter}, “Housing loans to blacks: obstacle is removed” in \textit{Sunday Tribune}, 1977.08.28.
\textsuperscript{41} RWA, Komitee van die algehele raad, vergadering 1978.06.30, p. 74. Sekretaris se verslag nr 7038. A.J. de Witt.
The amounts they had to pay varied between R82 and R250. The board was furthermore prepared to subsidise bond payments on the property of its black employees by 50 per cent. Once the bond was paid up the subsidy came to an end.\(^{42}\)

In a preliminary survey that had been made it was estimated that about 200 black employees of the board would qualify for the scheme. The subsidy could amount to as much as R2400 per month. An existing payment of R3.50, paid to every employee not resident on the board’s property, was to fall away with the new housing allowance subsidy. This arrangement reduced the total black housing allowance payments of the board to R1700 per month.\(^{43}\)

The house-buying scheme had many weaknesses. The land on which the houses were built could only be rented from the administration boards. This was considered as a means of securing a form of income for the board in view of the fact that no taxes were levied on the property. A second negative factor was that the board discriminated against its black employees in that the whites had a 56 per cent subsidy. The only real advantage was that home ownership was made possible for the black employees of the board. In exchange for ownership rights the residents of the houses in the townships had to pay slightly more.

<table>
<thead>
<tr>
<th>Township</th>
<th>Monthly rental in 1978</th>
<th>Monthly payment for homeowners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soweto (West Rand)</td>
<td>R14.20</td>
<td>R21.59</td>
</tr>
<tr>
<td>Thokoza (East Rand)</td>
<td>R12.50</td>
<td>R22.12</td>
</tr>
<tr>
<td>Sebokeng (Vaal Triangle)</td>
<td>R16.66</td>
<td>R19.14</td>
</tr>
</tbody>
</table>

\(^{42}\) Ibid., p. 75. Sekretaris se verslag nr 7038. A.J. de Witt.

\(^{43}\) RWA, Komitee van die algehele raad, vergadering 1978.06.30, pp. 74-5. Sekretaris se verslag nr 7038. A.J. de Witt.

\(^{44}\) Ibid., p. 76. Sekretaris se verslag nr 7038. A.J. de Witt.
The board agreed that the housing scheme could be made available to its black employees. The understanding was then that the facility would be extended to the married employees who qualified for urban residence and resided at a comfortable distance from the work. Furthermore the employee had to have a record of at least one year of employment with the board. The employee also had to be ‘reliable’.45

In August 1981 local councils in the Transvaal province started making plans to secure for their black employees housing loans under what came to be termed the 99-year leasehold scheme. The plan was strongly propagated by the province’s MEC for local government, Hein Kruger.46 Once local authorities had set the trend of providing housing to workers, the Rand Water Board followed the example.

However, it was in the field of education that the era of Soweto was to have the most significant effect. The period of protest had forced the government extensively to revise its position in respect of providing education to people of colour in the country. This state of affairs made it possible for the board to see to the interests of its employees’ children. Already in 1972 the board introduced a bursary scheme to the value of R120 per annum for the children of its black employees. The money was made available for them specifically to become qualified in technical areas. The problem was that no applications were received for funding. In 1978 the board adjusted the conditions for funding and all its black employees became eligible to apply for funding for their children ‘to attain secondary school education’.47

**Technological innovation**

In its normal operations the Rand Water Board was making good progress. It was essentially a modern undertaking that kept abreast of the latest developments in the field of public water supply

---

45 RWA, Komitee van die algehele raad, vergadering 1978.06.30, p. 76. Approved.
46 ANON., “Swart werkers by stadsrade kry huislening” in Die Vaderland, 1981.08.05.
47 RWA, Committee of the whole board meeting, 1978.11.24, p. 149.
services. As one of the largest undertakings of its kind in South Africa it was also possible for the board to introduce a number of innovations. In future it could serve as a benchmark for other water utilities. Some of these deserve mention.

Fig 9.4. A modern control room for water treatment at Zuikerbosch pumping station for water treatment at Zuikerbosch in 1975.
Source: Rand Water

Carbonation processes. Over a period of many years it was found that lime was the best and most efficient means of purifying the water pumped from the Vaal river. In order to stabilise the water, an acid was necessary. For this purpose carbon dioxide (CO₂) was used. The carbonation process had been employed since the earliest days of the Vereeniging pumping station. It was produced from coal fired boilers. At Zuikerbosch the lime kilns were used for the purpose.⁴⁸ If the production of lime in the lime burning section was in calibration with the quantities used in the treatment of raw water, there was an over-supply of between five and eight per cent on average in the amount of gas necessary for the carbonation

⁴⁸ Personal disclosure Dr R.J. Laburn, Blairgowrie, 2003.02.08.
process. In the mid-1970s problems were experienced with re-carbonation and it became evident that CO₂ had to be dispersed and controlled more efficiently.

Consequently the gas distribution system was changed to serve individual carbonation units under treatment. Gas blowers were improved and additional hot air boosters were introduced to the system. These measures were a considerable improvement on the system that had been in use for more than 20 years at Zuikerbosch.⁴⁹

Illus. 9.3. Part of the laboratory facilities at the Vereeniging pumping station in 1970. In the course of the decade a greater variety of tests were conducted as more sophisticated equipment was acquired. Source: Rand Water

Laboratory analysis. In 1972 the board approved of the purchase of an automatic analyser. This piece of equipment, considered to be the most advanced of its kind at the time, not only improved the

⁴⁹. RWA, Minutes 1975-6, p. 468: 924e gewone vergadering, hoofkwartier, Johannesburg, 1976.02.27. Hoofingenieursverslag, nr 5383, R.J. Laburn.
quality and amount of tests conducted by the laboratory, but was also cost-effective in terms of labour. Only one scientist was needed to operate the machine. By 1976 the results were so good that the green light was given for the purchase of another analyser, which could run tests on synthetic washing compounds, phenols and silica used in automatic processes. One motivation for the investment was that the analyser was considered as a means of using the board’s skilled human resources more effectively. By 1978 when a third analyser was purchased the laboratory was running as many as 170 tests a week in the laboratory.

Illus. 9.5 The telemetry console at Zwartkopjes in 1974. Source: Rand Water

Telemetry. In April 1976 the board agreed to the purchase and installation of a radio communications system between the Vaal dam and the Barrage. It formed part of the long-term plans for an


automatic telemetry system. During the heavy rainfall period at the start of 1976 the telephone communications between the dam and the Barrage was out of operation. This not only created a problem, but also was dangerous, according to the officials. Consequently it was felt that reliable radio communications could prevent future breakdowns in communication. The board consequently approved of R14 000 for the purchase of equipment.\footnote{52}

It was in the field of flood prediction that innovative plans were the order of the day. In 1977 Prof. D.C. Midgley, director of the University of the Witwatersrand’s hydrological research unit was confident that in the near future it would be possible to predict potential floods in the catchment area of the Vaal river. He felt it would ultimately be possible to make predictions up to four days before the time. At his unit researchers were working on early warning systems that could be operated with the support of computers.\footnote{53} Researchers at the University of the Free State meanwhile were busy with research on the floods of 1975. A team of five, working in the institute for social and economic research, had earlier conducted similar research on the Orange river.\footnote{54} Their findings were important to the board. It was now possible to determine how early flood warning systems could prevent disaster.

In the 1980 additional water supply scheme comprehensive plans were introduced to improve the telemetry and telecontrol system.\footnote{55} The comprehensive radio communications system was installed in 1984. It replaced the old system that had been developed in bits and pieces since 1957. This was by far the most comprehensive system of its kind to be installed since the board started in 1903. It linked

\footnote{52}{RWA, Minutes 1976-7, p. 53: 926e gewone vergadering, hoofkwartier, Johannesburg, 1976.04.30. Hoofingenieursverslag, nr 5418, R.J. Laburn.}
\footnote{53}{ANON., “Flood predictions promised”in Vereeniging and Vanderbijlpark News, 1977.04.01.}
\footnote{54}{ANON., “Vloedskade: navorsers kom na Vereeniging” in Vaalweekblad, 1977.10.28.}
\footnote{55}{RWA, Minutes 1980-81, p. 129. 975th ordinary meeting of the board, headquarters, Johannesburg, 1980.05.30. Chief engineer’s report no. 6196. L.H. James.}
base stations, repeater stations, mobile and portable units. It cost the board R460 000.\textsuperscript{56}

**Research**

When the government introduced water research initiatives in the early 1970s, it was required of the Rand Water Board to make contributions towards funding the research work. This was paid in the form of a levy on the amount of water sold to all the board’s consumers. Later officials of the board started complaining that the returns on the research undertaking did not yield clear results. Consequently in July 1977 the board considered reducing the levy. For a start, it was argued, the money paid to the Water Research Commission was too much. The government did not agree. In turn the board was not prepared to let the matter stand over. Consequently, in November 1977 it empowered the chairman to enter into negotiations with the research commission.\textsuperscript{57} More direct research benefits were then forthcoming.

In January 1978 the chief engineer, R.J. Laburn, informed the board that the Water Research Commission had launched a research project aimed at optimising the utilisation of the Vaal river system in the Pretoria-Witwatersrand-Vereeniging-Sasolburg complex. It was considered to be in the interest of the board to participate. Permission was then given for the purchase of equipment to the value of R50 000 to monitor and collect data for the project.\textsuperscript{58} In 1979 the board approved the installation of a further eight sampling stations to the value of R45 000. The samplers used at the weirs worked automatically. At times there were breakdowns. Then manual samples had to be taken until funds were available to


\textsuperscript{57} RWA, Committee of the whole board meeting, 1977.11.25, p. 3530. Secretary’s report, no. 6913.

\textsuperscript{58} RWA, Minutes 1977-8, pp. 485-6: 947th meeting of the Rand Water Board, Mapleton pumping station, 1978.01.27. Chief engineer’s report no. 5759.
Related research was conducted on water purification. A prototype of a purification plant was also built in 1979-80 to find out what the effect of carbon was on certain purification processes. In 1980 the first findings of the commission’s researchers were made known. A computer had been used to simulate the present and future transfer of water in bulk by the board to its consumers on the Witwatersrand. In the report it was stated that the optimum plant and pipeline capacities were equivalent to 98 per cent of the maximum seven-day demand. In an effort to minimise the fluctuations in the day-to-day pumping rates, the research showed, the service reservoirs had to be filled to the equivalent of about 160 per cent of the maximum monthly demand. It was pointed out that the cost of reservoir construction could be reduced if 137 per cent of monthly demand to the storage points could be retained. It was believed at the time that the ability of the simulation model that had been created with the aid of the computer, could address some of the potential problems in maximising the available water supply system of the board. The computer as a technological research tool was beginning to come into its own. In 1981 it was announced that Professor David Stephenson of the department of civil engineering at the University of the Witwatersrand was to stand at the helm of a project aimed at investigating power generating water sources and the problem of urban drainage systems. Part of the research was also to determine how the limited water supply of South Africa could be optimised. It was expected that leading authorities in different parts of the world were to participate with their South African counterparts in the project.

At the start of the 1980s, the government’s water research initiative was once again queried. After the necessary consultations, A.J. de


Witt, the secretary to the board, reported that the utility enjoyed direct advantages from research. Investigations were being conducted in the PWV region on the control of pollution and effluent disposal. Samples from the board’s water supply were used in the tests. The water research institute had spent R450 000 on the particular research project. Board members were not completely satisfied with the research being conducted at the time and consequently started pushing for representation on the research commission. It was of the opinion that the organisation had a basic right to be represented. The government did not agree. Instead it indicated that individual researchers of the board would be taken in to participate as specialists in the operations of the commission. Meanwhile steps were taken internally to have research done that would be of particular benefit to the board. The first steps were consequently taken to form a research network. By the end of 1982 the board’s researchers became part of a dynamic project to conduct tests on activated carbon in the board’s treatment process. Four institutions, the Rand Water Board, the National Water Research Institute, the Water Research Commission and Klipfontein Organic Products cooperated in the project. For the board the research was of importance. Its researchers were able to specialise in the fields of the testing and evaluation of selected carbon materials on pilot plant scale using feed water produced by existing purification processes.

64. Ibid., p. 191. 1 000e gewone vergadering, hoofkwartier, Johannesburg, 1982.06.25. Sekretaris se verslag, nr 7487. A.J. de Witt and board decision.
Chapter 9

The floods of 1975
The 1970s are remembered for their share of natural disasters. One such event was the floods experienced in the board’s Bar348rage area of the Vaal Triangle during the summer raining season of 1974-5. At the old railway bridge in Vereeniging the water level on occasion rose to 1428,8 m above sea level, registering one of the highest floods since 1917. What had happened was that the floods were preceded by consistently high rainfall over a period of several months in different parts of the catchment area. Between the first week of December 1974 and the start of February 1975 the inflow of the Vaal dam registered 2119 m$^3$ per second. It was exceptionally high. The occurrence of several simultaneous floods then had an immediate impact on the Barrage. Houses were flooded in the low-lying regions of Vereeniging, especially near the township of Three Rivers where the Klip river flowed into the Barrage. The board suffered no losses. Its Vereeniging works had been designed to cope with the floods of 1894 and 1917.

However, the board did suffer damages elsewhere because of the unusual climatic conditions. On 18 January 1975 a storm caused damage to the value of R55 000 to buildings and vehicles at the Zwartkopjes pumping station. Strong winds uprooted 96 trees. Buildings, equipment, fences and lampposts were damaged. Following the floods, residents along the banks of the Barrage were made aware of the potential damage that storm water could cause. Consequently, at the end of 1975 there were numerous calls on the department of water affairs to warn people before the Vaal river was to come down in flood. In an effort to allay fears officials of the department of water affairs started opening up sluice gates well

68. RWA, Annual report balance sheet and accounts of the Rand Water Board for the financial year to 31st March, 1975, pp. 5-6.
70. RWA, Annual report balance sheet and accounts of the Rand Water Board for the financial year to 31st March, 1975, pp. 5-6.
71. RWA, Minutes 1975-6, p. 142: 916e gewone vergadering, hoofkwartier, Johannesburg, 1975.06.27. Hoofingenieursverslag, nr 5269, R.J. Laburn.
before any potential flooding was realised.\textsuperscript{72} Shortly before Christmas businesses in the low lying areas of Standerton had to be evacuated and officials of the board and the department of water affairs were preparing to cope with flood conditions at the Vaal dam. Shortly before, 22 sluice gates at the Vaal dam had been opened. The Klip river burst its banks and flooded parts of Vosloo Park, the Vereeniging game park and some local sports fields.\textsuperscript{73}

![Image of Vaal Dam sluices opened during floods of 1975]

\textbf{Illus. 9.6} All the sluices of the Barrage were opened during the floods of 1975. Source: Rand Water

Ultimately the lifting of the wall at the Vaal dam, a project of the department of water affairs which started in 1979 at an estimated cost of R24 million, and set for completion in 1984, was considered a good measure to prevent floods from causing damage similar to

\begin{footnotes}

\end{footnotes}
the havoc of 1975. Another consequence of the 1975 floods was that meticulous attention was subsequently given to the factor of potential floods when any regional development plans were made for the Vaal Triangle.

Illus. 9.7 The Vaal dam outlet tower for raw water under construction in 1982. Source: Rand Water

Vaal-Zuikerbosch canal
The canal between the Vaal dam and the Zuikerbosch pumping station was one of the major capital projects undertaken by the board in the 1980s. The 900 mm pipeline from Vaal dam to Zuikerbosch in 1967 was a precursor of the canal. The new one like the first was a means of abstracting raw water in a more direct manner from the Vaal dam. The system consisted of an outlet tower

74. ANON., “Vergroting van dam sal vloedgevaar baie vermindere” in Vaalweekblad, 1979.06.29.
76. See previous chapter.
in the Vaal dam with two 3,5 m diameter water tunnels of 600 m that were linked up to a 3,5 m diameter pipeline that covered a distance of 8 km before linking up with a 21 km canal flowing to Zuikerbosch.\footnote{77}{RWA, 79th annual report, balance sheet and accounts of the Rand Water Board. Financial year to 31st March 1984, p. 11.}

First plans for the construction of a canal between the Vaal dam and Zuikerbosch were mooted in September 1975 when a project was approved for a raw water supply from the dam at a cost of R12,8 million.\footnote{78}{RWA, Minutes 1979-80, p. 523. 973rd ordinary meeting, headquarters, Johannesburg, 1980.01.26. Chief engineer’s report no. 6155. L.H. James.} In 1977 the chief engineer, R.J. Laburn, pointed out that, in view of the rising consumption patterns, it would be necessary for more raw water to be available within the next five years. There had been problems with the abstraction of water by means of pipelines and extraction from the Vaal river. He consequently recommended to the board that a canal be constructed directly between the Vaal dam and the pumping station at Zuikerbosch. The board in committee gave its approval for the plan and indicated that it should be ready by 1980. The government was also in agreement with the project. The canal had a number of advantages. Not only was it substantially cheaper than a pipeline, but its estimated annual maintenance cost of R70 000 was also considered a boon.\footnote{79}{RWA, Komitee van die algehele raad, vergadering, 1977.04.29, p. 3382. Hoofingenieursverslag 5619. R.J. Laburn.} Officials at the department of water affairs were in favour of the construction of the canal and indicated that government would also be favourably disposed towards the plan.\footnote{80}{RWA, Committee of the whole board meeting, 1977.07.29, p. 3481}
The case for the board extracting more water from the Vaal dam was largely the result of an investigation that had been conducted on the quality of the Barrage water. The results of the tests were submitted to the government as evidence why it was essential for the board to get more water directly from the Vaal dam. The government, at the end of 1977 still had some reservations on certain aspects of the board’s proposals. In 1980 the first steps were taken towards the acquisition of servitudes on the land necessary for the canal. The costs had meanwhile risen substantially and it was estimated that the construction work of the canal alone would be more than R21,6 million. In October 1980 it was announced that Sasol Een (Pty) Ltd had applied to extract water directly from the canal. It was then agreed to upgrade the

---

81. RWA, Komitee van die algehele raad, vergadering 1977.08.26, p. 3495. Vir kennisname.
82. RWA, Committee of the whole board meeting, 1977.11.25, p. 3552.
capacity of the canal system to 24,8 m³/s. In exchange for the arrangement, which was approved by the department of water affairs, the company had to make a financial contribution towards the construction of the canal.\textsuperscript{85}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{trimming_machines_preparing_21_km_zoekfontein_zuikerbosch_canal.png}
\caption{Illus. 9.9 Trimming machines preparing the 21 km Zoekfontein-Zuikerbosch canal. Source: Rand Water}
\end{figure}

The proposed system featured a 10 km pipeline with a diameter of 3,5 m. Its control centre was situated at Zoekfontein where the water flow was monitored. A number of energy-dissipating chutes directed the water down the canal. The canal itself was 12 m wide and 4 m deep and about 21 km in length. At the end of the canal a dam was built over a surface area of 1 km in length and 0,5 km in width. Weirs were built in the canal to ensure that it was never completely empty.\textsuperscript{86} The pipeline/canal was completed at a cost of R85,2 million and officially opened on 5 May 1983 by environmental affairs and fisheries minister Sarel (S.A.S.) Hayward.

\begin{flushleft}
\textsuperscript{86} ANON., “Water Board canal serves pump station” in Vereeniging and Vanderbijlpark News, 1981.11.27.
\end{flushleft}
Upon its completion the canal was capable of conveying 2150 Mℓ/d of raw water to the Zuikerbosch purification and pumping station.\footnote{RWA, 79th annual report, balance sheet and accounts of the Rand Water Board. Financial year to 31st March 1984, p. 3.}

**Pipelines and leakages**

For many years experts at the Rand Water Board argued that much valuable water and money could be saved if there were ways and means of detecting leakages in the mains. Johannesburg’s city engineers, at one stage in the 1970s estimated that 10 per cent of the city’s water supplies were leaking from pipelines. They argued that if it could be stopped, as much as R1 million could be saved annually.\footnote{V. BELJAKOVA, “Technology stops money going down the drain” in *Sunday Times*, 1979.07.01.} At the Rand Water Board the engineers had been aware of the potential savings from leaks for a long time. In 1960 for example, there were 410 reported leaks. By 1975 the number had dropped to 250.\footnote{RWA, Minutes 1975-6, p. 189: 917th meeting of the Rand Water Board, 1975.07.25. General matter discussed by the board.} Since pipelines formed a major component in the water distribution system much attention was given over the years to their maintenance. Between 1960 and 1975 the total distance of pipelines of the board more than doubled from a total length of 940 km to 1870 km. By 1980 the pipelines of the board, (excluding those less than 150 mm in diameter), covered a distance of 2239 km.\footnote{RWA, 75th annual report, balance sheet and accounts of the Rand Water Board. Financial year to 31st March 1980, p. 12.}

Internally the work done on pipelines and the accompanying expertise that came from many years of experience, gave rise to industrial development. In 1965 the board started, on a limited scale, with a pipe manufacturing plant at Zwartkopjes.\footnote{R.J. LABURN, The Rand Water Board 75 1903-1978: a treatise on the Rand Water Board with specific reference to its responsibilities achievements and policies during 75 years of operation, pp. 59-61.} This made it possible for the organisation to provide in some of its own specialised needs. It could also perform a service that was not
readily available – that of restoring pipes for re-use.\textsuperscript{92} An added advantage was that the board’s engineers were now familiar with production costs and it was consequently possible to negotiate for competitive prices when millions of rands worth of pipes had to be purchased for the development of the board’s distribution system.\textsuperscript{93}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{pipeManufacturingPlant1975.jpg}
\caption{Illus. 9.10 Working in the pipe manufacturing plant in 1975.\newline Source: Rand Water}
\end{figure}

Work on leaking pipelines was stepped up in 1970 when a comprehensive project was launched to replace old and leaking pipelines. One of the major causes of leakage was external corrosion. This was the result of rust setting in on the outside of the steel pipelines. Various steps were taken to protect the pipelines, but the major solution was considered to be the replacement of old

\textsuperscript{92} See RWA 550/A/B. Confidential report R.J. Laburn – Finance and Executive committee, 1966.05.18. Chief engineer’s report 4245; Copy board decision. Minutes 797th ordinary meeting of the board, Johannesburg, 1965.07.30.

pipes over short distances. One of the first projects was the replacement of the 205 mm City Deep pipeline covering a distance of 1045 m. The line had been laid in 1930. Another replacement was the 550 mm reservoir pipeline between Randfontein and the Krugersdorp reservoir that had been laid in 1935. A third major section to be replaced was the 610 mm Signal Hill-Leeuypoort pipeline dating back to 1938. The work cost R83 500 to complete, but it was considered a good investment.\footnote{RWA, Minutes 1970-1, p. 213: 860e gewone vergadering, hoofkwartier, Johannesburg, 1970.10.30. Hoofingenieursverslag, nr 4698, R.J. Laburn.}

Work on the pipelines implied that some consumers on occasion had to go without a constant and reliable water supply for brief periods of time. The board usually notified its consumers (the municipal authorities), who in turn notified domestic consumers.\footnote{ANON., “Pretoria en Rand kry minder water” in Die Transvaler, 1976.08.05.}

Given the complex nature and the number of parties affected by the operations, the board’s working teams coped well with the task. Sometimes things did go wrong. If pipelines were damaged during excavations or replacement, consumers were forced to rely on emergency water supplies that were transported to temporary distribution points in tankers and by fire brigades.\footnote{J. BUYS, “Water short at hospital” in Rand Daily Mail, 1976.09.03; OOS-RANDSE VERTEENWOORDIGER, “Mens en dier ly dors aan Oos-Rand” in Die Vaderland, 1976.09.02; ANON., “Hospital staff collected water” in The Star, 1976.09.02.}

For obvious reasons residents and property owners in residential townships were frequently not favourably disposed to water pipelines being laid on their property. As a rule they gave preference to the use instead of road reserves for this purpose. On occasion, the ratepayers of Glen Austin complained to their town engineer about plans to install a water reticulation scheme that was initially scheduled to cross over their properties. One major consideration was that the residents of the township, like many people in other middle to upper class townships, were becoming more environmentally conscious.\footnote{ANON., “Glen Austin debates water” in The Star, 1981.08.27.} They were also aware of the fact that water pipelines operating under high pressure could be
potentially dangerous. Ultimately the principle objection of consumers was having the encumbrance of a pipeline or servitude on the property. In this respect environmental considerations might have been of secondary importance to them. This was particularly the case as pipelines started increasing in size. In June 1975 a high-pressure concrete water pipeline between Vereeniging and Sasolburg burst and the repair of the damage amounted to R20 000. The water supply to Sasolburg was restored after a short time by means of the existing steel pipeline between Zuikerbosch and Sasolburg. For the board a disaster of this kind was an exception to the rule. However, it was a factor that had to be taken into consideration in the management of risks in the operations of the organisation. As a rule it was possible for the Rand Water Board to install pipelines with great efficiency. The experience gained over many years made it possible to do the work in the shortest possible time. In later years attention was also given to landscape restoration in areas where pipelines were laid. It was part of the board’s policy to be environmentally friendly. Restoring the flora, which in many cases was part of sensitive indigenous environments, became a standard procedure in pipe laying operations.

The replacement of old pipelines however remained one of the major preoccupations of the board. By the 1970s the organisation had been providing water for almost three quarters of a century and some of the mains were in need of replacement. In May 1977 the board approved eight pipeline replacement and reconditioning projects. One of the oldest pipelines to be replaced was that between Grahamstown Street and Paarlshoop, which had been laid in 1914. It passed through Mayfair and as a result of many years of

---

99. Personal disclosure Mr. V.H. Bath, Johannesburg, 2003.03.07.
100. RWA, Minutes 1975-6, p. 149: 916e gewone vergadering, hoofkwartier, Johannesburg, 1975.06.27.
101. Oral historical information, V.J. Bath 2002.11.06.
corrosion many blowouts occurred.\(^{102}\) The other pipelines that were
to receive attention were: the Casseldale pipeline (1935); several
sections of the pipeline between Brakpan reservoir and Nigel (laid
between 1936 and 1965); the Brakpan interconnection pipeline
(1942); the West Springs-Modder East pipeline (1938); and the
pipeline between Leeuwpoot and Kleinfontein, which had been
laid in 1934 and added to in 1955. The total price of the work to be
done was estimated to be about R553 000.\(^{103}\)
The pipe replacement project, as well as the laying of new pipelines
implied that the board was a lucrative source of contracts for pipe
manufacturing companies. The country’s industrial sector had
made considerable progress since the 1940s when pipes still had to
be imported from overseas. In the years of international isolation
during the 1960s the country’s industries flourished and the
patriotic inclination to buy South African products was the order of
the day. However, there was one principle in the management
structures of the Rand Water Board that enjoyed priority. The
organisation would not compromise quality standards on the
materials it used. In 1976 political considerations also came into
play when one manufacturer of steel piping, Hall Longmore
Contractors (Pty.) Ltd, informed the board that it intended starting
with manufacturing operations in one of the homelands.\(^{104}\)
One implication of this type of business, aimed at boosting the
economies of the homelands, was that it would ultimately cost the
consumer of water more money. Enquiries made by the board’s
officials indicated that concerns like Iscor, Escom, the department
of posts and telegraphs as well as the railways did not pursue this
line. The board consequently decided it intended to resort to the
principle of special preference in respect of goods produced,
manufactured, or assembled in border areas. It was also agreed that

---

102. RWA, Minutes 1977-8, p. 111: 939th meeting of the Rand Water Board, headquarters,
Johannesburg, 1977.05.27. Chief engineer’s report no. 5624.

103. RWA, Minutes 1977-8, pp 111-2: 939th meeting of the Rand Water Board,
headquarters, Johannesburg, 1977.05.27. Chief engineer’s report no. 5624.

104. RWA, Committee of the whole board meeting, 1976.03.26, p. 3167. Secretary’s report,
no. 6659. A.J. de Witt.
all applications were to be dealt with in a uniform manner.\(^{105}\) In future competitive prices and quality were to be evaluated in even greater detail. The type of specialised equipment the board used, had to be of a high quality. It had to give years of good service.\(^{106}\) The board was also of the opinion that there were firms in the country, which had for a number of years been able to provide in the highly specialised requirements of the board.\(^{107}\) They could not be let down when decisions, with a political agenda, had to be taken. Gradually a new principle came into play. There was a sense of competition as more manufacturers started producing pipes. It implied that manufacturers of water pipes would have to compete with each other for supply contracts that could be profitable, providing they conformed to high quality standards. Replacing pipelines was expensive. Consequently, the board tried to preserve its existing pipelines and keep them in use for as long as possible. In 1982 research started into the linings of the board’s steel pipes. In a report A.B. Hardwick, one of the senior engineers of the board, explained that up to 1969 bitumen had been used as a lining in steel pipes. Subsequently there had been experiments with cement mortar lining and painted coatings. The life expectancy of bitumen was between 35 and 40 years. As a result of the age of many of the pipelines, Hardwick explained, it was necessary to start with a relining project. Cement mortar was considered the best solution. There were advantages. Cement was durable; it hardly had any effect on the quality of the water; it could withstand higher velocities than bitumen; was not easily damaged in the process of construction; and it was easy to do the work on site.\(^{108}\) Examples of the durability of the cement-lined pipelines were the 1200/1300 mm diameter pipeline between Mavillon and Pretoria.

---

105. Ibid., p. 3167.
and the 2100 mm Zuikerbosch-Mapleton pipeline. These pipelines were reportedly operating very well after they had been lined.

Illus. 9.11 A 600 mm sluice valve of a pipeline under construction on the Pretoria municipal boundary in 1980. Source Rand Water

In the 1982 investigation tests were conducted on the compatibility and the elasticity of the steel pipeline as well as the rigidity of the concrete linings. Attention was given to the responses of materials

under pressure. D.D.T. Trebicki, one of the board’s engineers, conducted the research. He was at the time busy with postgraduate studies at the University of the Witwatersrand under the supervision of Prof. D. Stephenson. Numerous tests were done on the concrete linings in the pipes. Attention was given to acoustic emission monitoring. When that did not work well a remote controlled vehicle (ROV) was put to the test. Video equipment was purchased to record crack patterns and their extent, and still photographs were taken of crack widths. Various local and overseas companies supported in the investigation by providing equipment. A Scottish company, for example, assisted in monitoring the cement lining while it was under test in a pipeline. At the same time the CSIR was monitoring the strain that concrete could take in the pipelines.

Ever since the 1960s special steps had been taken by the engineering division of the board to protect the pipelines against corrosion. The corrosion, research showed, was apparently caused by electrical currents, water, gas and petroleum in the soil. A number of protective measures were taken. Ageing pipelines were constantly repaired to prevent corrosion. This was difficult in areas where there were railway lines with electrical currents. The cathodic protection system implied that cables were placed in strategic areas in the ground. The measure tended to diminish the deterioration of the pipelines. In 1980 an extensive program was started to lay cables along the Esselen Park-Pretoria pipeline. Attention was also given to the Brakpan-West Springs, Leeuwpoort-Kleinfontein extensions, the pipelines between Rosettenville and the central part of Johannesburg, as well as the Daleside-Zwartkopjes system. By 1994 there were fewer than 112


cathodic protection installations in the board’s pipeline system. These were maintained on a bi-weekly basis.\textsuperscript{113}

The 1970s were also noted for the discussions amongst experts on the best type of pipeline – concrete or steel. In August 1973 the chairman, H.C. Stegmann, informed the board that a report was to be submitted in due time to the board in which it was recommended that steel instead of concrete pipelines should be laid in townships. The concrete pipes were found to develop leaks and bursts more often than steel pipes. It was also easier to repair breaks in steel pipes.\textsuperscript{114} There was a debate on the matter that had not yet been concluded. Then in March 1974 the board gave approval for an investigation, conducted by employees of the board and the firm of Steffen, Robertson and Kirsten consulting geotechnical engineers, on pre-stressed concrete pipeline joints. This followed after failures had been reported in the 1800 mm Palmiet-Klipfontein and the 1100 mm Meredale-Moroka prestressed concrete pipelines. Failures tended to occur exclusively at steel socket/concrete spigot composite joints in the pipeline.\textsuperscript{115}

**Water restrictions in the late 1970s**

Towards the end of 1977 the board introduced water restrictions after a drop in the annual average rainfall. On the East Rand and in the Eastern Transvaal, in particular, the effects of a drought being experienced were serious.\textsuperscript{116} The board was at the time upgrading and improving water mains in the region.\textsuperscript{117} Chief engineer R.J. Laburn told the board that the regular peaks for consumption in the region were between 175 and 220 Mℓ/d. The drought and the accompanying heat, caused the consumption of water to rise to as

\textsuperscript{113} RWA, Rand Water Board: annual report 1994, p. 9.
\textsuperscript{114} RWA, Komitee van die algehele raad, 1973.08.31, p. 2662.
\textsuperscript{115} RWA, Committee of the whole board meeting, 1974.03.29, pp. 2800, 2802. Chief engineer’s report no 5073. R.J. Laburn.
\textsuperscript{116} RWA, Committee of the whole board meeting, 1977.11.25, p. 3551.
much as 240 Mℓ/d.\textsuperscript{118} In the press it was reported that many of the reservoirs on the East Rand were only 30 to 35 per cent full. One reservoir, at Benoni, on occasion even ran dry.\textsuperscript{119} Before the end of November, restrictions were the order of the day. In urban centres, such as Benoni, Boksburg, Bethal, Brakpan, Devon, Heidelberg, Springs and even further at Kinross, Leandra, Nigel, Rensburg, Secunda, and Trichardt, residents were prohibited from using garden sprinklers. Government consumers were only allowed to use large amounts of water at certain times.\textsuperscript{120}

By mid-December 1977 it was reported that the prevailing drought conditions were affecting the greater part of the Transvaal and Northern Natal. Farming operations were severely hampered because of the heat and the lack of rainfall.\textsuperscript{121} However, by the end of the year the drought conditions abated and it was possible for the board to cope with the available water supply. In some areas drought conditions still prevailed. This was especially the case in the rural part of the Western Transvaal. For example, in 1978 residents of squatters’ camps such as Makau in the black homeland of Bophuthatswana, close to Ga-Rankuwa, had to pay local entrepreneurs between 50 and 70 cents for 200 ℓ of water. The entrepreneurs acted as ‘agents’ of local farmers who had boreholes on their land and in turn sold the water for 15 cents per 200 ℓ. The people then used donkey carts and trucks to transport the water to the squatter camps.\textsuperscript{122}

In May 1979, there were indications of water restrictions being introduced once again in the whole service area of the Rand Water Board after the levels of the Vaal and Bloemhof dams had dropped to between 15 and 25 per cent less than the same time in May 1978. Earlier the board had taken note that the minister of water affairs

\begin{footnotes}
\footnotetext[118]{RWA, Committee of the whole board meeting, 1977.11.25, p. 3551.}
\footnotetext[119]{ANON., “Water curbs continue” in The Star, 1977.11.21.}
\footnotetext[121]{ANON., “Droogte, hitte wurg boere nog plek-plek” in Die Transvaler, 1977.12.15.}
\footnotetext[122]{S. KGAME, “Water sales rake in cash” in Rand Daily Mail, 1978.01.09.}
\end{footnotes}
had been commenting on the state of dam levels. Then officials of the department of water affairs warned that water restrictions were imminent. However, they did give the assurance that notice would be given well in advance.

In June 1979, following an announcement by the minister of water affairs, Braam Raubenheimer, local authorities on the Rand braced themselves for the introduction of water restrictions that were to come into effect on 10 June. The department of water affairs cut its supply of water to the Rand Water Board by five per cent. The board took note with concern that it was unable to secure a five per cent saving from its consumers. What was initially considered to be restrictions that would be confined to Johannesburg and parts of the West Rand, soon spread to Benoni, Edenvale and Roodepoort. In addition, Pretoria too was targeted for restrictions. In the press there was speculation that the Pretoria-Witwatersrand-Vereeniging region was facing its worst drought conditions in 70 years. The flow of water into the Vaal dam was described as being the lowest in 55 years. Some of the emergency measures introduced included a clamp-down on the use of sprinklers in gardens, the

124. ANON., “SA se grootste damme al leër: minister kom dalk met waterbeperkings” in Die Vaderland, 1979.05.16.
126. ANON., “Waterbeperkings vir Rand op 10 Junie” in Die Transvaler, 1979.06.02.
127. ANON., “Gardens go thirsty one day a week” in Rand Daily Mail, 1979.06.02; ANON., “Water to be cut by 5 percent” in The Star, 1979.06.01; ANON., “Streng waterperke kom in Junie” in Beeld, 1979.06.02.
129. ANON., “More water curbs” in The Citizen, 1979.06.07; ANON., “Ten towns face water curbs” in The Citizen, 1979.06.05.
closing down of automatic toilet flushing systems in large public buildings, and the filling of swimming pools.\textsuperscript{133} Despite reports of good rains by August 1979 the water restrictions were not lifted.\textsuperscript{134} Instead, they continued up to October, when angry consumers started voicing complaints. One of the major arguments was that it did not make sense having water restrictions at the start of the rainy season.\textsuperscript{135} The rainfall figures for the first part of the month still indicated that it was less than the average for the time of the year.\textsuperscript{136} Uncertainty prevailed. Some experts predicted that 10 years of drought lay ahead for South Africa.\textsuperscript{137} Despite substantial rains over large parts of the Vaal catchment area the level of the Vaal dam only rose by one per cent towards the end of October 1979.\textsuperscript{138} Only towards the end of November 1979 were there indications that the restrictions might be lifted.\textsuperscript{139} In December Dr J. P. Kriel, secretary of the department of water affairs, nipped all expectations that water restrictions were to be lifted in the bud when he told the Sasolburg Afrikaanse sakekamer that his department was recording information on the lowest water supplies in 55 years. It was consequently unlikely for water restrictions to be lifted.\textsuperscript{140} By February 1980 good rains had the effect that the Vaal dam was practically full. Although the local authorities and the Rand Water Board were slow to inform consumers, the department of water affairs informally indicated that the curbs could soon be something of the past.\textsuperscript{141} At its February 1980 monthly meeting the

\textsuperscript{133} ANON., “Water restrictions could avert crisis situation” in Vereeniging and Vanderbijlpark News, 1979.06.08; ANON., “Waterperke tref só” in Beeld, 1979.06.07..

\textsuperscript{134} E. ERASMUS, “Waterperk voorlopig behou” in Die Transvaler, 1979.08.20.

\textsuperscript{135} ANON., “Vaal-waterperke sinloos, sê hoë kenner” in Die Vaderland, 1979.10.04.


\textsuperscript{137} ANON., “Tien droë jare wag op SA, sê geleerde” in Die Vaderland, 1979.10.19.

\textsuperscript{138} ANON., “Waterperke nie opgehef: Damme bly leeg ná groot reën” in Die Transvaler, 1979.10.23.

\textsuperscript{139} C. MARAIS, “Curbs on water may be lifted” in Rand Daily Mail, 1979.11.27.


\textsuperscript{141} ANON., “Daar is oral water” in Beeld, 1980.02.19.
Johannesburg city council lifted the water restrictions. Because of the good rains it was possible for the first time in many months to open the sluices of the Vaal dam. The effect of water restrictions was still evident by March 1980, long after the curbs had been lifted. According to the city engineer’s department in Johannesburg, water consumption was on an average five per cent lower than previously.

In the 1980s drought conditions once again forced the board to introduce restrictions – this time more comprehensive than ever before in its history of more than three quarters of a century. By implication this condition suggested that the available water resources of the Rand Water Board were insufficient to cope with the growing demand. It was thus necessary to find alternative sources of supply.

Phase II of the 1970 additional water supply scheme

In 1975 the board approved phase II of the 1970 additional water supply scheme. It was intended to increase the amount of potable water produced by 600 Mℓ/d, at an estimated cost of R150 million. A major component of this phase was the construction of a new outlet from the Vaal dam, a pipeline along the north bank of the Vaal river, and the construction of the Vaal dam-Zuikerbosch canal, discussed above. For the board the acquisition of the additional water was of vital importance. It was clear that its available supply was increasingly unable to provide in the growing demand for water.

143. ANON., “Sluices are open and restrictions dropped” in Rand Daily Mail, 1980.02.19.
144. ANON., “Min water is verbruik” in Die Vaderland, 1980.03.07.
By 1979 it was argued that, in retrospect, parts of the original 1970 supply scheme not yet completed were partly responsible for the prevailing water restrictions. Although the water crisis was described as being ‘only a temporary measure’ it was an indication that there were shortfalls in the available supply. Officials at the department of water affairs tried to play down the significance of the water curbs from a governmental perspective by predicting that it would be at an end by 1982. \(^{149}\) It was clear to the board that the matter had to be addressed in a direct and immediate manner.

Illus. 9.12 In the early 1980s Zuikerbosch pumping station was a hive of activity. This photograph, taken in 1981 shows three of the four 200 Mt/d sedimentation tanks upon completion at the plant.

Source: Rand Water

Since the 1970 scheme had been tabled substantial changes had taken place. Parts had been deferred. Others were deleted, or simply altered to suit short-term requirements. One such change was the plan to utilise the advantage of a lower watershed in the vicinity of Boksburg. A 2,1 m diameter pipeline was then built over

a distance of about 78 km, from Zuikerbosch pumping station’s treatment plant via a booster pumping station at Mapleton to a reservoir at Vlakfontein near Benoni. This pipeline was capable of pumping 600 M\(\ell\)/d into the Vlakfontein reservoir to supply water to the urban areas to the north of Johannesburg. It was completed in March 1979.\(^{150}\) Although this project had major long-term benefits, it was clear that more future-orientated thinking was necessary when the board wanted to cope with any anticipated growth in demand for water.

In the first phase of the 1970 additional water supply scheme, provision was made for a pumping station at Mapleton (about 12 km south of Boksburg). Its supply was to come from Zuikerbosch. The Mapleton pumping station was to supply water \textit{via} Rynfield in Benoni to the Vlakfontein reservoir.\(^{151}\) In the second phase of the 1970 scheme, the Mapleton pumping station was to be developed to a capacity of 600 M\(\ell\)/d. Ultimately it was scheduled to cope with a capacity of 1800 M\(\ell\)/d.\(^{152}\) The objective was to use this pipeline to provide water to large parts of the East Rand, which included Brakpan and Springs.\(^{153}\)

Another major development of the time was the Eikenhof booster pumping station. It formed part of the 1970 additional water scheme. The station, with a nominal capacity of 600 M\(\ell\)/d was situated about 10 km northwest of Zwartkopjes. Water from Zuikerbosch was pumped to Eikenhof. It was then chlorinated and re-pumped by means of an electric motor-driven centrifugal pump to the Meredale Reservoir, which served the West-Rand. The Eikenhof pumping station also pumped water to Diepkloof at a maximum head of 239 m.\(^{154}\) One major advantage of the booster


\(^{152}\) RWA, Committee of the whole board meeting, 1975.09.26, p. 3057. Chief engineer’s report no. 5287. R.J. Laburn.


station was that it could provide valuable support in the process of supplying the fast-growing black townships of the West Rand with water. In the years to come this proved to be a valuable addition to the board’s system. As the general standard of living in the black townships improved the demand for water increased. In this indirect manner it was possible for the Rand Water Board to make a meaningful contribution towards restoring the human dignity of a portion of the country’s population that had been disadvantaged by earlier policies.

**Pollution**

By the second half of the 1970s the stepped-up program of action to combat pollution was beginning to pay handsome dividends. Problems experienced with water hyacinth *Eichornia crassipes* were addressed by concerted actions. In comparison with other water storage areas, the Vaal river and Vaal dam experienced few problems as far as algal growth and water hyacinth were concerned. In fact, the problem of weeds on the Barrage was well under control. The board conducted frequent pro-active operations to remove the weeds manually from the river. This proved to be successful and it was possible for the chief engineer to report to the board:

(T)he Vaal river Barrage reservoir is one of the least weed-infested of all the Republic’s eutrophied water bodies.

However, the struggle for an environmentally friendly water system was not yet complete. There was an increase in specialised measures to dispose of effluents. The country’s chemical industry was growing rapidly and it diversification was an outstanding feature. Consequently the board was forced to start making use of specialised methods to detect traces of pollution. It was also at the

---


156. ANON., “Duiwelsblom los in Transvaal” in *Beeld*, 1975.08.22.

time becoming a viable proposition to provide commercial pollution disposal services. Officials of the board constantly took note of the latest developments.¹⁵⁸ It was common knowledge that commercial concerns had the task of disposing of polluted materials. Consequently the board’s officials started taking note of solid waste disposal sites in the catchment areas of the river. Surveillance operations became part of routine activities of the board.¹⁵⁹ Special attention was given to industrial effluents that passed through municipal sewers. When dangerous effluents were traced, surveillance officials and municipal authorities conducted inspections before steps were taken to combat illicit effluent discharges. The worksheet of performance in the field was good. In the 1974 financial year the board took steps against 10 factories. Five were in Springs, two in Germiston, one in Vereeniging, one in Vanderbijlpark and one in Nigel. Officials of the board in the course of the year conducted about 1500 factory inspections. In many cases the factories addressed the problems by spending substantial sums of money on improving effluent disposal systems. Other factories incurred massive savings by consuming less water.¹⁶⁰ The pollution situation in the Vaal Triangle was later the subject of a research project undertaken by officials of the Water Research Commission in conjunction with the board.¹⁶¹ Some local industries were sensitive to environmental pollution. One such industry was Natref, the national petroleum refinery at Sasolburg. By 1972 it already had an effective water conservation project in place. In the design of the plant provision had been made for the speedier maintenance of some key plant elements in an effort to combat pollution. The refinery resorted to extensive air-


cooling instead of water-cooling practices. In cases where it could not be applied, cooling was conducted within closed water reticulation systems. Special measures were also introduced to ensure that the outflow of water was within the prescribed limits required by the water authorities.\footnote{162}{J. MEINTJES, \textit{Sasol 1950-1975} (Tafelberg, Kaapstad, 1975), pp. 139-40.}

Because of the board’s efforts to control pollution, nine local authorities in the Vaal river catchment area employed additional staff for effluent inspection and related activities.\footnote{163}{RWA, Minutes 1974-5, p. 215: 907th meeting of the Rand Water Board, Headquarters, Johannesburg 1974.09.27. Chief engineer’s report, no. 5136, R.J. Laburn.} The effect of these measures was that one of the larger industrial concerns, Iscor, made a substantial investment in a filtration plant to improve the quality of effluent before it flowed into the Barrage reservoir.\footnote{164}{A NON., “Filtreeraanleg spaar baie geld” in \textit{Vaalweekblad}, 1977.09.02.} The Sasol factory, in the neighbouring town of Sasolburg, at the time spent R18 million to clamp down on pollution. The company acknowledged the fact that it had started operations at a time in the 1950s when pollution control measures were not as strict. In the 1960’s measures had been introduced to conduct tests to bring down the levels of water and air pollution in conjunction with the CSIR. By 1979 the company was aware of how important it was to lower pollution levels to the satisfaction of the people working at the different factories in the industrial area, as well as the residents of the town.\footnote{165}{A NON., “R18 milj. Om besoedeling te bekamp” in \textit{Vaalweekblad}, 1979.08.17.}

Sewage pollution, which was to increase in the next two decades, was posing insurmountable problems. Apart from the fact that sewage effluent has a high degree of dissolved salt content, it also contains nitrates, phosphates and ammonia, which are conducive to the growth of algae. Sewage water also contains a wide-ranging number of bacteria and viruses.\footnote{166}{RWA, Minutes 1969-70, p. 83: 844e gewone vergadering, hoofkwartier, Johannesburg, 1969.06.27. Hoofingenieursverslag, nr 4586, R.J. Laburn.} In its efforts to provide consumers with high quality water, the Rand Water Board was faced with numerous challenges in this area. In a 1974 report to the
Chapter 9

board Laburn reported that there had been a significant improvement in sewage disposal effluent. The majority of local authorities did not keep abreast with the inexorable increase in effluent, which according to projections by experts, tended to double every ten years. The consequence was that sewage had a negative impact on the Barrage catchment area. Laburn pointed out:

Although the tributaries draining the Witwatersrand still include extensive vlei areas, rich in self-purification capability, the effects of this increase in sewage flow are clearly seen in the colour deterioration and the increased chlorine demand of the water abstracted at Vereeniging. There had been considerable technological progress in water treatment since the 1960s, Laburn explained, but it was necessary to make more use of it, if the problem of pollution was to be addressed in the Barrage area. The pressure the Rand Water Board brought to bear on the local authorities had the effect that expensive but efficient sewage schemes were developed. In the case of Meyerton the expenditure amounted to R6.5 million. Vanderbijlpark municipality invested extensively in the improvement of its sewage system.

In an effort to prevent sewage pollution, the board had over the years resorted to requesting the director of local government to withhold approval of new townships, town planning amendment schemes and subdivisions, until the local authorities had made proper sewage disposal provisions. This was still the order of the


171. RWA, Newspaper clippings 1975-8. Undated newspaper report, ANON., “R2,6m sewage system starts”.

372
day in the 1970s. By 1974 the director of local government also started referring all
applications for subdivisions of land, in its area of service, to the board. Especially in terms of real estate development this was an
important measure. The board was faced with sanitary threats to
the water supply. The Transvaal board for the development of peri-
urban areas had also in the 1970s been given the task of planning
the development of the Vaal dam-Barrage area. This government
authority was also constantly in communication with the board on
the necessary measures to ensure sound development. One of the
underlying principles of policy started taking shape among officials
of the board who were responsible for monitoring pollution,
namely that it was more effective to control pollution pro-actively
than retrospectively.

A new central depot

Part of the board’s decentralised system of planning started taking
shape in the early 1970s. In 1973 the central distribution, transport
and stores complex at Village Main in central Johannesburg was
scheduled to be closed down and transferred to Zwartkopjes. This
decision followed in the wake of plans that had been made in the
late 1960s to remodel the central depot. It was necessary because of
severe congestion. The Central Depot was situated about 1,5 km

---

172. RWA, Minutes 1974-5, p. 215: 907th meeting of the Rand Water Board, Headquarters,
Johannesburg 1974.09.27. Chief engineer’s report, no. 5136, R.J. Laburn. See for example
173. RWA, Minutes 1974-5, p. 215: 907th meeting of the Rand Water Board, Headquarters,
174. Ibid., p. 217: 907th meeting of the Rand Water Board, Headquarters, Johannesburg
175. Ibid., p. 217: 907th meeting of the Rand Water Board, Headquarters, Johannesburg
176. RWA, Minutes 1972-3, p. 341: 887th meeting of the Rand Water Board, Headquarters,
from the board’s headquarters in the Johannesburg Central Business District (CBD).\textsuperscript{177}

\textbf{Illus. 9.13 Fraser Street head office in 1977. Source: Rand Water}