The substance of ubiquity

Dedicated to the memory of Kitty Degueldre (1919-2000)
who spoke to me of water long ago
The substance of ubiquity
Rand Water
1903-2003

By
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As society emerged over the course of several hundred years, water became the stuff that cleansed, rid the town and the human body of waste, purified, cooled, quenched thirst, irrigated, offered recreation and enhanced urban aesthetics. At the same time it was also a subject of struggle between farmers, industrialists, social movements, government agencies, town planners, hygienists, gardeners, bankers and commercial firms. At a more general level, water has had a ‘civilizational’ role, for tapped water and flush toilets inside homes have long been regarded as essential preconditions for modern society.

The term ‘ubiquity’, used in the title to this study was brought into general usage in the English language towards the end of the Middle Ages. Apart from its apparent spiritual significance, it was used to explain the effect of law and monarchical authority in society. At present ubiquity is frequently used to describe many cultural manifestations, inter alia trends in fashion and global

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2. See Encyclopaedia Britannica, Ultimate reference suite DVD.
contexts of development. From a materialist perspective, water is perhaps one of the most ubiquitous of natural substances in our daily lives. It is an essential for the sustenance of the human body. Without it we are liable to dehydrate and succumb. The world around us would lose its inherent vitality. In short: water is life. However, water is also a scarce commodity. Only 0.644 per cent of the earth’s upper crustal and surface water comes in a liquid form as fresh water. Of that amount 99 per cent is underground.

Water is hard to come by – particularly in some of the arid parts of Africa. In the case of South Africa the awareness of a shortage of water and its general scarcity is increasingly forcing the government to require of the people that greater care be taken to ensure careful consumption and distribution.

This study tells the story of how water as a ubiquitous substance was distributed to one of the most active social and economic regions in Africa in the twentieth century. The institution that was instrumental in the process of distribution is an organisation of substance – Rand Water. It is the story of this utility we shall narrate in the pages to follow.

Over the past century a number of authors have made meaningful contributions towards contemporary historical contextualisations of Rand Water. An outstanding feature of the available historiography is that primarily persons in the employment of the utility were responsible for writing on the topic. M. McCormack, secretary to the board, wrote the first history of the Rand Water Board,

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published in 1912. It is a detailed exposition of the manner in which the utility was structured and commenced operations at the start of the twentieth century. Two decades after the founding of the board, another history by an anonymous author, was published. The publication formed part of the festivities commemorating the inauguration of the Barrage. It was followed in 1924 by a more detailed study, also written by an anonymous author, on the basic operations of the board. It was intended as an information document for visiting British parliamentarians. In 1927 the retiring chairman of the board, Mr. T.A.R. Purchas, published an interesting article on the topic in the Municipal Magazine. A long time passed before any substantial history was again produced.

In 1955 an anonymous history on the operations of the board was published. It was written in a nippy journalistic style. The publication was intended for a popular readership and appeared at the time the Zuikerbosch pumping station was officially taken into use.

The most prolific author on Rand Water’s history has been Dr R.J. Laburn, a former chief engineer of the utility. His major

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8. Anon., *Rand Water Board: short description of the board’s undertaking (prepared in connection with the visit of the Empire Parliamentary delegation to the Board’s Vaal River works on the 11th October, 1924)* (Hortor’s, Johannesburg, 1924).


contribution was a study to commemorate the utility’s 75th anniversary in 1978.12 As an engineer Laburn concentrated extensively on detailed descriptions of engineering aspects. His insight and visionary leadership as an outstanding engineer stood him in good stead. From the mid-1960s to the early 1980s he was instrumental in providing a sound historical foundation for numerous research-based studies on the utility.13 It was an era when water research in South Africa made considerable progress. The government in the 1970s invested heavily in the development of scientific research and water related technology. It was reflected in many of the technical research initiatives of members of staff of Rand Water at the time. Although there were frequent references to the historical development of the organisation, hardly any standard historical texts appeared. Only in the mid 1980s was the drought in history related investigations reappear when another Rand Water staff member, Dr H.T. Ramsden, completed his doctoral dissertation in law. The study shed light on a number of interesting historical themes in respect of Rand Water and its legal status.14

In the 1990s the first academic studies by people outside the organisation started appearing. The relatively new field of environmental history that gained popularity internationally partly inspired the new trend.15 Cosser was the first to write on the early history of the water supply of Johannesburg. Extensive attention


15 .  For more on the new trend and its development in South African historiography, see S. DOVERS, R. EDGECOMBE and B. GUEST (eds), *South Africa’s environmental history: cases and comparisons*, (David Philip Publishers, Cape Town, 2002).
Acknowledgements

was given to the private enterprise initiatives to provide water to the city. A substantial part of the work, dealt with the early history of Rand Water.\textsuperscript{16} A further two articles appeared at the turn of the new century.\textsuperscript{17}

Although the present study is primarily a centenary history, it is also aimed at contributing to the corpus of information on the water history of South Africa. For the past century Rand Water has been a reliable service provider to one of the most dynamic economic regions in Africa. Without this institution, which as a result of the ubiquitous nature of its product, appears to be almost invisible, development would hardly have materialised. It is therefore a narrative of accomplishment and dedicated service to South African society. The story of Rand Water, at the start of the twenty-first century, is also one that reflects the ideals and aspirations of a new South African society. In it the values of a dynamic multi-cultural democratic society is a major theme. Furthermore, concerns with the environment, and particularly a greater responsibility towards the careful use of water have become a significant part of Rand Water’s activities.

It is hoped that in this study justice is done to the record of outstanding accomplishments of the utility over the past hundred years.

Many people have provided valuable assistance in the process of researching this study. Some need to be singled out.

Ms June Lötz, of Rand Water’s marketing division, facilitated the discussions on the research contract and provided valuable support

\begin{itemize}
\item[\textsuperscript{16}] E.M. Cossor, The impact and management of water scarcity in Johannesburg, 1886-1905 (MA, UW, 1990).
\end{itemize}
Author’s note

in many areas of negotiations with management, staff and people outside the organisation. Without her dedicated support the project would not have materialised.

Jannie Ferreira and his staff at the records division of Rand Water provided access to the minutes of various committees, the files in the archives and miscellaneous documents. Their co-operation is appreciated. The library staff at Rietvlei, Augusta Schoeman, Steven Ramela and Tembisa Maqwati, were most helpful in finding sources. They also made available space in the library for me to work. For two months in 2002 the library was a home away from home. Also, a word of thanks to San Geldenhuys and the staff other staff members of Potchefstroom University’s Vaal Triangle Faculty library for their valuable support.

I would like to express my gratitude to the staff of the South African archives repository in Pretoria, the University of Cape Town’s libraries, manuscripts and archives division, as well as the city of Johannesburg’s library and information services section where it was possible to work in the Harold Strange library of African Studies.

At the start of the project we requested an evaluation panel to be appointed. The requirement was that the panel’s members had to be people with years of experience in the organisation. The team ultimately consisted of Vincent Bath, Jannie Ferreira, Maggie Letsoalo, Tom Ramsden, Sid Smit, Etienne Myburgh, Gert van der Westhuizen, James Gardiner, Bob Laburn, Attie van Rensburg, Tony de Witt and Dale Hobbs. Each member worked through the manuscript and provided valuable detailed comments and constructive criticism. Later, at a meeting, held at Rietvlei on 7 February 2003, we discussed the manuscript as a group. Questions were asked, comments were made and clarity was gained on a number of matters. Afterwards there followed further personal discussions. The contribution of this team, towards making the work factually more correct is appreciated. It ensured a high degree of quality control. In more than one way their unstinting support
Acknowledgements

and assistance is representative of the quality of people that have been part of Rand Water the past century.

At the recommendation of the Rand Water management a further panel session was held on 21 February 2003 at Stone Manor in Vanderbijlpark with selected employees. The participants were Koble Elijah, Elsa Swanepoel, Annette Saayman, Bheki Buthelezi, Lenely (Lizzie) Nkomo, Ivan (Foxy) Louw, David Ndou, Andrew Radebe, Paulus Nhlapo, George Cindi and Moroka Makuru. This was a valuable opportunity to get workers’ perspectives on the organisation and its history. Important oral historical information, dating back to the early 1960s, was acquired in this manner. I am grateful for their contributions and the opportunity to share some insights on the centenary project with them. In many respects their story is the forerunner of the shape Rand Water’s history will take on in the century to come.

The board’s present chairman, Pirosław Camay, needs to be singled out. He worked through the manuscript and provided important information on recent trends within the organisation. Other Rand Water staffers who gave advice and valuable information include Francois van Wyk, Tony Els, Johan Kohl and Lourens Human. Despite busy work schedules they found the time to respond to my requests. Thanks to them.

Four specialists helped with the proofreading and editorial preparation of the manuscript. They made valuable editorial comments. A special word of thanks to language consultant Johan Blaauw, fellow historian Dr Karl Koperski, as well as Ms Althea Kotzé for undertaking this important task. Professor Johannes Haarhoff of RAU came in towards the end of the project and undertook the task of working through the text from a technical perspective. His advice and recommendations, as an experienced academic and specialist in water research, was of immense importance. I am deeply grateful to him.

A valued student and fellow historian, Valerie Zangel, provided support in the form of books and the search for illustrations. Also
an analytical chemist, Prof. Paul Coetzee of RAU, in the last stages of proofreading provided valuable advice with technical terminology. Thanks to them.

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Finally, thanks to my wife Elise and our two sons, Johann (junior) and Gustaf. They were prepared to go without a husband and father for almost a year. Without their support, this study would not have been possible.

Johann Tempelhoff

Vanderbijlpark

25 July 2003
Chapter 1

Early human settlements on the Highveld and their water supply

At Sterkfontein, north of Krugersdorp, not far from where the pipelines of Rand Water pass through the Magaliesberg, to transfer water to rural and industrial communities in the North West Province, palaeontologists in the twentieth century found traces of early humankind dating back to as far as three million years before the present.¹ It is here at Sterkfontein and Swartkrans where early hominids of the *Australopithecus robustus* and *Homo habilis* type made tools from stone and bone to hunt and dig up roots from the soil. Further south, on the banks of the Klip River, close to Vereeniging, not far from where Rand Water’s major pumping stations are situated, palaeontologists have discovered traces of (*Homo erectus*), people who had walked upright, some 200 000 years before the present.² These people were hunter-gatherers who lived

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in caves and elementary natural shelters.\(^3\) Of their environment we know:

Most of the places of habitation were next to rivers, streams, near fountains or in marshes or swampy areas. In these regions most of the types of game occurred on which the Acheulian hunter preyed. He hunted large game, among others wildebeest. One of the hunting techniques was to drive the animals into marshy areas and kill them there.\(^4\)

About 120,000 years before the present middle Stone Age people, north of the Vaal River, made smaller tools. They tended to have a somewhat different lifestyle compared to that of their early Stone Age ancestors. Numerous climatic changes had taken place. One outstanding development was that rainfall declined and the land became drier. The sea began to recede. In some areas forests started making way for bush and grassy plains. Water was still abundant. Humans and other animals could live in relative comfort. They could now settle in areas that were previously considered to be inhospitable. It was in this period that the first fire-making skills were mastered.\(^5\) Contrary to earlier assumptions, these early communities of humans in many cases resorted to scavenging activities. They would, for example, take over carcases of dead animals that had died natural deaths or had been killed by carnivores like lions and leopards.\(^6\)

About 40,000 years ago yet another change took place in human society in the South African interior. The advent of the late Stone Age saw people settling in substantial number as communities on the grass plains of the Highveld. They used exquisitely well-shaped stone and bone tools for cutting and scraping flesh and skin, as well as for honing and drilling holes. These instruments were small, but the story they tell is one of outstanding craftsmanship. Archaeologists have been unable to find traces of people in the

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5. Ibid.
Early human settlement on the Highveld

region between 9000 and 4500 years before the present. It remains an open question why this state of affairs prevailed. However, once the humans reappeared, continuity was restored. Most likely they had been forced to change their lifestyle because of unfavourable climatic conditions. They may even have migrated elsewhere, only to return once again. From this evidence it is possible to make the assumption that some areas of the South African interior, and therefore also the region currently provided with water by Rand Water, was uninhabited from time to time.\(^7\)

The San and Khoi
The San\(^8\) and Khoi\(^9\) people of Southern Africa, sometimes also referred to as the Khoisan,\(^10\) can be categorised as late Stone Age people. The San were hunter-gatherers, living in small communities of about 24 people, depending on the ability of the environment to sustain humans. It is possible that the later Stone Age people (from about 40 000 years ago) who used microliths (smaller stone and bone tools) were the direct ancestors of the San. These people had learnt the necessary skills to survive under all types of conditions. They are currently noted for their outstanding ability to survive in the arid parts of the subcontinent. However, there was a time when these people were resident in the water-rich environments of the region. Some communities even resided in the coolest mountain areas of Lesotho and the wettest of subtropical areas in KwaZulu-Natal.\(^11\)

\(^7\) H.J. VAN ASWEGEN, *History of South Africa to 1854*, (1990), (JLVS electronic library).
\(^8\) Formerly known as the Bushmen.
\(^9\) Formerly known as the Hottentot.
\(^10\) This reference is usually made on the grounds of cultural processes that had taken place once the later San hunter-gatherers and Khoi pastoralists integrated in the interior.
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For the purposes of this discussion it is important to take note how these early South Africans had adjusted to arid conditions and were able to survive with very limited water supplies.

By making use of ostrich eggshells and skin containers they were able to store the water and fluids necessary to sustain them. They were also familiar with the plants of their environment and knew which roots contained large quantities of water. This secured their survival, even in desert conditions.

Illus. 1.1. An ostrich eggshell water container used by the San. Source: G.W. Stow

Water was a substance that everybody needed in relatively substantial quantities. In fact, it was the critical resource that shaped the survival or people. In communities where it was in short supply, such as that of !Kung, control over water resources and vegetables was placed under the authority of a hereditary custodian. This was because of the role that topophilia – a love and passion for specific environments in which they resided as communities – played in their lives. It was also a means of placing scarce goods and services under the authority of a leadership that had to act in the interest of the group as a whole.

12. W. BEINART and P. COATES, Environment and history: the taming of nature in the USA and South Africa, p. 9
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The domestication of livestock took place about 8000 years ago in the northern parts of Africa. This required of people to be resident in areas where grazing and abundant water supplies were available.\(^{15}\) Khoi communities drifting into the interior of Southern Africa after the San, were skilled pastoralists and consequently able to provide for their protein requirements in a more consistent and sustained manner. They were not very settled in their habits of residence and tended to move about the countryside in search of grazing for their livestock. Their nomadic lifestyle enabled them to frequent areas where agriculturalists were unable to reside. They were a temporary presence on the landscape and did not need to explore the long-term prospects of settlement.\(^{16}\) The Khoi tended to move around in larger groups than the San. They were able to secure food for consumption more easily and could consequently live in groups numbering several hundred.\(^{17}\)

![Illus. 1. 2. Southern Africa. Source: Encyclopaedia Britannica](image_url)
Important clues to understanding our early African ancestors on the Highveld are to be found in the documentation recorded on rocks by ancient artists and shamans. Until recently it was believed that the oldest rock art in South Africa was about 27 500 years old.\textsuperscript{18} Since the turn of the new millennium discoveries at Stilbaai in the Southern Cape have shifted the time scale back to 66 000 years before the present.\textsuperscript{19} Rock engravings (petroglyphs) in open spaces and wall paintings in caves are very important records of the past. As a form of visual communication – preceding the written language – these works of art tell us about the world of ancient Africa. Some experts are of the opinion that the rock art is the product of spiritual experiences. What is more important for our purposes is that the art narrates fragments of the natural history of the environment. It is possible to determine where people were resident, what they perceived in their environment and how they committed their perceptions into visual images, thereby paving the way for what eventually was to become written language some six thousand years ago.

On a small island at the Vaal River Barrage, not far from Rand Water’s Number 2 water inlet to the Vereeniging pumping station, there are a number of rock engravings, amongst others an elephant and an eland. These petroglyphs tell the story of what the local inhabitants had seen in the water rich environment in which they were resident. It is difficult to tell how old these works of art are, but they might well go back several thousand years. The chances are that later Stone Age hunters were able to ambush wildlife in marshy areas of the river from where they could not easily escape. The animals would then be stoned or beaten to death. In this manner, the hunters could provide their communities with valuable meat and materials such as hides, bones and ivory. It is

\textsuperscript{18} D. LEWIS-WILLIAMS and G. BLUNDELL, Fragile heritage: a rock art fieldguide, p. 5.
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possible that fishing with spears and traps would have been a popular means of procuring food in the Vaal River.

Illus. 1.3 Rock engraving of an elephant on an island in the Vaal River close to Rand Water’s Vereeniging pumping station. Photo: JWN Tempelhoff

Illus. 1.4 Engraving of an eland on an island in the Vaal River Barrage. Photo: JWN Tempelhoff
A little further to the north of Vereeniging, at Redan, on the banks of one of the tributaries of the Klip River, abstract rock engravings also bear evidence of the human past in the vicinity of a water supply.\(^{20}\) On this site most of several hundred surviving illustrations are abstract shapes and designs, suggesting that the sun formed a focus of observation. There are a few animal designs, but most of the engravings deal with abstract symmetry and form. For some archaeologists and paleo-anthropologists many of these sites of rock art are considered to have been ceremonial areas of religious worship where, for example, rainmaking rituals could have been performed.\(^{21}\) Experts date the site back to between 200 and 4000 years before the present.\(^{22}\) It could even be earlier. What is important is that here in the rock art of the region there are indications that sources of water have been instrumental in enabling humans to articulate their cultural creativity by embellishing the experienced world in expressive forms of art.

**Stone and Iron Age integration**

In the third century AD the first large groups of Iron Age people drifted into South Africa. They were Bantu speaking people who had mastered the skills of mining and working with metal. It formed part of a history of technological innovation that had started about a thousand years earlier in the Mediterranean area and then spread to Western Africa.\(^{23}\) The Iron Age people were technologically more advanced than their Stone Age neighbours. Their industrial skills enabled them to become specialists in the manufacture of tools of farming, war and hunting, such as picks, spears, arrowheads and axes. They could also make tools for


\(^{22}\) Information Ms. M. Prins currently busy with Ph. D.-studies at PUCHE on the petroglyphs of Redan.

industrial activities such as adzes, picks and hoes to till the lands. At first these settlers preferred to reside in the frost-free areas of the Lowveld and the coastal regions. Then from about 1450 they started moving into the interior where they settled on the Highveld.\textsuperscript{24}

Illus. 1.5 Iron Age smelters plying their trade in the Lowveld in 1880. This is an industrial custom that was brought to Southern Africa more than 1700 years ago. Source: Harold Strange Library of African Studies, Johannesburg.

Iron Age and Stone Age communities tended to mix and even unite to form single communities with a common culture exclusive to their environment.\textsuperscript{25} This was the case especially in areas where Iron Age settlements were in close proximity to the Kalahari-type environments.\textsuperscript{26} Tswana communities, for example, maintained close relations with hunters, the Sarwa, who were part Khoi.\textsuperscript{27} They became clients of the Tswana, opening up trade opportunities with communities deep within the Kalahari interior. The Iron Age

\begin{footnotesize}
\begin{enumerate}
\item RW, Typescript manuscript: “Rietvlei Nature Reserve”
\item R. MASON, Prehistory of the Transvaal: a record of human activity, p. 373.
\item H.J. and J. DEACON, Human beginnings in South Africa: uncovering the secrets of the Stone Age, p. 133.
\item M. WILSON, “The hunters and herders” in M. WILSON and L. THOMPSON (eds.) A history of South Africa to 1870, p. 165.
\end{enumerate}
\end{footnotesize}
village had stonewalls. Sometimes the people lived in caves, but most of the time they built circular huts of stone and adobe. In close proximity to the settlement members of the community would busy themselves with mining metal ore, the manufacture of tools, pottery manufacturing and food production such as gardening and livestock farming.\textsuperscript{28} In cases where livestock comprised part of the domestic environment, the herders moved after grazing, sometimes at a great distance from the main settlement.

In integrated societies members of San communities tended to offer their services, performing tasks in exchange for food supplies.\textsuperscript{29} It is possible that combined early Sotho-Tswana communities formed part of the Iron Age settlements in the southern parts of Gauteng.\textsuperscript{30} The Iron Age residents of the region go back to at least AD 1500.\textsuperscript{31} Traces of these settlements are found at Rietvlei, where the head office of Rand Water is situated, on the edge of the Witwatersrand, overlooking the Klip River Valley. The dominant motive for human settlement was a moderate climate and the necessary resources to secure a livelihood on the grasslands of the Highveld. It was here on the Witwatersrand and further northwest, in the Magalies mountain range, close to well-wooded and well-watered areas where settlements started taking shape. The area suited stock farmers. There was little threat of the tsetse fly and the dreaded disease, \textit{trypanosomiasis}, (sleeping sickness) which it carried.\textsuperscript{32}

Water was important for the industrial processes of pottery and iron smelting taking place in the Melville \textit{kopjes} as early as AD 1060.\textsuperscript{33} The agriculturalists also required water for purposes of irrigation. Communications and trading relations with

\begin{thebibliography}{99}
\bibitem{28} R. Mason, \textit{Prehistory of the Transvaal: a record of human activity}, p. 373.
\bibitem{33} \textit{Ibid.}, p. 135.
\end{thebibliography}
communities in the plateau below the Witwatersrand ridge would also have been important considerations when communities settled down in the Klipriviersberg area.

The land was well settled and communities formed villages where water, wildlife and energy sources were in abundance. It is possible that elementary land rotation practices were the order of the day amongst agriculturalists in the area. Sotho families liked to settle in dense communities on the summits of mountains and against hillsides. On the southern Highveld, archaeologists have identified different types of stone-built village and town settlements. In general these settlements were situated in luxuriant environments, with low trees along the hill slopes and pools of water interconnected by small streams. Reeds grew close to and in the water. They were essential for covering the roofs of huts, and in some were even used to form the walls of houses. The dwellings had plastered walls, an indication that water was available in abundance to make clay. Often the settlements formed part of cattle outposts where water was also available. There were further indications, as in the case of Southern Sotho towns such as Ntsuanatsatse, that well ordered political systems of government secured development. Architecturally these settlements were also appealing. Valuable local resources such as water, graphite, salt, iron ore, lead copper and gold, resorted under the authority of the local ruler. Also the skills required for the effective use of these materials would have been subject to the ruler’s authority. Water was however a ubiquitous substance, used by all. But when water sources started drying up, communities had to disperse.

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The origins of the Tswana, one of the major linguistic groups in Gauteng and the Northwest Province, can be traced back to the thirteenth and fourteenth centuries. It was the era of the three founding ancestors, Morolong, Masilo and Mokgatla. Morolong lived in western Gauteng and Masilo lived in the northern parts of the province. Mokgatla was resident in northeastern Gauteng in the fifteenth to sixteenth centuries.\(^{38}\) There were a number of splits and numerous new chiefdoms appeared. They tended to interact with neighbouring Khoisan communities and seldom sought to maintain self-contained ethnic entities.\(^{39}\)

Some researchers accentuate modes of production in the process of interpreting the archaeological past. It is generally accepted that small communities, in order to conserve energy, tended to form on grasslands instead or in woodlands. Settlements in woodlands had to be numerous. Many people were needed to clear the land. In the process they could acquire materials, such as wood, for the purposes of construction and energy.\(^{40}\) It can be safely assumed that Iron Age communities were familiar with local water supplies. It required

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human energy to collect and transfer water. Consequently, water sources would not be at too great a distance from settlements. At the same time it was necessary to take measures to ensure that the sources were well clear of intense human and animal traffic. It was essential to maintain the pristine quality, privacy and security of the sources. Archaeological maps of old settlements suggest they were as a rule within reasonable range of substantial rivers and streams.41

Illus. 1.7 Settlement on the Highveld in the early 1880s. Source: Harold Strange library of African Studies, Johannesburg.

The Difaqane, also known as the Mfecane, was responsible for substantial societal change in many parts of what are today the provinces of Mpumalanga, Gauteng, the Northwest and Free State. Oral information and written documentation tell the story of a series of wars waged in southern Africa when invading armies from what is today known as KwaZulu-Natal started penetrating the interior. This happened basically in the period from 1790 to 1830. Small communities, unable to stave off the attacks of Nguni

41. See for example the distribution map of settlement on the Southern Highveld in M. Hall, The changing past: farmers, kings and traders in southern Africa, 200-1860, p. 50.
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warriors from the coastal region, were either exterminated or absorbed into the community formed under the leadership of Mzilikaze (1790-1868). He was a notable leader of what was to become known as the Matabele people. Many areas of the Highveld were left devastated by these wars. In other areas groups consolidated and were able to defend themselves against foreign threats. They formed strong polities and maintained authority deep into the nineteenth century. An outstanding example is the formation of the Basotho nation under the leadership of Moshweshwe (1786-1870) in what is today known as Lesotho.

The first Europeans

By the late eighteenth century, people of European origin started frequenting the interior of South Africa. As a rule they were adventurers, explorers, traders and missionaries. They came from all parts of the globe. However, most were of European descent. Those who were of Dutch origin were, as a rule, descendants of the first colonists who had settled at the Cape after 1652 when the Dutch East India Company established a refreshment station at what is today known as Cape Town. The city became an important port of call for passing ships. Apart from fresh supplies of meat, vegetables and fruit, Cape Town was also a centre of fresh water supplies.42

Cape Town soon acquired a cosmopolitan character as people from various parts of the world arrived and found permanent residence in a new style urban settlement, based on a Western European model. An elementary urban water supply was soon established to provide in both the domestic and proto-industrial requirements of the community.43


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As farming operations started beyond the urban settlement the available water sources determined the nature of rural settlement.

Illus. 1.9. Laundry day at Zonnebloem, one of the early wine farms at the Cape. Artist Angas, c. 1947. Source: William Fehr collection, Cape Town.
In the 1830s groups of whites started trekking into the interior as settlers. This was a partial response to the fact that the British, for a second time, had annexed the Cape in 1806. Because of the decline of the Dutch empire by the eighteenth century, these whites had become indigenous to the extent that they resorted to the formation of frontier communities that later evolved into states (the republics of Natalia, Transvaal and the Orange Free State) suited to southern African conditions. People of British descent who arrived after 1806 were primarily urbanites and in the Cape Colony and Natal Colony (founded in 1844) they were responsible for the establishment of colonial villages and towns, close to water supplies, where primary industry and trade, as well as civil service facilities, formed the nuclear activities of local communities.

Illus. 1.10 An arid Karoo settlement in the nineteenth century with the local water supply in the foreground. Source: Harold Strange library of African Studies, Johannesburg.

Ever since the early eighteenth century white pastoralists had learnt to survive with the minimum of water. This was particularly the case when they started settling in the Karoo region. At first they resided temporarily, as nomadic pastoralists. After seeking more suitable places they tended to settle permanently, usually where
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water supplies and grazing were available.\textsuperscript{44} By the eighteenth century they had made contact with the southward moving Nguni peoples on the Eastern frontier before trekking into the interior of South Africa. When they entered the region to the north of the Vaal River as from the 1830s in organised groups, in what became known as the Great Trek, many of these whites settled on farms on the Highveld, close to water resources and sufficient sources of energy.\textsuperscript{45} Here they practiced agriculture, with the \textit{fyntuin} that typically had vegetable patches, a herb garden and fruit orchard.

\textbf{Illus. 1.11. A farmstead in Marico in the late 1880s. Source: Harold Strange African Studies Library, Johannesburg.}

Some farmers, especially in the early years of settlement, tended to resort to transhumance practices of moving to the bushveld where they would stay for the winter months. The weather was generally warmer, grazing was abundant and there were many hunting opportunities. In the summer months, shortly before the first rains,

\textsuperscript{44} J. WALTON, \textit{Homesteads and villages of South Africa}, pp. 70-2.

\textsuperscript{45} F.J. POTGIETER, “Die vestiging van die blanke in Transvaal (1837-1886) met speisale verwysing na die verhouding tussen die mens en die omgewing” in \textit{Archives Yearbook for South African History}, 21(2), 1958, p. 177.
the Highvelders would return to their farms in time to plant for the next season.⁴⁶

Villages were formed in the proximity of perennial water supplies. At first these centres were intended for trading and religious practice. Later they became administrative centres where the republican government could communicate with its citizenry.⁴⁷ The villages then turned into towns, such as Potchefstroom (founded 1839), Rustenburg (1851), Pretoria (1855), and Heidelberg (1866).⁴⁸ Under the supervision of the district’s landdrost water furrows would be carefully excavated and made to provide the town, in a rectangular pattern of street blocks, with the necessary water supply. The water allocations for each domestic consumer were measured in terms of hours per week.⁴⁹ The landdrost (magistrate) of the district was at the helm of a number of officials, inter alia also the veldcornets who were responsible for maintaining contact with the farming community. These officials were responsible for monitoring and allocating the available water supplies of the rivers and spruits in the areas under their jurisdiction.

Up to the late 1860s the Zuid-Afrikaansche Republiek, also known as the Transvaal (established in 1852), was primarily a rural republic. Once the first discoveries of diamonds in Griqualand West (in 1867) occurred, the economy in the western parts of the state and on the Highveld was adjusted to providing food supplies to the diamond mining communities at Kimberley (founded 1871). In 1871-3 the discovery of alluvial gold deposits first at Eersteling in the present-day Limpopo Province and later at Pilgrim’s Rest in what is currently the Mpumalanga Province, paved the way for the mining

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industrial revolution that was to take place on the Witwatersrand during the second half of the 1880s. The sustainability of all these human actions relied on the availability of a ubiquitous substance – water. How the available supplies were enhanced to make intensive modern industrial activity possible is explained in the chapters that follow.
South Africa’s early experience of the industrial revolution is intricately linked to developments in Britain in the late eighteenth century. In 1795, some 50 years after the start of its rapid industrial development, Britain for the first time annexed the Cape in an effort to prevent the French under Napoleon from taking control of the strategically located southern tip of Africa. In the process new technologies were introduced at the Cape. At the same time the British familiarised themselves with the available local resources. The result was that when the Cape was annexed for the second time in 1806 the region almost overnight became a supply centre to support manufacturing processes in Britain. Sheep farming became a substantial industry. It increasingly shaped the economy of the Cape.¹ Agricultural production was confined essentially to the Western Cape and exports were limited. Nevertheless, the region became part of the industrial revolution as British-manufactured goods found their way into South Africa.

It was in the process of exploiting the natural resources that the interior of South Africa was opened up. At first the indigenous forests were exploited along the coastal belt.²

Thereafter hunters moved into the interior collecting the natural produce of the hunt such as, animal hides, ivory, tortoise shell and horns that were exported to Britain.³ By the mid-nineteenth century a lucrative industry with the export centres of Port Elizabeth in the Eastern Cape and Durban in the colony of Natal gained dominance.

² P.L. WICKENS, “Agriculture” in F.L. COLEMAN (ed.), Economic history of South Africa, p. 74; For a description of some of the indigenous trees exploited up to the start of the twentieth century, and the early forestry history, see D.E. HUTCHINS, “Forestry in South Africa” in W. FLINT (ed.), Science in South Africa: a handbook and review, pp. 391-413. Given the scarcity value of certain woods, such as stinkwood, too little research has thus far been done to determine to what extent indigenous timber was exported from e.g. the colony of Natal in the nineteenth century. See B. ELLIS, “White settler impact on the environment of Durban, 1845-1870 in S. DOVERS, R. EDGECOMBE and B. GUEST (eds), South Africa’s environmental history: cases and comparisons, pp. 39-43.

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Illus. 2.2. Hunting camp at a water source, early nineteenth century. Source: William Fehr Collection, Cape Town

Illus. 2.3. Hunting gnu at a water source c. 1831. Source William Fehr Collection, Cape Town.
It was in the field of mining that the most substantial breakthroughs were made. In 1867 there were impressive diamond discoveries in Griqualand West. By 1871 the mining town of Kimberley was founded, with thousands of people streaming to the semi-arid region of the Northern Cape. The diamond fields shaped South African society in a specific manner. The industrial activity unlocked capital and thereby opened the way for the subsequent development of the gold mining industry. The diamond fields were also responsible for the consolidation of labour patterns that were to persist in South African society until the final quarter of the twentieth century. Artisans from Europe came to South Africa to work on the mines and in related industries. As they secured for themselves a working environment, these people reinforced a socio-economic stratification between the races in labour. It had already begun to develop in a rigid system of sharp distinction between white and black on the farms.  

Illus. 2.4. Diamond mining operations at Kimberley in 1876. Water furrow in the foreground on the right. Source: William Fehr Collection, Cape Town.

In the new industrial urban areas, the structure was maintained. The entrepreneurs who were responsible for opening up the wealth of southern Africa came from Britain and Europe. They were

familiar with the demand for raw materials in the rapidly growing industrial markets in the northern hemisphere. Unskilled and semi-skilled South Africans, who did not make out part of the new immigrant population, were employed in the new urban centres.

Illus 2.5 Panning for gold in a spruit on the Witwatersrand in the 1880s. Source: Harold Strange African Studies Library, Johannesburg.

Many of the indigenous communities in southern Africa were still part of an advanced Iron Age culture in which indigenous mining technology, manufacturing processes and commercial practices of trade and barter were well developed to suit specific cultural requirements. It was from these communities that members of the male population gravitated towards Kimberley to find employment on the mines. The rewards for their labour were the products of the

5 An example of the dynamic nature of early African iron age culture is the Great Zimbabwe culture which between 1250 and 1450 AD, was the result of gold mining activities that were the order of the day in the vicinity of the mythical Monomotapa. The nature of the stone structures suggests that it marked the growth of trade between East Africa and the East from the Red Sea from about the ninth century AD. From the archaeological finds at Zimbabwe it appears as if Chinese items of value did find their way to the community. It is estimated that between 7 and 9 million ounces of gold circulated in East Africa before the arrival of Europeans on the plateau in the 1890s. See J. McCANN, Green land, brown land, black land: an environmental history of Africa, 1800-1990, pp. 32-4.
late industrial revolution in the northern hemisphere. Firearms, bicycles, domestic sewing machines, farming utensils, colourful cloth, decorative jewellery and primary forms of furniture were among the consumer goods that were high in demand.\(^6\)

The white rural residents of the interior also started flowing into the new town, first as traders in food produce, then as transport drivers and later as workers in mining and industry. The innovative abilities of Kimberley’s industrial society were put to the test from the outset. In Britain the industrial revolution had been powered by the energy of steam.\(^7\) In Griqualand West, the components necessary for generating power – water, wood and coal – were expensive and scarce commodities. Transport drivers were quick to respond in providing firewood. In due course coal deliveries followed. Water remained in short supply and consumers were forced to work carefully with the available resources. In the arid climatic conditions of the Northern Cape the new industrial pioneers, who came from regions in the northern hemisphere where water had been in abundance, acquired firsthand experience of a typical South African ‘water crisis’. Lionel Phillips, for example explained conditions in Kimberley thus:

> Water, obtained solely from wells, was frightfully scarce. We were driven at times to wash in expensive soda-water, and baths were a rare luxury. Men used to ride to the Modder River, which generally harboured a few pools even in the dry season, or to the Vaal river, roughly twenty miles [32 km]\(^8\) distant, for a thorough cleansing.\(^9\)

Later a railway line also linked Kimberley and Cape Town. This placed even greater strain on the available local water and wood supplies.

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\(^6\) P. DELIUS, “Migrant labour and the Pedi” in S. MARKS and A. ATMORE (eds), Economy and society in pre-industrial South Africa, pp. 299-302.

\(^7\) P.G. EIDELBERG, “The first industrial revolution: iron and coal” in T. VAN Wijk, and M.C. VAN ZYL, (eds.), Europe 1555-1848, (JLVS, Electronic library, Pretoria 1999); See also Goudie on energy consumption and the changes that took place, already as from the nineteenth century. A. GOUDIE, The human impact on the natural environment, pp. 32-4.

\(^8\) All distances in the text were converted from miles to km. 1 mile = 1.6 km.

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The mining industrial revolution in southern Africa, up to the 1870s, was primarily confined to the Cape Colony. It was particularly slow to come to the Transvaal Highveld. In 1877 Britain tried to gain control of the Zuid-Afrikaansche Republic (Transvaal) when, for a period of four years, it annexed the region. The attempts at creating a British colonial sphere of influence in the Transvaal were thwarted by the republican-minded Transvalers who had in the meantime become Afrikaner nationalists determined to defend their country. Within the space of three months, between December 1880 and February 1881, the Transvalers fought a victorious war against Britain. The First Anglo Boer War (1880-1), as it subsequently was termed, saw Britain withdrawing from the region north of the Vaal river. It was only temporary. Within the next decade a revolution of a different kind took place – this time under the auspices of British inspired private enterprise.

The discoveries of gold

The first gold discoveries in the interior were reported from the Transvaal in the 1850s. At first it did not attract a lot of attention. Then came the discovery of alluvial deposits in 1871 at Eersteling in the northern parts of the state (currently the Limpopo Province) by Edward Button (1835-1900), a Natal prospector. Soon mining operations were also started at Pilgrim’s Rest in the Eastern Transvaal (currently Mpumalanga Province). These early developments, as well as the mining activities on the diamond fields of the Northern Cape ultimately, were the dress rehearsals for South Africa’s major industrial revolution.


As from the early 1880s the region, known as the Witwatersrand (literally meaning the ridge of white waters), had a special attraction to mining prospectors.\textsuperscript{12}

Illus. 2.6 Struben’s valley on the Witwatersrand in the nineteenth century. The availability of good water supplies was conducive to gold prospecting and mining activities. Source: Harold Strange African Studies Library, Johannesburg.

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It was the first discoveries of the Struben brothers on the West Rand and the major discoveries of George Harrison (? – 1886) in what is today Johannesburg that opened the way for the rapid development of the Witwatersrand. Once it was known that there were substantial gold deposits on the Highveld, people from all parts of the world drifted to the Transvaal. The result was the establishment of Johannesburg, a dusty mining town, in September 1886.

Unlike most cities elsewhere in the world, Johannesburg is not situated on the banks of a large river. At first this did not prove to be a problem. Water was available in plentiful supplies from the small local rivers, streams and springs. In their preliminary investigations mining pioneers, such as the Struben brothers, had located sufficient water sources successfully to conduct prospecting operations. The miners to follow also encountered few problems. In fact, for many who had earlier been active on the Diamond Fields of Kimberley, the Highveld with its numerous fountains must have been a veritable paradise.

The first residents of the new mining town settled close to accessible water sources. The Jukskei River, Natalspruit, the springs of Doornfontein and Braamfontein, as well as the wetlands of Bertrams and Fordsburg provided for the domestic and industrial needs of Johannesburg. Rainwater was also potted up. However, by early 1887 there were indications of water shortages, and water sold at exorbitant prices. Because of the exceptional circumstances under which Johannesburg had been established the Transvaal

government was unable to provide overnight – along the customary guidelines of the traditional excavated leivoor – for the water needs of Johannesburg. Republican politicians were also negative towards the mining fraternity in Johannesburg. For them these uitlanders (foreigners) meant trouble. During the days of Pilgrim’s Rest in the 1870s, the politicians remembered, the miners were the cause of much political turmoil.\textsuperscript{18} It is thus understandable why the Volksraad, only in September 1897, passed the Municipal Bill, which made it possible for the Johannesburg sanitary board (under the chairmanship of the resident magistrate) to make the necessary institutional arrangements for providing reliable services – \textit{inter alia} a good water and sanitary infrastructure.\textsuperscript{19} Perhaps an even more important factor was that the state was poor. The civil service had been structured basically to provide for the limited needs of a predominantly rural white community. Advanced urban infrastructure was not a top priority. It was thus evident that the necessary expertise to provide a sophisticated water service was absent. Once mining operations had begun and the urban settlement grew it was clear that the water needs of Johannesburg would far outstrip the existing systems of water supply available in the two major urban centres of the region – Pretoria and Potchefstroom. Under these conditions the government was literally obliged to let free market initiatives take the lead. This was by no means a trend of development exclusive to South Africa. Also overseas, for example in New York, private initiatives had been responsible for the establishment of the first water supplies to what ultimately would become one of the biggest cities of the world.\textsuperscript{20}

\textsuperscript{19} H. Zeederberg, \textit{Golden days}, p. 12.
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Illus. 2.7: Johannesburg in the vicinity of Doornfontein in 1887. Water storage dam in the foreground. Source: Rand Water.

Free marketeers and water

In December 1887, the government of the South African Republic granted James Sivewright, a concession to provide the new town with water. Sivewright, a friend of President S.J.P. (Paul) Kruger, identified the water source in Doornfontein. He was, in March 1888, instrumental in the founding in Kimberley of the Johannesburg Waterworks and Exploration Company, Ltd. The company’s business was to sell land. A secondary operation was to provide water to the young mining town of Johannesburg.


Illus. 2.8. The limits of supply of the Johannesburg Waterworks Estate & Exploration Company in 1892. Source: Rand Water
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The firm of Barnato Brothers, also from Kimberley at the time, was a founding member of the new company. In 1889 Barney Barnato (1852-97), who had meanwhile moved from Kimberley to Johannesburg, was instrumental in taking control of the water concession, on behalf of Barnato Brothers.

Sivewright, once he had made sufficient money, retired to the Cape, where he became a cabinet minister. In 1895 the waterworks company became a full subsidiary of Johannesburg Consolidated Investments (JCI) – one of the major gold mining companies on the Witwatersrand. The waterworks company was an integral part of Johannesburg’s business environment in which strong competition was the order of the day. It implied that its activities would be affected by the frequent feuds in which the local captains of trade and industry were involved. This state of affairs had a detrimental effect on the provision of water for Johannesburg. Already in 1888 the Johannesburg Waterworks Estate & Exploration Company Limited, was technically able to provide 152,678 ℓ of water from the Natalspruit, 2,44 Mℓ from a reservoir near Berea and 919,285 ℓ from Doornfontein. Quality was a priority. Pipes were imported from Britain. The work was also done at great speed. On 23 June 1888 the first domestic consumer was linked to the new waterworks scheme. The scheme was a comprehensive undertaking and it

26. His estate was situated near Groote Schuur. In the twentieth century the house was later acquired as the residence of the governors general of South Africa. Later it became the residence of the country’s state president. See G.A. Leyds, A history of Johannesburg: the early years, p. 53.
28. In the original documentation all liquid volumes were given in gallons. For the purposes of this study the figures were converted to ℓ. 1 Gallon = 4,5 ℓ.
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required a substantial capital investment to put into operation. Consequently for consumers the service came at a price. According to the company’s first annual report, consumers paid “1/6 per 100 gallons” (one shilling and sixpence per 450 ℓ). Later prices shot up because of drought conditions and the unscrupulous manipulation of supply and demand. Understandably the water company was not very popular with consumers. The supplies always appeared to be insufficient, ineffective and too expensive.

Illus. 2.9. The foundation stone is laid in 1888 of the first service reservoir of Johannesburg. Source: Rand Water.

31 ANON., Rand Water Board 1903–1953, p. 3; R.J. LABURN, ’n Historiese oorsig oor watervoorsiening aan die Witwatersrand, p. 2.

In times of drought the residents of Johannesburg did their washing with ammonia and lavender water and prepared food with soda water.\(^{33}\) The soft drink manufacturers Goldberg and Zeffertt (Pty) Limited,\(^{34}\) and the first beer brewer Charles G. Chandler, who moved up to Johannesburg from Kimberley in 1888, did good business.\(^{35}\) Water carts, selling a bucket full for as much as two shilling and sixpence were a common feature of the Johannesburg landscape by the 1890s.\(^{36}\) One early resident, G.A. Leyds, recorded how his mother:

> used to keep a half-crown ready on the mantelshelf to pay for the bucketful which she could draw from the wagon when it came. This was our allowance for the day, during the winter, for all purposes: washing, drinking, cooking.\(^{37}\)

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35. F. STARK (Ed.), Seventy golden years 1886-1956, p. 41.
36. N. MANDY, A city divided: Johannesburg and Soweto, p. 11.
The growth in consumption was phenomenal. At the end of the 1880’s the waterworks company daily provided 342 000 ℓ of water to Johannesburg.\(^{38}\) By 1894 it was estimated the city daily consumed between 2,89 and 5,86 Mℓ.\(^{39}\) A special commission of inquiry in 1895 pointed out that although the water supply company could provide 10,36 Mℓ/d, it would in time become necessary to provide at least 11,57 Mℓ/d.\(^{40}\) Up to that point it appeared as if the company was able to provide for the existing demand.

The success of the water company and the growing demand for water gave rise to competition. There were lucrative business opportunities and a number of small companies and syndicates were formed.\(^{41}\) For example, in 1892 the Braamfontein Water Company was founded by the Corner House group of companies, which had started with the development of 174 erven in Parktown, Westcliff, Forest Town, The Terrace and Marienhof.\(^{42}\) By the end of the nineteenth century the company was able to provide about 380 000 ℓ of water daily.\(^{43}\) The value of the real estate was directly linked to the availability of a good supply of water.\(^{44}\) Another local water business venture was the Vierfontein Syndicate, discussed in detail below. As long as local water sources provided the needs of consumers, there was no need to look for additional water. The situation changed once rapid urban and industrial growth set in. It was then that the viability of sources further afield (such as the Vaal river) were contemplated.

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41. ANON., Rand Water Board 1903–1953, p. 4.
42. A.P. CARTWRIGHT, The Corner House: the early history of Johannesburg, pp. 186, 188–9; R.J. LABURN, ‘n Historiese oorsig oor watervoorsiening aan die Witwatersrand, p. 3.
43. M. MCCORMACK, Origin and history of the Rand Water Board, p. 3.
Changing patterns of consumption

A preliminary consideration of some factors, which gave rise to changing patterns of water consumption, sheds some light on the early development of Johannesburg and surroundings.

Deep level mining: In 1889 Johannesburg’s existing water supply was put to the test by the mining industry. Ever since the mines started operations in 1886 large quantities of water were consumed. From mid-1889 it became more difficult to extract gold. Initially the natural process of oxidation, close to the surface, made it possible to extract gold easily from the rock. As soon as the miners reached depths greater than 40 metres, it became more difficult.45 In 1890 the MacArthur Forester process of gold extraction was introduced.

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This technique, developed in Scotland, relied on cyanide to extract gold from the rock.\textsuperscript{46} Moreover, there was a substantial increase in the number of mills used for crushing the rock from the gold was extracted. In 1889 some 711 crushing-mills were in operation. Ten years later, in September 1899, there were 6000 in operation on the Witwatersrand. These machines could not be operated without large supplies of water. It was estimated, for example, that 2009 ℓ of water were needed to mill one ton of gold bearing gravel.\textsuperscript{47} Around 1898 the production of mills rose from 316 163 to 7,3 million tons.\textsuperscript{48}


\textsuperscript{46} Ibid., p. 11.


Secondary industries: As from 1886 a number of secondary industries were developed in Johannesburg. Many relied extensively on water. For example laundry work was an important activity.

Illus. 2.14 and 15. At first the laundry of Johannesburg’s residents was done on the outskirts of the town by informal labourers. Source: Harold Strange African Studies Library, Johannesburg.
By 1890 the industrial activity of doing laundry was dominated by a guild of Zulu males, known as the *AmaWasha*. Along with some indigent whites they were responsible for doing the laundry of the town’s residents.\(^{49}\) At first operations were conducted at Sans Souci (just off Empire Road in Parktown) in the Braamfontein Spruit. Eventually some 1000 workers operated from eight centres, *inter alia* at Elandsfontein, Concordia and Boysens.\(^{50}\) Because of pollution hazard and an increasing demand for domestic water consumption the *AmaWasha* were relocated south of Johannesburg, at Witbank, where in 1897 it was estimated they did some 150 tons of washing monthly.\(^{51}\)

![Illus. 2.16. The *AmaWasha* were a highly organised group of workers who relied on sufficient water supplies to conduct their work. Source: Van Onselen.](image)

Ultimately laundry factories replaced the manual laundry system. However, this did not imply lower water consumption. The new mechanised process was powered by steam. Other large industrial consumers of water included the railway industry (as from 1892),


\(^{50}\) Ibid., p. 55.

the brick-making sector in Braamfontein,⁵² Johannesburg’s first large scale beer brewery (founded in 1895), which by 1897 produced 50 000 barrels annually,⁵³ and an ice factory which was established in Braamfontein in 1897.⁵⁴

Illus. 2.17. The Castle Beer Brewery (established 1895) was a major industrial consumer of water. Source: Rosenthal.

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⁵⁴. E. PALESTRANT, Johannesburg one hundred: a pictorial history, p. 72.
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Illus. 2.18. One of the first soft drink factories in Johannesburg. Source: Stark

Pollution: The new technological developments on the Witwatersrand held in many dangers. Toxic pollution, caused by the cyanide used in the mining industry, was a real threat.\(^5^5\) For example, in 1889 when plans were mooted for the provision of water from Vierfontein, south of Johannesburg, the indications were that the water of the Klip river was pure and of high quality.\(^5^6\) Four years later conditions had changed substantially. Engineer C. Aburrow reported to the authorities that the Klip river formed the prime catchment for mine effluent over a distance of more than 16 km. This led to the pollution of the stream as it was assumed that cyanide was present. It led to the death of livestock that drank from the river.\(^5^7\)

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56. TA, SS4380, p. 78. R1262/95 at R7961/94. C. Aburrow, Johannesburg – Water Committee of the Johannesburg Health authority, 1893.03.04.

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Illus. 2.19. Gold processing plant on the Witwatersrand. Tanks containing cyanide inevitably led to polluted effluent water draining into the rivers and *spruits*. Source: Harold Strange African Studies Library, Johannesburg.

Conditions hardly improved. In 1895 a special commission of enquiry informed the government that one of the city’s main regions of water supply, the Doornfontein valley, was severely polluted. As a result of unsanitary conditions it had deteriorated to the extent that it was recommended that the source be completely isolated. It could pollute other sources of water. In February 1896 the Transvaal Medical Society warned the public in the press that, apart from the prevailing water shortage:

(T)he water at present being consumed is very detrimental to the public health. G.R. Andrews, the engineer of the Johannesburg Waterworks, Estate and Exploration Company Ltd., was acutely aware of the


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polluted state of the water supply when he joined the company in 1889. In some areas it did not improve at all before the end of the century. Another engineer, T.L. Stewart, who was investigating water sources in a radius of almost 50 km of Johannesburg, underscored the crisis. It was futile to use storage tanks, he explained:

Owing to mining operations and the existence of a considerable population in the transverse valleys, which cut the Rand a supply of water collected from the surface and stored in reservoirs, would certainly be polluted.

The danger of pollution did not stop posing a threat before the end of the century.

Population growth: The population growth of nineteenth century Johannesburg was phenomenal. A small mining town, which in September 1886 had a population of about 250 people, could boast 25 000 residents by 1889. Five years later there were 41 000 people, and by 1896 the city’s population reached 102 000. In 1901 conservative estimates, put the resident population of Johannesburg at 150 000 people.

Industrial innovation and development, pollution and population growth were a few of the dynamic forces, which shaped the nature of the demand for water in Johannesburg and elsewhere along the...
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Witwatersrand in the final decade of the nineteenth century. Some shortsighted people were of the opinion that the gold rush would soon be something of the past. Everything would then return to normal, making of the golden city once again a rural backwater. Fortunately there were also those farsighted people who knew that the future development of Johannesburg and its surrounding region would take place over the long term. In order to secure its future sufficient water was necessary.

The search for alternative sources

Literally since the founding of Johannesburg the search for viable water resources was the order of the day. It only became more intense at times of drought – as was the case particularly in the period 1894-6. Both the government and private sector were active in trying to locate viable water sources. Some of the attempts were of a hilarious nature. On 25 October 1895 Solly Joel, a prominent Johannesburg businessman, who was chairman of the waterworks company at the time, conducted an experiment which ensured that his name was recorded for posterity. He was responsible for firing a rocket into the clouds from the grounds of the Wanderers Club’s football grounds, where the Johannesburg station is currently situated. 67 There was considerable discontent amongst members of the republican Volksraad who complained about the act that they considered being blasphemous. 68

Starting in the 1880s two surface water supply sources were identified – the Klip river and the Vaal river. The Klip river, a tributary of the Vaal, was the first to be developed.

The Klip river scheme: On 15 June 1888, an engineer, L.G. Vorstman who was soon to take up the development of Pretoria’s water supply scheme, 69 asked the government for permission to provide


68. R.J. LABURN, “Doornfontein – the farm with water”, (unpublished manuscript), pp. 5-6.

69. See ZAR, Notulen van den Eersten Volksraad der Zuid–Afrikaansche Republiek voor het jaar 1898, pp. 724–6. Art. 1010 of 1898.08.22.
Johannesburg with water from the Klip river, south of the town. He was of the opinion there existed a need and consequently he intended installing a pumping system and a dam, which could yield as much as 18.3 million ℓ of water. This, he explained, would be sufficient to provide the natural environment of the town with water.\(^{70}\)

At the time he estimated the cost of the project at approximately £150,000. Part of the river scheme included a fountain – an extremely desirable source of water especially for drinking water – on the farm Olifantsvlei.\(^{71}\)

The Klip river, which runs into the Vaal river near Vereeniging, was an option as source of water for Johannesburg from the outset. The geological dolomite formations to the south of the city, which the river passed through, had the capacity of storing vast amounts of water.\(^{72}\) The fact that there was a river linked to one of the major waterways further south, only made the region more desirable as a natural storage area. In short: it was a logical future artery of water supply to one of the fastest growing urban regions in Southern Africa. Vorstman’s proposals were backed by a petition with 460 signatures of people among whom numbered the magistrate of Johannesburg, representatives of the medical board, the diggers committee, the local health board and representatives of various newspapers.\(^{73}\)

The prospect of a new or even an additional supply of water for Johannesburg was not welcomed in all circles. There were rumbles in the business community. In June 1888 a group of 25 residents – in particular 10 owners of land on portions of the farm Zwartkopjes on the Klip river – declared that their agricultural activities would

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70. TA, SS1654, p. 58. R5340/88. LG Vorstman - State President and members of the Executive Council, 1888.06.15.
71. Ibid., p. 58.
be affected by the proposed water scheme.\textsuperscript{74} Although their complaint was justified, there is reason to believe other forces were also at work.

In December 1888 William Hay, a representative of the Vierfontein Gold Mining Company, which conducted mining operations in the vicinity of the Klip river, explained to the government that the company’s interests might be harmed by the proposed water scheme. By granting concessions to all and sundry, future developments could be restricted.\textsuperscript{75} In the same letter he let the government know that his company was prepared to negotiate. There was a fountain on Vierfontein. If the company were granted a concession for providing water to Johannesburg, it would be prepared to pay the government £1000 per annum.\textsuperscript{76} By 1889 the syndicate had managed to construct a pumping station on the farm Olifantsvlei in the Klip river and was pumping water to a dam in Turffontein.\textsuperscript{77} The strongest opposition to the Klip river scheme came from the Johannesburg Waterworks Estate and Exploration Company Limited. In a petition to the government it was explained that an additional water supply was unnecessary.\textsuperscript{78} In fact, it was claimed, the waterworks company was able to extract as much as

\textsuperscript{74} TA, SS1654, pp. 33-4. R5393/88 at R5340/88. Undated memorial C.H. de Power, J van Jaarsveld and 23 other signatories; See also TA, SS1654, p.4. Deputy State Secretary – WE Bok, 1888.06.25.


\textsuperscript{76} Ibid., p. 35.

\textsuperscript{77} 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. 2.

\textsuperscript{78} TA, SS1654, pp. 62-64. R5456/88 at R5340/88. J.P. Meyer, I.T. Lewis and others – State President and members of the Executive Council, Pretoria, 1888.06.14.
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6.1 million ℓ of water daily from Doornfontein.⁷⁹ Even more water could be produced, should the need arise.⁸⁰

The government’s reservation about the Klip river scheme was that the farmers living on the Klip river would not approve of the water being tapped from their river.⁸¹ This in effect proved to be no problem. By October 1888, Fieldcornet J.P. Meyer, the responsible official for the Klip river ward, in the Heidelberg district,⁸² who himself had vested interests in the mining industry,⁸³ was able to secure the co-operation of the majority of farmers on the banks of the Klip river.⁸⁴ With the exception of a few people (already referred to above),⁸⁵ those resident on portions of the farm Witkop (alias Witbank), portions of Zwartkopjes, Slangfontein and Rietfontein, approved of the proposed Klip river scheme.⁸⁶ The

⁷⁹. According to the manager, Mr W. Dunbar, 950 000 ℓ water daily taken from Natalspruit, 1,52 million ℓ from the reserve and 570 000 ℓ pumped at Doornfontein. The company also had a servitude on water over a distance of almost 4 km along the Klip river. See TA, SS1654, p. 68. R5456/88 at R5340/88. Statement W. Dunbar, Johannesburg, 1888.06.15.


⁸¹. TA, SS1654, p. 4. R5340/88 at R5340/88. W.E. Bok – Deputy State Secretary, 1888.08.19.


⁸⁵. TA, SS1654, pp. 79-81 R9690/88 at R5340/88 J.H. van der Merwe, distrik Heidelberg – State President and members of the Executive Council, Pretoria;

response was thus overwhelmingly in favour of the proposed water scheme.\footnote{By 1893 all the rights on water from the Klip river, up to the Vaal river, had either been sold or secured for the purposes of water extraction for the Witwatersrand. See TA, SS4380, p. 79. R1262/95 at R7961/94. Prokureurs and C. Aburrow, Johannesburg – M. Adolfi, Waterkomitee van die Johannesburgse Gesondheidskomitee, Februarie 1893. The only problems with securing rights were experienced on the farms Alewynspoort and Zwartkopjes. The latter was one of the sources with the best supply of water.}

Consequently the government in October 1888 granted a concession to Vorstman to pump water from the farm Olifantsvlei, on the Klip river for Johannesburg. Reservoirs were to be built and pipes were to be laid.\footnote{TA, SS1654, p. 25. R9447/88 at R5340/88, Acte van Overeenkomst S.J.P. Kruger, W.E. Bok and L.G. Vorstman, 1888.10.18.} The concessionaire undertook to start with the job within four months. He intended completing the construction within the space of two years.\footnote{Ibid., p. 26. R9447/88 at R5340/88, Artikel 7. Acte van Overeenkomst S.J.P. Kruger, W.E. Bok and L.G. Vorstman, 1888.10.18.} This undertaking proved to be somewhat quixotic. Even after a year nothing had come of the project.\footnote{TA, SS1654, pp. 36-7. R3904/89 at R5340/88. L.G. Vorstman, Johannesburg – W.E. Bok, Pretoria, 1889.04.27.}

Meanwhile, on 21 November 1888 a deed of cession was concluded between Vorstman and the Johannesburg Waterworks Syndicate.\footnote{The people at the helm of this syndicate were Edward Lippert, R.M. Campbell, H. Eckstein, Thomas Moir, Alois Hugo, H. Malcomess and S.L. King. See H.T. RAMSDEN, The status powers and duties of the Rand Water Board: a legal history and analysis, (Ph. D, Wits, 1985), p. 120.} The concession was ceded to the company.\footnote{Ibid., p. 120. See text and related footnote.} The government was formally informed in April 1889 that the concession had been sold to a European company.\footnote{TA, SS1654, p. 8. R3904/89 at R5340/88. W.E. Bok – Government, Pretoria, 1989.04.29.} Conditions were laid down to the effect that the project to supply water had to be executed within a specified period of time.\footnote{H.T. RAMSDEN, The status powers and duties of the Rand Water Board: a legal history and analysis, (Ph. D, Wits, 1985), pp. 121-2.} Little came of it. In December 1892 the rights for the development of the Klip river scheme were ceded to
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the Vierfontein Syndicate. In future the Klip river scheme was essentially relegated to the status of a bargaining device if market forces demanded a viable water supply for Johannesburg. The Klip river was now in fact earmarked to supply the local mining industry with water. It was to yield water until 1938 when supplies were shut down, not for reasons of quantity, but rather of quality.

The Vaal river concession

The first proposals for supplying water to Johannesburg from the Vaal river were made to government at the start of 1889. More substantive plans were tabled when an engineer, C. Schürmann and his associate, F.C. Eloff, the son in law of President Kruger, in August 1889 asked the government for a concession to supply water to Johannesburg from the Vaal river. They were aware of the Vorstman concession in respect of the Klip river and were eager to have similar terms laid down in the agreement they intended concluding with the government. At the time a number of similar requests were also made to the government. Herman Eckstein of the Corner House, as well as D. Schutte and E. de Marillae, seemed to be interested. However, the government had made up its mind. On 27 November 1889 an agreement was concluded with Eloff and Schürmann to supply water from the Vaal river to Johannesburg.

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95. Ibid., p. 127.
96. Personal disclosure Dr R.J. Laburn, Blairgowrie, 2003.02.08; Also see RWA, Thirty-third annual report of the Rand Water Board to the Honourable the minister of public health, Union of South Africa. Financial year ended 31st March, 1938, p. 41; RWA, Fifty-first annual report of the Rand Water Board to the His Excellency the Governor-General, Union of South Africa. Financial year ended 31st March, 1956, p. 43.
97. R.J. LABURN, ‘n Historiese oorsig oor watervoorsiening aan die Witwatersrand, p. 4.
99. TA, SS4940, pp. 143, 149, 156-8. R13503a/89 H. Eckstein, Johannesburg – State Secretary, 1889.12.21; R13721/89 D. Schutte, Pretoria – State President and members of the Executive Council, 1889.12.18; E. de Marillae – State President and members of the Executive Council, Pretoria, 1890.05.27.
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It appears as if the Vaal river concessionaires had a very specific programme of action. Early in January 1890 they asked the government for a more comprehensive concession. It was clear to them that the Klip river was ‘insufficient’ to provide Johannesburg with water. Consequently they wanted to integrate the system, so that the scheme could operate from the Vaal river.\footnote{TA, SS4940, pp. 25-6. R839(b)/90 at R7835/95. C. Schürmann and F.C. Eloff, Pretoria – State Secretary, Pretoria, 1890.01.21.} No specific proposals were made, but the government was asked to inform the Volksraad on the proposed scheme. The concessionaires wanted the Volksraad formally to give its approval for the Vaal river water scheme.\footnote{TA, SS4940, pp. 30-1; 32-3. R8090/89 at R8612/90 and R7835/95. C. Schürmann and F.C. Eloff, Pretoria – State Secretary, 1890.01.22; R1398c/90 at R8090/89 and R7835/95. C. Schürmann and F.C. Eloff, Pretoria – 1890.02.03.} At first the government ignored the request, but later in the year it responded by taking the matter to the Raad where it was approved without much debate.\footnote{TA, SS4940, pp. 30-1; 32-3. R8090/89 at R8612/90 and R7835/95. C. Schürmann and F.C. Eloff, Pretoria – State Secretary, 1890.01.22; R1398c/90 at R8090/89 and R7835/95. C. Schürmann and F.C. Eloff, Pretoria – 1890.02.03; TA, SS4939, p. 214. R7835/95. Copy Executive Council decision Art. 425 of 1890.06.14; TA, SS4940, p. 36. VRR565/90 at R7835/95. Copy Volksraadsbesluit Art. 380 of 1890.06.16.} The objectives of the concessionaires with the Vaal river project can only be guessed. They wanted to get the Johannesburg Waterworks and Exploration Company Ltd. interested. The company obviously would have wanted to eliminate potential competition. A second agreement between the government and the concessionaires, which hardly differed from the original concession, was concluded on 28 July 1890.\footnote{TA, SS4939, pp. 217-221. R8090/89 at R7835/95. Copy Executive Council decision Art. 482 of 1890.07.25.}

From there on the development of the Vaal river scheme was similar to that of the Klip river scheme. The concessionaires had originally agreed to submit drawings of the proposed scheme to the government within six months of the conclusion of the agreement.\footnote{TA, SS4939, pp. 249-50. R7835/95. One Kuypers – Onder–Statsekretaris, 1894.06.30.} They then asked the government for a respite. Their reason was that the financial markets in South Africa and Europe
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were in a state of depression. They informed the government that they had entered into an agreement with one Baron E. Oppenheim. He undertook to raise investments in Paris, London and Amsterdam amounting to £600 000.106 His efforts were futile because, as he reported to his associates in South Africa:

The greatest part of the public does not know even where the Transvaal is.107

For a considerable period of time the Vaal river project was dormant.

Only on 27 December 1892 were there signs of activity when Eloff and Schürmann notified the government that they had ceded their concession to Barnato Brothers108 – the company that in fact owned the Johannesburg Waterworks and Exploration Company Ltd. The effective control over the proposed Vaal river scheme gave the company the freedom to determine if and when Johannesburg’s existing water supply needed upgrading.

106. TA, SS4940, pp. 76-8. R628/91 at R7835/95. C. Schürmann and F.C. Eloff, Pretoria – State President and members of the Executive Council, 1891.01.16.
108. TA, SS4939, p. 250. R7835/95. One Kuypers – Deputy State Secretary, 1894.06.30.; TA, SS4940, p. 82. R15086/92 at R7835/95.F.C. Eloff and C. Schürmann, Pretoria – State President and members of the Executive Council, 1892.12.27.
The Vaal river scheme in jeopardy

Towards the end of 1892, in view of the approaching presidential elections,\(^{109}\) there was a public outcry over the granting of concessions in the South African Republic. On the whole public opinion, especially in Johannesburg, was strongly opposed to the government granting concessions. It was felt that concessions were a legal form of nepotism, which ultimately could lead to corruption. An added factor of discontent was the delay in the execution of schemes. The Johannesburg health committee, in particular, wanted the government to take steps against delays in providing the city with a good water supply. At a special meeting it was decided to notify the government that the Vaal river concession, as a result of the delays, should be shelved.\(^{110}\) The sense of urgency with which the matter was brought to the attention of the government, suggests that the water consuming public of the city had a point.

The discontent was also apparent in the sensitive political arena. One of the leading opponents to the scheme was Jan F. Celliers, former editor of *De Volksstem*, who as member of the second *Volksraad* expressed his disappointment with the decision of the government to grant the concessionaire the opportunity to renew the agreement. In a letter to the government he explained he was protesting, not only as a citizen of the republic, but especially as member of the legislature, particularly as member of the second *Volksraad* for the Witwatersrand gold fields.\(^{111}\) Celliers was a respected Transvaal politician. He had been instrumental in the nationalist victory as a propagandist and fiery opponent to British rule, in the period of the annexation of Transvaal (1877-81). The government tried to deal with the matter sensitively. The letter of


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protest of Celliers was submitted to the second Volksraad.112 The Raad discussed the matter on two occasions, and tacitly approved of the government’s leniency to the concessionaires.113 Meanwhile rumours were rife of underhand deals and corruption in securing the concession. The political atmosphere in Transvaal, at the time, was not conducive to irregularities, and consequently the government tried its best to contain the criticism. Nevertheless it was a hopeless task. The result was that interest in the project seemed to dwindle.

Another source of opposition to the proposed Vaal river scheme emanated from the Orange Free State. A number of members of the town council of Parys (J.P. Steytler, B. van der Hoven, W.J.J. Paulsen, Z.C. Pretorius and J. Versteeg) complained to their government in Bloemfontein about the proposed pumping of water from the Vaal. They explained that in the winter months the river was low. If large amounts of water had to be extracted to supply Johannesburg, they could foresee there would hardly be any left for the citizens resident on the banks of the Vaal river.114 Furthermore it was pointed out that the town of Parys was situated on the banks of the river. Water shortages already prevailed in town during the winter months. This was despite the fact that the council had spent money on the upgrading of the water furrows.115

This opposition to the proposed Vaal river scheme was of substantial importance. Supplying water to Johannesburg was no longer a Transvaal issue. Instead, the residents of another state expressed concern about the potential loss of water. In terms of international relations it was a sensitive issue. There was an

112. TA, SS4940, pp. 118-9. R1186/93 at R7835/95. W.J. Leyds, Pretoria – Chairman and members of the Tweede Volksraad, 1893.05.03.

113. TA, SS4940, pp. 125-6. R8174/93. Copy Tweede Volksraad decision, Art. 479 of 1893.06.30 and Art. 484 of 1893.07.03; See also ZAR, Notulen van den Tweeden Volksraad der Zuid–Afrikaansche Republiek, 1893, pp. 213-7. Arts 477–9 of 1893.06.30.


115. Ibid. p.111.
understanding between the Transvaal and the government of the Free State that the water of the Vaal river was to be divided in half. Each state was entitled to one half of the available resources. The problem, which still persisted, was that the water supply was not consistent throughout the year.

Within the Transvaal there were also spontaneous forces undermining the credibility of the Vaal river scheme. One of the controversial propositions for water to the Rand was the Wonderfontein scheme, a project promoted by the mining magnate George Goch. His plans were first mooted in April 1890. The objective was to supply water to Johannesburg from the source of the Wonderfontein, in the Potchefstroom district. From the outset the plan was shrouded in a cloud of controversy. Goch was an important role player in the politics of water. He had contacts high up in the government. For very transparent reasons, he was

opposed to the government’s leniency to extend its deadline for the
development of the Vaal river scheme.\textsuperscript{121} In the public debate it
increasingly became apparent that a comparison was being drawn
between the viability of the Wonderfontein and the Vaal river
schemes. The major issues were the anticipated costs and the
amount of water that the source could provide.\textsuperscript{122}

The greater threat to the Vaal river scheme was related to the
development of the Klip river. In March 1893 the Vierfontein
Syndicate, mentioned earlier, was founded,\textsuperscript{123} when H. Eckstein, the
Consolidated Goldfields of South Africa Ltd. and S. Neumann and
Co. joined forces.\textsuperscript{124} The expanded membership improved its
financial strength considerably. They were now in a position to
offer water to the residents of Johannesburg from a source almost
seven km south of the town on the farm Vierfontein. The plan was
for an extensive dam wall to be constructed which could secure a
storage of some 12 214 million l.\textsuperscript{125} There was also a fountain
available for pumping water, but its potential was limited. One
factor which did not count in the favour of the syndicate was the
fact that as a rule the local authority of Johannesburg, as well as the
government of the South African Republic, gave preference to
fountain sources over storage dams which relied on rainwater.\textsuperscript{126}

\begin{itemize}
\item \textsuperscript{121} TA, SS4940, pp. 85-6. R7835/95. Haarhoff & Hull, Pretoria – State Secretary, Pretoria, 1892.12.28.
\item \textsuperscript{122} See for example, ZAR, Notulen van den Eersten Volksraad der Z.A. Republiek, 1894,
p. 417. Art. 1025 of 1894.07.27.
\item \textsuperscript{123} According to F.E. Kanthack many companies in the early years bought up land in the
valley. If they could not purchase the land they concluded agreements with the
river Valley springs. Minutes of evidence, 1919.03.18: F.E. Kanthack Director of
Irrigation for the Union of South Africa; TAC4/2. Water Commission W107. Statement
Johannesburg, 1902.01.28.
Syndicate Limited”, R.N. Schumacher, Johannesburg, 1902.01.28; R.J. LABURN, ‘n
Historiese oorsig oor watervoorsiening aan die Witwatersrand, p. 3.
\item \textsuperscript{125} TA, SS4378, p. 174. R10375/94 at R7961/94. Rapport, J.M.A. Wolmarans and S. Wierda;
R.J. LABURN, ‘n Historiese oorsig oor watervoorsiening aan die Witwatersrand, p. 3.
\item \textsuperscript{126} TA, SS4378, p. 174. R10375/94 at R7961/94. Rapport, J.M.A. Wolmarans and S. Wierda,
p. 174.
\end{itemize}
The Vierfontein Syndicate was however of the opinion that at some point in time there might be a demand for their resources. Consequently they were prepared to enter into an agreement with the government.\cite{127} As a potential service provider, should there be a need for water in Johannesburg and environs, the syndicate could oppose literally any extensive scheme that was aimed at providing large quantities of water over a considerable period of time. This had an effect on the prospects of developing the Vaal river.

**Barnato defends the Vaal river scheme**

In the face of stiff competition, Barney Barnato remained optimistic about the potential of the Vaal river scheme. On 30 May 1893 he submitted the first set of plans for the water supply to the government.\cite{128} It was estimated the proposed project would cost about £440 000. Three pumping stations were to be erected over a distance of 58 km from ‘Waaldrif’ to Johannesburg. An 18-inch pipe (45 cm) was to be used for pumping the water to the Witwatersrand.\cite{129}

From a strategic point of view the plans were outstanding. The water would be taken from the confluence of the Vaal and Klip river, close to the new town of Vereeniging (founded in 1892). It was to follow a route *via* Olifantsvlei in the Klip river. On the farm Vierfontein a filtration plant was to be constructed where the water would be purified before being pumped up to Johannesburg.\cite{130}

Vereeniging, a young coal-mining town, was situated geographically at the point where the river was the closest to Johannesburg. At the time of the plans being mooted, the industrialist, Sammy Marks, one of the founding fathers of Vereeniging and friend of President Paul Kruger, was strongly in

\begin{itemize}
  \item \cite{127}. *Ibid.*
  \item \cite{128}. TA, SS4940, pp. 91-2. R6527/93 at R7835/95. P. Nel, Pretoria – State Secretary, Pretoria, 1893.05.30.
  \item \cite{129}. TA, SS4940, pp. 100-2. R7040/93 at R7835/95. General description of the waterworks to be done by the Johannesburg Waterworks, Estate and Exploration Company Limited…. R.L. Mcdonald, Johannesburg, 1893.06.29.
  \item \cite{130}. *Ibid.*, pp. 100–2.
\end{itemize}
favour of Barnato’s project. He was convinced that the Vaal river would be the ultimate source of water for the Witwatersrand.\textsuperscript{131} History was to prove him right. Barnato’s plan appealed also to the Kruger government. After some scrutiny officials recommended that the pipeline be situated adjacent to the main road between Vereeniging and Johannesburg.\textsuperscript{132}

Illus. 2.21. The Vaal River at Vereeniging prior to the construction of the Barrage. Source: Samuel Marks Collection, University of Cape Town Library.

Barnato went even further in preparing the way for the Vaal river water scheme. His company appointed T.L. Stewart, the water supply engineer of the Cape Colony who had been responsible for improving the water systems of Port Elizabeth and Cape Town.\textsuperscript{133} In June 1893 Stewart submitted plans that made provision for

\textsuperscript{133} TA, SS4939, p. 252. R7835/95. Ene Kuypers – Onder-Statsekretaris, 1894.06.30; TA, SS4940, pp. 104-5. R7882/93 at R7835/95. P. Nel, Pretoria – State Secretary, Pretoria, 1893.06.30.
supplying Johannesburg with an estimated 18,32 Mℓ\textsuperscript{134} of water daily.\textsuperscript{135} As a whole the scheme now proposed to government could easily stand the test of experts. Barnato was confident that water shortages in Johannesburg would soon be something of the past. It was going to cost the water supply company £600 000, he explained, but it was a worthwhile investment.\textsuperscript{136} Barnato’s aim was, in some respects, a ploy to bring the proposed Wonderfontein scheme, which the government favoured, into discredit. Overall the scheme underlined the fact of the matter, namely that in future substantial capital investments would have to be made to provide the Witwatersrand with water. It also became increasingly clear that it would in future be necessary to differentiate between two types of consumers: the mining industry and the rest.

The impact of drought conditions and local government development

In 1894 the start of severe drought conditions caused a water crisis in Johannesburg. It soon became apparent that a very specific dispensation was the order of the day. The needs of the two different groups of consumers – domestic and industrial – had to be addressed. Circumstantial evidence suggests that the southern parts of Johannesburg, in particular the Klip river area that potentially linked the Vaal river to the Witwatersrand, had been earmarked to provide the mining industry with water. It is also interesting to note that whilst commissions of investigation were involved in locating a viable water supply for Johannesburg, not

\begin{itemize}
  \item \textsuperscript{134} 1 Mℓ = a million litres.
  \item \textsuperscript{136} TA, SS4377, p. 13. Johannesburg Waterworks, Estate and Exploration Company, Limited. Director’s Report and accounts of the company for the year ending 30th June 1893.
\end{itemize}
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once did the Vaal river feature prominently in any recommendations.\textsuperscript{137}

Illus. 2.22. In the drought of 1895 water sold for two shillings and sixpence per bucket. Source: Rand Water

In January 1893 the Johannesburg sanitary committee formed a special water committee. It had to assist the government commissioner in finding the most suitable sources of water for Johannesburg. From the deliberations of this committee it soon became clear that in future the search for water would go well beyond the immediate borders of Johannesburg.\textsuperscript{138} The government had earlier given considerable attention to potential crisis conditions. In July 1893 President Kruger told the second Volksraad that he had held talks with the Nederlands Zuid-Afrikaansche Spoorwegmaatschappij on the viability of a plan to transport water from the Vaal river to Johannesburg.\textsuperscript{139} The railway line, which


\textsuperscript{138} E.M. COSSER, The impact and management of water scarcity in Johannesburg, 1886-1905 (MA, UW, 1990), pp. 53-4.

\textsuperscript{139} ZAR, Notulen van den Tweeden Volksraad der Z.A. Republiek, p. 220. Art. 481 of 1893.07.03.
connected the Orange Free State and the Transvaal in May 1892, crossed the Vaal river at Vereeniging. The plan of the government was thus not farfetched. The only constraint was the high cost of building the necessary railway wagons and constructing the necessary equipment for pumping water into the railway wagons. Sammy Marks meanwhile also made some recommendations. He was of the opinion that second grade coal, mined in Vereeniging, could be used to provide power for the scheme to pump water to the Witwatersrand.

Illus. 2.23. In 1892 the railway bridge over the Vaal river at Vereeniging was taken into use. President Paul Kruger (third from left) and the entrepreneur Sammy Marks (third from right) at one point made plans to transport water in railway carriers to Johannesburg. Source: Central archives repository, Pretoria.


141. ZAR, Notulen van den Tweeden Volksraad der Z.A. Republiek, p. 220. Art. 481 of 1893.07.03.

In June 1894 the Volksraad appointed a commission of enquiry into the water supply of Johannesburg. The members were J.M.A. Wolmarans, S. Wierda and A. Bock. The objective of the government was to try to finally find a solution to the chronic water shortage experienced in the city. Since 1893 there had been attempts by the local authority of Johannesburg to become a service provider. In business quarters this was seen as an attempt by the government to interfere in the operations of the free market. Lobbyists made the plans suspect. They spread rumours to the effect that the role of government in the service of providing water would merely push up taxes.

The commission submitted two reports to the Volksraad on 21 September 1894. In the first drawn up by Wolmarans and Wierda, the recommendation was that consideration be given to enabling the Johannesburg health committee ultimately to take over the water service. A number of potential sources were considered. These included Rooikop, Klipfontein, which formed part of the Jukskei River, Gemsbokfontein, Klipspruit, Alewijnspoort, Wonderfontein, Rietfontein, Olifantsfontein and the sources of the Vierfontein Syndicate as well as the sources of the Johannesburg waterworks company. They further recommended that taxes be levied from local landholders to pay for the service. In his minority report A. Bock recommended that government should be careful of embarking on a plan to take over all the water resources. One implication was increased taxation. It was overall an investment that could be costly without necessarily bringing in profits. He opposed the Wonderfontein scheme because it would be

146. Ibid., pp. 176–7.
The first Volksraad tended to be in favour of the commission’s proposals for government playing a leading role in providing water. However, when it was decided on 22 September 1894 that Kruger’s executive and the health committee of Johannesburg should carry on with plans to try and find a solution to the water situation, the plan was in fact a dead letter.

Barney Barnato ensured, well in advance, that all possible steps be taken to undermine any plans the government might have had. It is evident from the following. In September 1894 Lionel Phillips wrote to J. Wernher in London:

(T)he Barnatos are ready to put up a large sum. It seems they have spent £35 000 to crush the Wonderfontein Scheme…. (A)ltho’ the money was not paid directly to kill the Scheme, it was so in effect.

The discontent in Johannesburg was rising. In the first Volksraad the representative for Johannesburg, Carl Jeppe, explained that the petitions to the government, signed by more than 4000 residents of Johannesburg, were symptomatic of the discontent with the prevailing state of affairs. At the time water was transported by means of carts to different parts of the city. It was then sold at exorbitant prices. In communications with the government the waterworks company reminded the executive they were still capable of providing in all the water needs of Johannesburg. Moreover, should there be an even greater need for water, they would be able to make use of the Vaal river. One proviso was that the company would require of the government to allow them to be

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the sole supplier of water to Johannesburg.\textsuperscript{152} It made sense. The development of a water scheme, like the Vaal river, would be expensive. The fact that Johannesburg did not have a formally constituted municipality prevented the existing local authority from entering into loan agreements. It was thus unable to raise funds for the development of an expensive water supply undertaking, such as the Vaal river scheme. The government of the ZAR was also hesitant to invest large sums on infrastructure. It was not in the interest of the population of the country as a whole.\textsuperscript{153}

In political circles it was stated that a major problem was that the Vaal river was ‘net afloopend water’ (only run-off water) and not fountain water.\textsuperscript{154} It was also argued that the water of the Vaal river was not consistent at all times of the year.\textsuperscript{155} There were also claims that the quality of the Vaal river’s water was inferior to that found in the dolomite areas adjacent to the Witwatersrand.\textsuperscript{156} Under these circumstances it appeared as if the political climate in the country and particularly in financial circles which would ultimately have to sponsor a comprehensive water project, were not entirely in favour of the Vaal river scheme. Consequently the focus shifted to other sources of water.

\textbf{Zuurbekom and a revived Vaal river initiative}

In 1897 a new development took place that appeared finally to sink all the prospects of the Vaal river. Since 1894 water had been

\begin{itemize}
  \item \textsuperscript{152} TA, SS4383, p. 51. R7961/94. Rapport in zake watervoorziening – Johannesburg. (Commissie van 1895), Augustus ’95.
  \item \textsuperscript{153} A Volksraad decision of 1894 outlines the administrative and political problems which prevented the existing local authority and the government of the ZAR from introducing a central water supply to Johannesburg. See ZAR, Notulen van den Eersten Volksraad der Z.A. Republiek, 1894, pp. 693-4. Eerste Volksraadsbesluit Art. 1820 of 1894.09.22.
  \item \textsuperscript{154} Observation by President S.J.P. Kruger to the First Volksraad. See ZAR, Notulen van den Eersten Volksraad der Z.A. Republiek, 1894, p. 417. Art. 1025 of 1894.07.27.
  \item \textsuperscript{155} ZAR, Notulen van den Eersten Volksraad der Z.A. Republiek, 1894, p. 417. Art. 1025 of 1894.07.27.
\end{itemize}
extracted from the farms Klipriviersoog and Zuurbekom which belonged to F.G.C. le Roux. It was situated at the source of the Klip river some 27 km southwest of Johannesburg. The geologist, David Draper, had first discovered the source. In July 1896 Barnato Brothers – as part of the Johannesburg Waterworks Estate and Exploration Company Ltd. – acquired it.

Illus. 2.24 Zuurbekom pumping station was completed in 1898-9 and was able to provide Johannesburg with sufficient water supplies until the early 1900s. It is still in operation today. Source: Rand Water.

In order to accommodate all the shareholders who had been in on the undertaking since 1894, the Zuurbekom Water Company Ltd. was formed. In December 1897, after considerable consolidation of interests, the company was incorporated into the Johannesburg Waterworks Estate and Exploration Company Ltd. In 1898 temporary pumps were in use and by 1899 when the pumping

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station at Zuurbekom was completed, the source could provide all the existing needs of Johannesburg. It has remained in operation up to the present. Of more importance, in the nineteenth century, was the fact that the source provided clear water that under no circumstances was pumped from surface storage reservoirs or dams. Essentially it appeared as if the proposed Vaal river project would finally be shelved. However, this was not the case.

Despite the prospect of an abundant supply of water in the not too distant future, an engineer, Michael Whitty, in April 1898 explained to the government that the mining industry on the Witwatersrand would soon face severe water shortages. The Vaal river was the only source of water that could possibly provide the need. He let the government know that he was the representative of a group of American and European entrepreneurs who had sufficient resources to take on projects of this nature. He also seemed to be well-informed on the state of affairs on the mines. Whitty was, for example, aware of the fact that the East Rand Proprietary Mines Gold Mining Company at that point only had 80 of their 120 ore stamping machines in operation because of water shortages. At the time the major task of the Vierfontein Syndicate, one of the major suppliers of water to the industry, provided 23 mines on the Witwatersrand, with water. These mines had approximately 2500 crushing-mills that relied on a liberal supply of water. The prevailing growth trend suggested that more large quantities of water – presumably from the Vaal river – would become essential in the near future.

In April 1898, at the time of an apparently revived interest in the Vaal river scheme, the Pretoria-based firm of Lewis & Marks, informed the government that they were aware of a dire water...
shortage developing on the Witwatersrand. The company’s Sammy Marks requested permission from the government to provide a service with water from the Vaal river. It was prepared to invest up to £600 000 in the project and put up its farms Klipfontein 562, Leeuwkuiil 187, Klipplaatdrif 336, Uitvlucht 307, Panfontein 133 and Vischgat 318 for the development. At the time there were also other propositions made to the government, but it appeared as if Lewis & Marks were in the best position to let the project materialise. By June 1898 the company’s engineers were busy surveying the route along which the pipeline was to be laid between the Vaal river and Johannesburg.163

Also in mining circles there were signs of interest. On 27 May 1898 a delegation of the Chamber of Mines held talks with the government in Pretoria.164 Earlier the chamber had indicated that the provision of water from any proposed scheme had first to be cost-effective.165 It was explained that a number of mines were facing imminent closure because of water shortages. The chamber wanted the government to assist them in locating satisfactory resources.166 By 8 July an agreement had been reached.167 For a while it appeared as if the scheme would go through. The major stakeholders in the project (the mining companies and a respected entrepreneurial firm, Lewis & Marks) were well focused on their ultimate objective. They did not however keep track of public opinion.

163. TA, SS7164, pp. 83-4. R5115/98. A. Crawford, Pretoria – State Secretary, 1898.06.03.
164. TA, SS7164, pp. 88-90. R6213/98 at R5115/98. Internal note State Secretary – Assistant State Secretary, 1898.05.28.
166. TA, SS7164, pp. 88-90. R6213/98 at R5115/98. Internal note State Secretary – Assistant State Secretary, 1898.05.28.
On 12 August 1898, the first of several petitions reached Pretoria. In the document, dated 1 August and emanating from the Vaal river ward of the Potchefstroom district, J.J. van Zyl and 42 local farmers protested against yet another attempt at pumping water from the Vaal river for the Witwatersrand. They requested the government not to allow the plan to go through. A similar petition was sent to the government of the Orange Free State by residents of Lindequesfontein, situated on the banks of the Vaal river, in the district of Kroonstad.

For the first time since the early 1890’s it appeared as if the government was determined to go so far as to resist the wishes of the burghers. In 1893, as explained above, protests from farmers along the Vaal river forced the government to take a soft line towards the development of the Vaal river scheme. The government was also wary of treading on the toes of the rulers of a neighbouring state. Now, for the first time, it appeared as if the government was prepared to act. It was a measure in the general interest of the country. In February 1899 the state secretary, F.W. Reitz, asked the firm of Lewis & Marks, if they would be interested in drawing up a contract for the Vaal river water project. The company informed the government that its chief executive officer, Sammy Marks, was in Europe. He would be back in due course. One he returned negotiations could be resumed on the matter. In June 1899 Reitz once again corresponded with the company’s management. The government, he explained, was aware that Marks
had returned from Europe and now wanted to continue with the planning of the project of obtaining water from the Vaal river.\textsuperscript{173}

The response of the company was prophetic, accurately reflecting the political climate in the South African Republic at the time. Crawford, on behalf of Lewis & Marks, explained that they were sorry to inform the government that as a result of the current conditions their associates in Europe were not inclined to start out on new business ventures.\textsuperscript{174} However, the company was prepared to co-operate in any initiative to develop the scheme and expressed the hope that in time to come it would be possible to implement the plan. In what was without a doubt also a personal observation of Sammy Marks in the letter, reference was made to the fact that ever since 1892 there was the conviction that the Vaal river ultimately had to be the source of water for the Witwatersrand.\textsuperscript{175} The time was however not yet ripe for the fruition of an important water scheme for the Witwatersrand. After July 1899 it was to take 15 years for a proposed Vaal river water scheme to enjoy recognition once again.

\begin{footnotesize}
\begin{itemize}
\item[\textsuperscript{173}]{TA, SS7164, p. 129. R5115/98. F.W. Reitz, Pretoria – Lewis & Marks, Pretoria, 1899.06.20.}
\item[\textsuperscript{174}]{TA, SS7164, p. 130. R9404/99 at R5115/98. H. Crawford, Pretoria – State Secretary, 1899.07.01.}
\item[\textsuperscript{175}]{Ibid., p. 130.}
\end{itemize}
\end{footnotesize}
Chapter 3

The colonial phase in the development of water supply on the Witwatersrand 1901-1911

Between 1899 and 1902 the Afrikaner republics of the Transvaal and the Orange Free State were at war with Britain. The Anglo-Boer War, also known as the South African War, was ostensibly the result of British imperial designs on extending its influence in Africa. In the process of expansion a major objective of Britain was to gain control of the gold mining wealth of the Transvaal. The war, which cost the British taxpayers an estimated £191 million, saw more than 365 000 imperial troops fighting against 75 000 republican burghers over a period of almost three years. It is estimated that more than 55 000 South Africans died as a result of the war, which saw the demise of the republics of Transvaal and the Orange Free State by the time the Treaty of Vereeniging was signed on 31 May 1902.\(^1\) About 34 000 Afrikaner civilians, mostly women and children died as a result of the war. A further 21 000 South Africans of colour died in what was traditionally perceived as a ‘white man’s war’. On the British side there were more than

97 000 casualties. Of these 7091 soldiers were killed or died of wounds sustained and 19 143 died of diseases.  
Already in March 1900 it was evident that the British were taking firm control of certain areas in the Transvaal. Within the space of two months the major towns of the Afrikaner republic, the industrial nucleus of Johannesburg and the political capital, Pretoria, were placed under British command. Essentially this marked the start of the era of British colonial rule in the Transvaal. In terms of the development of the water supply for the Witwatersrand the colonial era was destined to prevail for at least a quarter of a century. The Transvaal, much like the Free State, was subjected to typical British colonial policies aimed at the establishment of a British system of law and order. In few areas was the trend of development as transparent as in the case of the development of the Rand Water Board.

The typical British colonial mentality manifested itself in a number of ways. A strong sense of local purpose was uppermost in the minds of many officials. This was the case particularly in the operations of the Rand Water Board. According to Leyds (in the era following the war) there was a considerable degree of animosity and a rivalry between Pretoria and Johannesburg. The new British government of the Transvaal was friendly towards the residents of Pretoria and acknowledged that the city was to be the seat of government. However, it also recognised that the Witwatersrand was a meaningful geographical entity deserving greater autonomy. The establishment of the Rand Water Board was, according to Leyds, proof of this particular feeling.  

Preparing for post-war water requirements
Shortly after the British forces had taken over Johannesburg in 1900 the British commander, Lord Roberts, appointed Major

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W.A.L. O’ Meara of the Royal engineers to take control of Johannesburg’s local affairs until civil authority could be restored.4

Illus. 3.1. Major W.A.L. O’ Meara. A commission, under his guidance recommended that the Rand Water Board be established. Source: Rosenthal.

True to the British tradition, public health was considered a primary responsibility of local government. Consequently water and sanitary matters featured prominently in the recommendations that O’Meara made in a report of April 1901.5

4. N. MANDY, A city divided: Johannesburg and Soweto, p. 20.
5. Ibid., p. 24.

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He was convinced that the water companies had to be done away with.\footnote{Ibid., p. 24.} In its place there had to come a public utility that could act in a responsible manner when it came to providing water to one of the fastest growing regions in southern Africa. The water supply was important for another reason. One of the instructions of the British command in Transvaal was to ensure that the mining industry could be brought into full operation as soon as possible. Large amounts of water were necessary for extracting the gold from the rock.\footnote{Central Archives Repository, Pretoria (CAR). Transvaal Archives (TA) C4/2. Water Commission W107. Statement of evidence, p. 2. “The Vierfontein Syndicate Limited”, R.N. Schumacher, Johannesburg, 1902.01.28.} Consequently a reliable water supply was of crucial importance. From the outset special attention was given to providing the necessary infrastructure that would culminate in the establishment of a well-structured water utility.\footnote{Lord Alfred Milner was singled out as one of the major role players behind the scenes in the establishment of the Rand Water Board. See RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 10.} Some mines could provide for their own needs, but overall there were constant fears that water was in short supply.

In an effort to prepare itself for the post bellum era, plans were made to have the matter of the Transvaal’s water supply investigated.\footnote{M. MCCORMACK, Origin and history of the Rand Water Board, pp. 4-6.} There had been requests to this effect from the side of the Johannesburg town council and the Chamber of Mines.\footnote{RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 1.} Consequently, on 4 November 1901 the Transvaal military government appointed the Witwatersrand water supply commission.\footnote{TAC4/3, W34/1901. Notice of commission. A. Milner, Pretoria, 1901.11.04.} The chairman of the commission was G.V. Fiddes, the colonial secretary. Other members were A. Brakham, W. St. John Carr, B. Kritzinger, W. McCallum, J.W. Quinn and G. Rouiliot.\footnote{RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 1.}
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The commission had instructions to investigate specific issues. It had to report on the available sources of water on the Witwatersrand and make proposals on how an unfailling water supply for the towns and mining operations on the 'Reef' could be provided. Special attention had to be given to future water requirements. The commission also had to consider the potential establishment of a public body to take responsibility of supplying the Witwatersrand with water. In the report handed to the government on 26 February 1902, it was recommended that the government give consideration to the establishment of an institution that could go by the name of “The Rand Water Board”. Its members should comprise representatives of the town council of Johannesburg, the Chamber of Mines and all the local authorities on the Witwatersrand, outside the confines of Johannesburg. On the prospects for an unlimited supply of water, the commission appeared to be circumspect. Apart from the existing sources that had been known since the nineteenth century, there was no information on any new sources. Neither were there any particular recommendations.

However, the commission did provide some clarity on a number of issues. It was clear that the development task of an authority responsible for the supply of water was to focus on the regional dynamics of the Witwatersrand. The coadunate substances of gold and water literally determined the future region. Admittedly Johannesburg was the major point of growth, but the Witwatersrand, spanning a geographical region from east to west shared one major common denominator – the gold mining

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13. The ‘Main Reef’ had a bearing on the geological area from Randfontein to Springs where the gold occurred in large quantities.
17. See in this respect TA, LTG 73, 80/12. Report of the sub-committee appointed to draft and ordinance conferring borrowing power on the Rand Water Board. J. St. John Carr, Johannesburg 1904.04.27, p. 3.
industry. But the successful mining of gold was subject to the availability of a ubiquitous commodity – water. It thus made sense to the commission that the envisaged water undertaking had to be a regional institution providing water to the Witwatersrand, from Randfontein to Springs.\textsuperscript{18} In time to come these operations were to become even more extensive. The commission busied itself with the preparation of its report on the water supply. At the same time the British military command and the republican leaders were in the process of negotiations that ultimately would lead to the conclusion of the Anglo-Boer War with the signing of the Treaty of Vereeniging at Melrose House in Pretoria on 31 May 1902.

\textbf{Illus. 3.2. Johannesburg in 1902. Source: Stark}

In many respects the conclusion of the war was, for the planners of the proposed water supply, a mere formality. It was generally accepted that the outcome of the war was a foregone conclusion and the \textit{post-bellum} period instead required their attention. More than a month before the signing of the peace treaty W.E. Davidson submitted a memorandum to the Transvaal military government in which an overview was given of the estimated population growth and the accompanying water demand on the Witwatersrand.\textsuperscript{19} It was evident that what lay ahead was a daunting challenge to the brightest of engineering minds.

\textsuperscript{18} Ibid., p. 4
\textsuperscript{19} TA, GOV112, GEN244/02. Memorandum Witwatersrand water supply: W.E. Davidson, 1902.04.28.
Appointing the engineer

In its report of February 1902, the water commission had recommended that an engineer be appointed as soon as possible. This person had to report on the best potential water supply system.\(^{20}\) The government was eager to respond to the suggestion and let it be known that the appropriate person for the job would be ‘a younger man whose ability and energy can be guaranteed’.\(^{21}\) At times the Transvaal authorities tended to be over-eager in their haste to get on with the task at hand and on occasion it required the meditative insight of an elder statesman to warn against haste.\(^{22}\) This did not prevent them from considering prospective candidates for the job. Among the names mentioned were those of Messrs. A. Karlson, a former town engineer of Pretoria,\(^{23}\) H.P.R. Copeland, an engineer for the Australian government,\(^{24}\) J.A. Alexander,\(^{25}\) one Deacon,\(^{26}\) W. Hunter\(^{27}\) and J.T. Wood.\(^{28}\)

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21. TA, LTG 73, 80/12. Governor, Johannesburg – Secretary of State, London, 1903.03.09.

22. TA, LTG 73, 80/12. Secretary of State – Governor’s Office, Johannesburg, 1902.12.30.


Ultimately, once the board had started operating, it opted for the safer alternative. Consequently, in December 1904 it appointed the elderly D. Leitch, the town engineer of Johannesburg. His main advantage was that he had considerable local experience. He proved to be a capable engineer at the helm of the engineering division until his retirement at the end of July 1910. He was succeeded by the younger William Ingham, a British engineer who had been selected for the post from a group of 37 South African and 83 foreign candidates.

The government agreed in June 1902 to the appointment of top-class consulting engineers from Britain to conduct an investigation into the proposed water supply for the colony. It was required of the consultants to be experts in the field of water supply engineering. In particular they had to be familiar with the London Water Authority. The proposed Witwatersrand water supply utility would then have a role model. It was accepted that conditions in the interior of South Africa were different to those in Britain and that local expertise had to be made available to the consultants. In 1903, shortly after the Rand Water Board started with operations, the firm of Middleton, Hunter & Duff of London were appointed to undertake the consultancy. The report was completed in April 1904.

26. TA, LTG 73, 80/12. Secretary of State – Governor, Johannesburg, 1903.05.22; Governor, Johannesburg – Secretary of State, London, 1903.06.11; Secretary of State, London – Governor, Johannesburg, 1903.05.22.
27. TA, LTG 73, 80/12. Secretary of State, London – Governor, Johannesburg, 1903.06.05.
28. TA, LTG 73, 80/12. Secretary of State, London – Governor, Johannesburg, 1903.06.13.
29. RWA, Minutes, 1904-6, pp. 61, 64. 40th meeting, Johannesburg, 1904.12.02; and 41st meeting, 1904.12.30.
30. RWA, Minutes, 1910-1, p. 182. 137th meeting, Johannesburg 1910.07.15.
31. RWA, Minutes, 1910-1, pp. 200, 241-1. Minutes of a special meeting, 1910.08.26; and Minutes 142nd meeting, 1910.12.17.
32. TA, GOV112 GEN244/02. Copy of executive council resolution 191/02.
33. TA, LTG 73, 80/12. Secretary of State, London – Governor, Johannesburg, 1903.06.13.
34. TA, LTG 73, 80/12. Secretary of State, London – Governor, Johannesburg, 1903.06.13.
The establishment of the Rand Water Board

The Rand Water Board was officially established on 8 May 1903 in terms of Ordinance No. 32 of 1903, published in the *Transvaal Government Gazette*. The first official board meeting took place on 15 May 1903. There had been several plenary meetings since February of that year to prepare the way for what was ultimately to become the largest regional water utility in South Africa. The first chairman was Colonel George Fowke (R.E.), who was later promoted to the rank of Lieutenant-General and also awarded a knighthood. He was ostensibly a bridging figure in the early development of the board. William (later Sir) St. John Carr succeeded him in 1904. He too served for only a short term. In 1907 T.A.R. Purchas, one of the longest serving chairmen in the history of the board, was appointed to the position. He was to serve the board in that capacity until his retirement in 1928.

It was during the meetings before the formal establishment of the Rand Water Board that the foundations were laid for a creative mix of what the available human resources had to offer, and what

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36. Ordinance No. 32 of 1903, “Ordinance to establish a Water Board for the Witwatersrand Area” in The Transvaal Government Gazette, 6(191), 1903.05.08, pp. 824-6; RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 2.

37. RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 2.

38. RWA, Minutes 1903-4, p. 8. 3rd meeting of the board, Johannesburg, 1903.04.25.

39. RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 3.

40. RWA, Twenty-fourth annual report of the Rand Water Board to the Honourable the minister of public health, Union of South Africa. Financial year ended 31st March, 1929, p. 2.
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the government had in mind. Behind the thinking on the nature of the new water utility there was a singular sense of purpose. Its members had to be representative of the Witwatersrand region as a whole. Their combined relative positions of power on the board were well circumscribed. The town council of Johannesburg could for example appoint three representatives. From the Chamber of Mines there were to be five representatives. The Eastern Witwatersrand was to be represented by board members coming from Boksburg and Germiston while the Western Witwatersrand’s representatives had to be appointed by the health boards of Krugersdorp and Roodepoort-Maraisburg.

By February 1903 a list of names had already been submitted of the representatives considered capable of serving on the board. In their number there were distinguished men such as Percy Fitzpatrick, Julius Jeppe, George Farrar, R.W. Schumacher and F.D.P. Chaplin. Some declined their appointments. Others resigned soon after the board started functioning. Once the nature of the board’s responsibilities became apparent, membership was determined by the degree of dedication to the task at hand. Apart from the business interests that had to be served on the board,

42. See for example Minutes 1903-4, pp. 12-3. 4th ordinary meeting of the board, Johannesburg, 1903.05.01. Report D. Leitch, 1903.04.28.
43. TA, LTG 73, 80/12. Transvaal Colonial Secretary, Pretoria – Town clerk Johannesburg, secretary to the Chamber of Mines, as well as the chairmen of the health boards of Germiston, Boksburg, Krugersdorp, Roodepoort-Maraisburg, 1903.01.17.
45. Minutes, 1903-4, p. 1. 1st ordinary meeting of the board, Johannesburg 1903.03.07. He resigned again in August 1903.
46. RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 3.
47. Minutes, 1903-4, p. 1. 1st ordinary meeting of the board, Johannesburg 1903.03.07.
there were also civic responsibilities to bear in mind. It was necessary to maintain a sense of civic responsibility in the process of making decisions in the interest of the growing urban population on the Witwatersrand. Ultimately local politicians serving on councils proved to be valuable role players on the board.

The activities of the board were from the outset intricately linked to the contributions individual members could make. They had to think as individuals on behalf of the interests they represented. At the same time they had to be able to think as a team. It was this organisational initiative that consolidated the interests of civil government, industry and commerce. In the space of two years after its establishment, the board had to make decisions that had previously been the domain exclusively of the private sector. Now it had the responsibility of directing management thinking on matters of supply, demand and profit. A number of secretaries served the board in the early years. With the appointment of Major W.M. McCormack in 1906 as secretary and treasurer, effective administration gained momentum. McCormack served in this capacity until his retirement in 1920.50

Expropriating the private water companies
One of the most difficult tasks of the Rand Water Board at the time of its establishment was to consolidate all the available water

50. Maj. W.M. McCormack was first appointed in an acting capacity in 1906. See Minutes, 1904-6, pp. 449, 629. Minutes 72nd meeting of the board, Johannesburg, 1906.03.23 and Minutes 86th meeting of the board, Johannesburg 1906.10.19. He died in September 1921. See RWA, Seventeenth annual report of the Rand Water Board to the Honourable the minister of the interior, Union of South Africa. Financial year ended 31st March, 1922, p. 1.
resources under its authority. The government beforehand acted on good advice and obtained the services of Sir Henry Worsley Taylor, a British parliamentarian who had many years of experience in parliamentary bar practice,\textsuperscript{51} to take command of the proceedings over a period of six weeks in 1904-5.\textsuperscript{52} The board’s arbitration committee played a crucial role in the process. An arbitration court sat for 16 days starting on 6 December 1904. By January 1905 it was a made-out case that the Rand Water Board would be allowed to expropriate a number of private undertakings that owned water supplies. In total an amount of £2 216 238 was paid out. Of this amount the board paid £1 602 191 for the Johannesburg Waterworks Estate and Exploration Co., Ltd, £505 811 to the Vierfontein Syndicate, £51 499 to the Braamfontein Company Ltd. and £40 088 to the Wonderfontein concession.\textsuperscript{53} Another cost incurred was the payment of £176 584 to the Johannesburg town council for the pipes, mains, service reservoirs and other works that had been established for the town’s water supply.\textsuperscript{54} In making the payments there were members of the board who were of the opinion that the water undertakings had been given the best possible deal.\textsuperscript{55} Ultimately it was in the interest of the board’s operations that the expropriations be carried out in a through manner.

From the outset sufficient funds were one of the major preoccupations of the board. The members of the board, as well as some officials, were eager, for the government to step in and provide surety for the raising of loans, to pay for the establishment of the water service. The smaller local authorities did not have

\begin{itemize}
  \item \textsuperscript{51} TA, LTG 73, 80/12. Secretary of State, London – High Commissioner, Johannesburg 1904.07.30.
  \item \textsuperscript{53} RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 4.
  \item \textsuperscript{54} Ibid., p. 6.
\end{itemize}

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sufficient funds to pay for the laying of mains to their areas of jurisdiction. Following a thorough investigation there was consensus that it would be the responsibility of the board to pipe the water to the different areas under the jurisdiction of the local authorities represented on the board. They in turn had to distribute the water to consumers under their jurisdiction. This issue, although hotly debated in the press, was finalised, by the time the board started with effective operations in 1905.

Illus. 3.6. The water fountain in Joubert Park, Johannesburg, was a major leisure time attraction in the early 1900s. Source: JPL.

There was a sense of balance built into the system. The mines, in many cases the largest consumers of water, were in a position to pay their way. They were also the party on the board who would be in a position to be able to pay for the loans that had to be raised.
in supplying the water.\textsuperscript{60} The basis for measuring the contributions of the respective members of the board was to be, in the case of the mines, the number of tons of ore crushed. In the case of the local authorities, the contribution was to be determined by the rateable value of fixed property within the municipal boundaries.\textsuperscript{61}

It was necessary, however, for the government of the Transvaal to guarantee the loan that the board intended taking to finance its operations. In the first place it had to pay for the private water companies. Secondly there were numerous developments that had to be financed before a proper supply system could be brought into operation. The government was not keen to respond to the request of the board. At the start of 1905 a deputation of the board lobbied Lord Alfred Milner. They wanted him to influence the Transvaal government to help them raise loans with a low interest rate. Government backing was a prerequisite. Milner favoured the plan and suggested that the government look into the matter.\textsuperscript{62} However, there were other political decision makers who were of the opinion that the government should not take up the added responsibility. Instead the water utility should be granted the right, on the grounds of its official status as a public water supply authority, to raise loans. Eventually the board was allowed to pledge its own assets as security. As a result sections 55 to 69 of ordinance 48 of 1904 were enacted to provide the necessary security to raise loans.\textsuperscript{63} Once these arrangements were in place it was possible for the board to raise a loan of £3 400 000 from the firm of Speyer Brothers at an interest rate of four per cent over a period of 30 years.\textsuperscript{64} The funds were largely used to pay for the

\textsuperscript{60} TA, LTG 73, 80/12. Report of the sub-committee appointed to draft and ordinance conferring borrowing power on the Rand Water Board. J. St. John Carr, Johannesburg 1904.04.27, p. 11.

\textsuperscript{61} Ibid., pp. 11-2; See also J. Cowrie, Secretary to the Chamber of Mines, Johannesburg – Lt.-Gov., Pretoria, 1904.04.09.

\textsuperscript{62} TA, LTG 73, 80/12. L. Milner, Johannesburg – Lt.-Gov., Pretoria, 1905.01.11.

\textsuperscript{63} Personal disclosure Dr H.T. Ramsden, at panel discussion, Rietvlei, 2003.02.07.

\textsuperscript{64} RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, pp. 5-6.
private water companies that had been expropriated. What now remained was to provide a service that would ensure an income.

**Selling water at a moderate tariff**

From the outset there was a concerted effort to keep the cost of water to consumers low. In 1903 consumers in Johannesburg were still paying 26 pennies per kℓ.65 This soon changed. On 30 March 1905 the board decided the charge for water would be fixed at 13 pennies per kℓ.66 Within two months, on 19 May 1905, it was decided that in future consumers would 9 pennies per kℓ.67 In the case of larger consumers costs were reduced even further. At one stage the board was prepared to give a rebate of one halfpenny per kℓ to any consumer using more than 2 Mℓ/d68 for a period of at least three months.69

W. McCormack, the secretary to the board, in May 1905 reported to the Transvaal government:

> I have the honour ... to inform you that the Board is now intimating to the Municipalities and Mines within the limits of supply, that in December 1906 the Board will be able to have an available supply of six million gallons of water, and if the consumption amounts to the estimated supply, the Board will be able to sell water at this stage at a maximum of 3/- per thousand gallons. In September 1907 it is estimated that the available supply will be increased to 9½ million gallons per diem, and with an estimated consumption of the same amount the Board will be in a position to supply water at a maximum of 2/6- per thousand gallons.70

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66. RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 6.

67. RWA, Minutes 1905-6, p. 167. 51st, 1905.05.19; RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 6.

68. Mℓ/d = Megalitres per day.

69. RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 6.

70. TA, LTG 73, 80/12. W.M. McCormack, Johannesburg – Lieutenant-Governor, Pretoria, 1905.05.01.
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The 1905-projection was close to the mark. In 1907 the board reduced the cost of water to 8 pennies per kl, with a rebate of a halfpenny per kl for all consumers who used more than 2 Mℓ/d.\textsuperscript{71} In 1909 the rebate was scrapped in view of the additional charges the board had to pay on its loan capital account.\textsuperscript{72} There were more benefits to consumers. As from 1 October 1909 the board started selling water to local authorities and the mines that made contributions to the board’s fixed charges under the Act, at a cost of threepence per kl and sixpence per kl to all other consumers. At the start of April 1910 the rate was further lowered to 2 pennies and 4 pennies per kl respectively for fixed rate and other consumers.\textsuperscript{73} At that point it was contemplated that the cost of water would be reduced even more in time to come.\textsuperscript{74} By October 1910 the rate for water was set at 2 pennies for fixed rate consumers and 4 pennies per kl for other consumers. Shortly afterwards the charges were reduced to 1½ and 3 pennies per kl for fixed-rate consumers and other consumers respectively.\textsuperscript{75} Only when the board undertook its first major development at the Vaal river did consumers face higher tariffs. The brunt of the increases was carried by the mining industry.\textsuperscript{76}

A fine balance between community- and self-interest marked the tariffs of the board in the first decade of operations. The mining companies, represented by the Chamber of Mines were eager to get water at the cheapest possible rate. It was important to keep the production cost of gold to the minimum. The local authorities

\textsuperscript{71} RWA, Second annual report of the Rand Water Board to the Colonial Secretary of the Transvaal. Financial year ended 31st March, 1907, p. 5.

\textsuperscript{72} RWA, Fourth annual report of the Rand Water Board to the Colonial Secretary of the Transvaal. Financial year ended 31st March, 1909, p. 3.

\textsuperscript{73} RWA, Minutes 1909-10, p. 47. 126th meeting, Johannesburg, 1909.08.20.

\textsuperscript{74} RWA, Fifth annual report of the Rand Water Board to the Colonial Secretary of the Transvaal. Financial year ended 31st March, 1910, p. 2.

\textsuperscript{75} RWA, Sixth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1911, p. 4.

\textsuperscript{76} RWA, Ninth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1914, p. 6.

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primarily had the interests of their domestic consumers at heart. At the same time the water they purchased from the board provided a source of revenue. They could sell water at retail prices to the consumers under their jurisdiction.

**The demographics of the Rand's water**

True to its ubiquitous nature in the realm of human activities, the importance of water has always been in part intricately linked up with population figures. In the case of the Witwatersrand the growth of the population was subject to the growth and development of the gold mining industry. In the years immediately after the Anglo-Boer War the white urban population increased slowly. There were indications that it was usually the male member of a family who would undertake the journey to the town, find a job and take up temporary residence in a boarding house or hotel, before being joined by a spouse and children.\(^77\)

Qualified artisans from overseas also followed a similar pattern of settlement in Johannesburg. Many became wealthy in the new city of gold and were able to settle in the upper middle class suburbs to the east, and some even to the north of Johannesburg’s city centre.\(^78\) As a rule, by the 1910s, the trend was for the skilled working class people to be accommodated in comfortable working class suburbs where they could be joined by their families, or in the case of bachelors, start with a family, only when a job with a steady income had been secured.\(^79\)

In the case of blacks, after the war, there was a shortage of job opportunities. This was one of the reasons why the Transvaal government temporarily imported large numbers of Chinese to work on the mines.\(^80\) In time to come the black population once

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again started taking up residence as migrant labourers on the mines. They were then usually accommodated in compounds where the living conditions were depressing.\textsuperscript{81} Black people who were not employed on the mines were accommodated in the backyards of their employers’ homes or on factory grounds. Others found accommodation in the less well-off Malay township, where a typhoid epidemic broke out in 1904. This gave the municipal authorities the opportunity to move many of the blacks to the south of Johannesburg, where they were accommodated in temporary houses or provided with materials that could be used for the construction of houses. This, according to Van der Waal, laid the foundations for what would later on become known as Soweto.\textsuperscript{82}

From the available evidence the urban population of the Witwatersrand at the time of the formation of the Union of South Africa in 1910 was as follows:

\begin{table}[h]
\centering
\begin{tabular}{|l|l|l|l|}
\hline
Municipal area & Municipal area in sq km\textsuperscript{84} & Population & \\
& & White & Coloured & Total \\
\hline
Benoni & 68 & 6000 & 17 000 & 23 000 \\
Boksburg & 99 & 13 000 & 30 000 & 43 000 \\
Germiston & 58 & 15 319 & 38 244 & 53 563 \\
Johannesburg & 212 & 111 857 & 108 447 & 220 304 \\
Krugersdorp & 233 & 8750 & 33 000 & 41 750 \\
Roodepoort & 96 & 7500 & 27 500 & 35 000 \\
Springs & 73 & 1000 & 3000 & 4000 \\
\hline
Total & 809 & 163 426 & 257 191 & 420 617 \\
\hline
\end{tabular}
\caption{Urban population of the Witwatersrand 1909-10\textsuperscript{83}}
\end{table}

At the time it was estimated that the annual population growth stood at about 16 per cent, with the whites tending to increase at a

\textsuperscript{81} Ibid., p. 27.
\textsuperscript{82} G.M. Van der Waal, \textit{Die boukuns van Johannesburg 1886-1940: van mynkamp tot metropolis}, p. 152.
\textsuperscript{83} Information Engineer’s report, RWA, Sixth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1911, p. 20.
\textsuperscript{84} Original data in square miles. 1 square mile = 2,589 square km.
faster rate (17.4 per cent) than people of colour (13.7 per cent) to the urban centres.\textsuperscript{85} The growth rate tended to dwindle. In 1913, when there was labour unrest on the Witwatersrand the annual population growth rate dropped to 4.65 per cent.\textsuperscript{86} However, the industrial developments were so dynamic that the population growth continued unabated, and at an increasing tempo. In 1916-7, despite the outbreak of World War 1 (1914-18) and many people going on active service, the population of the Witwatersrand increased. Working on the estimates provided by the local authorities, the chief engineer of the board, William Ingham, estimated that between 1910 and 1916 the population of the Witwatersrand had increased by 33.9 per cent.\textsuperscript{87}

**Table 3.2. Per capita water consumption on the Witwatersrand in March 1911**\textsuperscript{88}

<table>
<thead>
<tr>
<th>Municipality</th>
<th>White population</th>
<th>Litres consumed (ℓ)</th>
<th>Consumption ℓ per capita per day (ℓ/cap/d), March 1911</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johannesburg</td>
<td>111 857</td>
<td>73 759 100</td>
<td>21</td>
</tr>
<tr>
<td>Germiston</td>
<td>15 319</td>
<td>4 107 400</td>
<td>8</td>
</tr>
<tr>
<td>Boksburg</td>
<td>13 000</td>
<td>2 165 000</td>
<td>5</td>
</tr>
<tr>
<td>Benoni</td>
<td>6000</td>
<td>1 283 000</td>
<td>7</td>
</tr>
<tr>
<td>Springs</td>
<td>1000</td>
<td>605 340</td>
<td>19</td>
</tr>
<tr>
<td>Roodepoort</td>
<td>7500</td>
<td>1 030 400</td>
<td>4</td>
</tr>
<tr>
<td>Krugersdorp</td>
<td>8750</td>
<td>23 100</td>
<td>0.1</td>
</tr>
</tbody>
</table>

One of the questions asked at the time by the management of the board had a bearing on the *per capita* consumption of water. True

\begin{itemize}
\item \textsuperscript{85} RWA, Sixth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1911, p. 20.
\item \textsuperscript{86} RWA, Eighth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1913, p. 20.
\item \textsuperscript{87} RWA, Eleventh annual report of the Rand Water Board to the Honourable the minister of the interior, Union of South Africa. Financial year ended 31st March, 1916, p. 21.
\item \textsuperscript{88} RWA, Sixth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1911, p. 20.
\end{itemize}
to the nature of colonial society,\textsuperscript{89} the major consumers of the type of water distributed by the board were white people. But then, the water supply system was specifically developed to suit the requirements of an urban industrial society in the Western European mould.

In urban centres where water supplies were readily available (for example Johannesburg and Springs), individuals tended to use more water. In other areas, where the necessary infrastructure was still in the process of development, \textit{per capita} consumption tended to be lower. It was at the time difficult to determine the \textit{per capita} water consumption. An estimated 78 per cent of the Witwatersrand’s people of colour were employed on the mines. They were also housed in mining compounds and it was consequently difficult to determine consumption trends. The mining companies purchased water in bulk and did not have meters that differentiated between industrial and domestic consumption.\textsuperscript{90} In 1912 the board’s chief engineer, W. Ingham, made his first estimates of daily \textit{per capita} consumption trends.\textsuperscript{91} The average white person, he argued, used between 79,65 and 204,75 ℓ/cap/d.\textsuperscript{92} The following year Ingham provided more detailed statistics. He was now able to state that the on average whites on the Witwatersrand consumed 76,5 ℓ/cap/d, while a persons of colour consumed 30,15 ℓ/cap/d.\textsuperscript{93} The geographical locality of consumers played an important role. In some areas, Ingham’s estimates suggested, black people consumed even less than 30 ℓ/d. This is evident from the following:

\begin{itemize}
\item \textsuperscript{89} T. SPEAR, “‘A town of strangers’ or ‘a model modern East African town’? Arusha and the Arisha”, B. FREUND, “The city of Durban: towards a structural analysis of the economic growth and character of a South African city”, in D.M. ANDERSON and R. RATHBONE (eds), \textit{Africa’s urban past}, pp. 113-4, 149.
\item \textsuperscript{90} RWA, Sixth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1911, p. 20.
\item \textsuperscript{91} In what follows ℓ/d = Litres per day.
\item \textsuperscript{92} RWA, Seventh annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1912, p. 24.
\item \textsuperscript{93} RWA, Eighth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1913, p. 24.
\end{itemize}
The colonial phase 1901-1911

Table 3.3. The racial distribution of *per capita* water consumption (in ℓ)\(^{94}\) on the Witwatersrand in 1913\(^{95}\)

<table>
<thead>
<tr>
<th>Municipal area</th>
<th>Whites ℓ/cap/d</th>
<th>Persons of colour ℓ/cap/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johannesburg</td>
<td>94,5</td>
<td>49,5</td>
</tr>
<tr>
<td>Germiston</td>
<td>45</td>
<td>13,5</td>
</tr>
<tr>
<td>Boksburg</td>
<td>36</td>
<td>9</td>
</tr>
<tr>
<td>Benoni</td>
<td>45</td>
<td>13,5</td>
</tr>
<tr>
<td>Springs</td>
<td>76,5</td>
<td>81</td>
</tr>
<tr>
<td>Roodepoort</td>
<td>27</td>
<td>4,5</td>
</tr>
<tr>
<td>Krugersdorp</td>
<td>9</td>
<td>2,25</td>
</tr>
</tbody>
</table>

Meeting the demand for water

Because of the intensive development of mining operations, the industrial sector was the major consumer of water on the Witwatersrand in the period after 1901. For the mines water was of the utmost importance. Especially at mines where the gold bearing rock was milled to extract gold, the consumption of water was high. By 1914 the mining sector consumed 53,9 per cent of the board’s water supply while domestic consumers used 38,2 per cent.\(^{96}\) The other consumers of significance were the railways administration. It used 4,2 per cent of the available water supply. The electricity supply sector (then in its infancy) consumed 0,74 per cent.\(^{97}\) In the years to come, the South African Railways became a major consumer of the board’s water.\(^{98}\) Later it even made a substantial monetary contribution towards the construction of the Rand Water Board’s Barrage on the Vaal river.

94. 1 gallon = 4,5 litres.
98. RWA, Fifth annual report of the Rand Water Board to the Colonial Secretary of the Transvaal. Financial year ended 31st March, 1910, p. 3.
From the outset the board had the objective of providing the best possible quality of water available. Section 17 of Ordinance 48 of 1904 laid down the requirements for domestic and health purposes for water in the Transvaal. This was applicable to consumers in the municipal as well as the mining sector, despite the fact that the mines in many cases did not really care much for potable water.

There was no problem from the outset with the quality of water supplied by the Rand Water Board. The fact that a substantial amount of water came from ancient underground lakes, situated in layers of dolomite, prevented the sources from being rapidly polluted. The underground supplies of Zuurbekom pumping station that provided much of the water of the region at the start of the century, was situated almost 30 km from the Johannesburg central business district. The distance away from human activities ensured that the water would not be easily polluted.

With the opening up of the underground water supply of the Klip river at Zwartkopjes it became necessary to start with water treatment. In 1907 the board’s chief engineer, D. Leitch, reported that it was necessary to contend with a percentage of iron (0.7 mg/ℓ.) in the water supply from Zwartkopjes. This by no means affected the taste of the water. However, it did lead to the growth of weeds in the mains. In order to halt it a small amount of copper sulphate (0.29 mg/ℓ.) was added to the water. These activities took place under the supervision of Dr C. Porter, the Medical Officer of Health of Johannesburg. He was the board’s honorary medical orderly of health.

100. RWA, Third annual report of the Rand Water Board to the Colonial Secretary of the Transvaal. Financial year ended 31st March, 1908, p. 3.
In 1908 Dr Porter advised the board to shut down one of its supply points at Zwartkopjes. There were *bacilli* of the typhoid type in the water. These disappeared after a few weeks. Subsequent investigations suggested that workers, as a result of their presence, accidentally deposited the *bacilli* in the vicinity of a well. Leitch also explained to the board that when new boreholes were pumped there were indications of bacterial content at first. After considerable pumping the bacteria tended to diminish. Problems were also experienced during the raining seasons, especially if the rainfall was high. The level of the ground water rose considerably. Under these circumstances it was possible for bacteria to create problems. After considerable pumping the problem would however subside.

Water treatment increased. By 1910 Porter recommended that a start be made with disinfection by adding chloride of lime to the water. At the Zwartkopjes pumping station an amount of 1,5 mg/l
was added.\textsuperscript{105} It represented 1,43 mg/ℓ. The disinfection process took place when the water arrived from the boreholes at the tanks. In order to secure the quality of water, the board also started with disinfection at New Doornfontein in Johannesburg. It was thought that during the dry seasons it would not be necessary to disinfect the water.\textsuperscript{106} By 1911, based on the recommendations of the government’s analyst, between 1,23 to 1,33 mg/ℓ of chloride of lime was added.\textsuperscript{107} The quality of the water provided by the board consistently improved. By 1913, it was reported that there had been a considerable drop in the percentage of micro-organisms in the water. There were, for the first time, even indications that on some occasions the water of the board was completely sterile.\textsuperscript{108} The board’s engineering division, however, was aware that with the growth in the population and industrial development disinfection had to become a standard procedure. Also, in view of the development of the Vaal river scheme it was considered prudent to make provision for disinfection in the purification process. Consequently, in 1916-7 a chlorination plant was built at Zwartkopjes.\textsuperscript{109} The hardness of the board’s water supply also came under scrutiny. It was found in 1908 that the water at Zwartkopjes, drawn from the dolomite, tended to be hard. The shafts and boreholes lowest down in the valley had the hardest water. The water was also harder than at Zuurbekom. In the course of 1908

\begin{footnotesize}
\footnote{105}{1lb = 0,45kg }
\footnote{106}{RWA, Fifth annual report of the Rand Water Board to the Colonial Secretary of the Transvaal. Financial year ended 31st March, 1910, p. 25.}
\footnote{107}{RWA, Sixth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1911, p. 28.}
\footnote{108}{RWA, Eighth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1913, p. 26.}
\footnote{109}{RWA, Twelfth annual report of the Rand Water Board to the Honourable the minister of the interior, Union of South Africa. Financial year ended 31st March, 1917, p. 27; RWA, Thirteenth annual report of the Rand Water Board to the Honourable the minister of the interior, Union of South Africa. Financial year ended 31st March, 1918, p. 29.}
\end{footnotesize}
plans were made for the softening of the water. By 1909 the board started with softening operations by adding hydrate of lime. In 1909-10 the Johannesburg town council requested that the water of the board be further softened. At the time the board’s water supply had a hardness of 22 parts per 100 000. It was on a par with the water supply of London at the time. However, in order to accommodate the council, the board’s chief engineer agreed to soften it further by reducing the hardness to 14 parts per 100 000. In the process a further settling tank with a capacity of 25 Mℓ water was constructed at Zwartkopjes. During 1923-4, as considerable amounts of Vaal river water started flowing in the board’s pipes, three state-of-the-art Wallace & Thiernan chlorinating sets were installed at Zwartkopjes. At Vereeniging a Paterson Chloronome, using liquified chlorine, was installed.

Coping with the increasing demand for water
The success story of the early Rand Water Board was evident in the manner in which it was able to contend with a rising demand for water. As the undertaking was capable of increasing its production of water from 8 to 10 Mℓ/d between 1905 and 1906, the demand simply kept increasing. At the start of 1910 the board supplied 47 Mℓ/d. In the second half of 1910, with the onset of a drought cycle, the capacity of the board was put to the test when it was realised that only 38 Mℓ/d from the existing sources of the

110. RWA, Third annual report of the Rand Water Board to the colonial secretary of the Transvaal. Financial year ended 31st March, 1908, p. 20.
113. RWA, Nineteenth annual report of the Rand Water Board to the honourable the minister of public health, Union of South Africa. Financial year ended 31st March, 1924, p. 35.
114. RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 7.
board could be safely relied on.\textsuperscript{116} Given this situation there was a constant need to identify sufficient water resources. When the board started operations in 1903 there were only two sources in operation. They were Zuurbekom to Yeoville \textit{via} Paarlshoop and Braamfontein to Parktown water tower.\textsuperscript{117} Soon plans were under way to develop the source of Zwartkopjes farm, situated in the Klip river valley. The British consulting engineers, Middleton, Hunter & Duff, in 1903 predicted that the board would need at least 45 M\(\ell\)/d before 1910.\textsuperscript{118} Zwartkopjes was seen as the potential source. Estimates suggested that this underground water supply, which had been purchased from the Vierfontein Syndicate, would easily cope with a daily water supply of 45 M\(\ell\).\textsuperscript{119} The board was confident that the supply and demand for water was under control when the first borehole drilling operations started on the farm early in 1905.\textsuperscript{120} By March 1907 a daily supply of 25 M\(\ell\) was available.\textsuperscript{121} It was well above the average daily consumption. At one point chief engineer Leitch even recommended that the price of water be lowered in order to push up consumption.\textsuperscript{122} By 1908 the board’s sources of supply to Johannesburg were as follows: There were two unused wells at Milner Park. There was a well at the Staib street depot of the board and three boreholes at New Doornfontein. The rest of the water was drawn from

\begin{itemize}
\item \textsuperscript{116} RWA, Sixth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1911, p. 2.
\item \textsuperscript{117} RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 7.
\item \textsuperscript{118} RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 11.
\item \textsuperscript{119} TA, LD862 4600/04. E.W. Bennett, Johannesburg – Attorney-General, Pretoria, 1904.08.19; RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 11.
\item \textsuperscript{120} RWA, Minutes 1904-6, pp. 76, 123-26. 43rd meeting 1905.01.27 and 47th meeting, 1905.03.24 (Report by D. Leitch to the board).
\item \textsuperscript{121} RWA, Second annual report of the Rand Water Board to the Colonial Secretary of the Transvaal. Financial year ended 31st March, 1907, p. 1.
\item \textsuperscript{122} RWA, Report of the Rand Water Board to the Colonial Secretary of the Transvaal, for the financial year ended 31st March 1906, p. 26.
\end{itemize}
Zwartkopjes and neighbouring properties in the Klip river valley, as well as at Zuurbekom.\(^{123}\)

By far the most water consumed in the area of the board, came from Zwartkopjes. This source of water started with operations in 1908 after a diviner had located a number of sites where 12 boreholes were eventually put down. A pumping station was built and ancillary facilities for a settling tank were brought into operation.\(^{124}\) In terms of the statutes of the board it was also not possible to extract more than 45 M\(\ell\) of water per day.\(^{125}\) In the early years the water of Zwartkopjes was pumped to the summit at Turffontein. From there it gravitated to Village Main Reef, Simmer and Jack and the East Rand. From Village Main Reef water was pumped to the Yeoville reservoir and to the municipal mains of Johannesburg from where it was pumped to the southern suburbs of the city.\(^{126}\)

By 1910 it became evident that Zwartkopjes could not be pumped for an unlimited period. What was originally deemed to be a source that would be able to cope with a supply of 45 M\(\ell\)/d, dropped to 38 M\(\ell\)/d.\(^{127}\)

There was thus a crisis when the drought of 1911-2 set in. Within the space of six months the supply of Zwartkopjes dropped from 23 to 16 M\(\ell\)/d.

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123. RWA, Third annual report of the Rand Water Board to the Colonial Secretary of the Transvaal. Financial year ended 31st March, 1908, p. 18.


125. TRANSVAAL COLONY, Section 3(1) of Ordinance No. 30 of 1905. Rand Water Board extended powers amendment ordinance 1905, 1905.09.19; RWA, Sixth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1911, p. 2.

126. RWA, Third annual report of the Rand Water Board to the Colonial Secretary of the Transvaal. Financial year ended 31st March, 1908, p. 19.

127. RWA, Sixth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1911, pp. 2-3.
Table 3.4 Decline in the daily supply of water from Zwartkopjes October 1911 – March 1912

<table>
<thead>
<tr>
<th>Month</th>
<th>Average Mℓ /d</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 1911</td>
<td>23</td>
</tr>
<tr>
<td>November 1911</td>
<td>20</td>
</tr>
<tr>
<td>December 1911</td>
<td>19</td>
</tr>
<tr>
<td>January 1912</td>
<td>18</td>
</tr>
<tr>
<td>February 1912</td>
<td>16</td>
</tr>
<tr>
<td>March 1912</td>
<td>16</td>
</tr>
</tbody>
</table>

In an effort to cope with the problem an investigation was launched to seek additional water at Zuurbekom. However, it became increasingly clear that the board would have to find alternative sources of supply. There were not many options open. It was evident that the sources of supply were already severely tested. Overall the water supply of the board was as follows:

Table 3.5 Water supply sources of the Rand Water Board in 1911

<table>
<thead>
<tr>
<th>Source</th>
<th>Mℓ/d</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zwartkopjes</td>
<td>26</td>
<td>65,17</td>
</tr>
<tr>
<td>Zuurbekom</td>
<td>13</td>
<td>32,03</td>
</tr>
<tr>
<td>Doornfontein (Ellis Park and Staib Street)</td>
<td>0,5</td>
<td>1,29</td>
</tr>
<tr>
<td>Springs</td>
<td>0,2</td>
<td>0,41</td>
</tr>
<tr>
<td>Braamfontein</td>
<td>0,5</td>
<td>1,11</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

At the time Zuurbekom, one of the most reliable sources of supply, was running at a 24 per cent overload. The other sources of supply, such as Doornfontein, Braamfontein and Springs, were

128. RWA, Seventh annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1912, p. 3.
129. RWA, Sixth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1911, pp. 2-3.
130. Ibid., p. 21.
131. Ibid., p. 21.
also in the process of deterioration. The chief engineer predicted that within the next number of months the maximum supply of the board would drop from 40 to 39 Mℓ/ℓ.\textsuperscript{132}

When William Ingham became the chief engineer of the board in 1910 he immediately started with a programme to pump more water from Zuurbekom. It was possible to push the supply up from 11 to 33 Mℓ/ℓ.\textsuperscript{133} At the end of the 1913 financial year, Zuurbekom had provided 40,92 per cent of the total water supply of the Rand Water Board.\textsuperscript{134} Whilst the water of Zuurbekom gradually increased, that of Zwartkopjes progressively started declining.\textsuperscript{135} The board knew all too well that a new source of supply had to be acquired for the Witwatersrand. All was not well and plans were made in earnest to secure a more reliable supply. The Vaal river was to play an important role in this context.

\textsuperscript{132} Ibid., p. 22.

\textsuperscript{133} ANON., \textit{Souvenir of the opening of the Vaal river scheme by His Royal Highness Arthur of Connaught, Governor General of the Union of South Africa, 27th July 1923}, p. 5.

\textsuperscript{134} RWA, Eighth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1913, p. 21.

\textsuperscript{135} Ibid., p. 22.
Chapter 4

The Vaal river scheme 1912-1923

The major accomplishment of the Rand Water Board in the first quarter of the twentieth century culminated with the opening of the Barrage in 1923. Architecturally the blend of *art nouveau* and classical styles used in the design of the impressive Barrage across the Vaal river at Lindequesdrift, as well as the impressive buildings of the Vereeniging pumping station, told the story of contemporary northern hemisphere trends in architectural fashion that had been absorbed into the landscape of the South African veld.

![Illus. 4.1. The office block at the Vereeniging pumping station. Source Rand Water](image)

It was an era, noted for its change in political and economic accent. There were crosscurrents of political sentiments that pervaded South African society. Amid war, rebellion, peace, industrial unrest
and economic fluctuations the Rand Water Board continued doing what it did best – supplying water to the Witwatersrand.

**The emergence of the extra-regional water utility**

The formation of the Union of South Africa in 1910 made provision for the creation of four provinces in a state where many elements of the British Westminster system of governance were present. The first tier of government was the national government, the second tier was responsible for the provincial administration and local government made out the third tier of government. In many respects the Rand Water Board was somewhat of a misnomer. It was a public utility, supplying water to a region (the Witwatersrand) within a province (Transvaal). At the same time it had to cater for consumers in the private (the mines) as well as the public (municipal) sector. For all intents and purposes it was a fully-fledged regional water supply authority.

At the outset the sources of supply of the Rand Water Board were situated in close proximity of Johannesburg from where the water was supplied to the Witwatersrand. The first attempt at locating sources elsewhere was in the case of Springs on the East Rand.¹ The commission of 1901, which laid down the plans for the framework of the future Rand Water Board, had in mind that the region in which the service provider was to operate had to extend from Randfontein in the west to Springs in the east.² The region was defined by a single common denominator: gold mining operations. The water supply of Springs was an isolated entity. Because of distance and cost implications local water sources were used. The town of Springs, (literally meaning ‘water springs’) had a sufficient supply for local use, but the water was not of a good quality.³ When

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the Rand Water Board started with operations it was consequently only a matter of the engineering division’s skills being applied in order to provide at Springs a reliable local water supply. Since October 1906 a borehole had provided a consistent supply of 112 500 ℓ/d. In the course of 1908 a small portable boiler and engine, taken over from the Johannesburg Waterworks and Exploration Company, was installed at Springs. It was to be used as a stand-by. A small reservoir of 810 000 ℓ was built at the site.\footnote{Ibid., p. 21.} It was an expensive undertaking. Small amounts of water were consumed and the pumping costs were high.\footnote{Ibid., p. 33.}

As a result of the water crisis at the main sources of water supply near Johannesburg, the board in 1911 gave instructions for an investigation into the potential of the water supply of Springs. It was thought it would be possible to extract about 9 Mℓ from the northern and southern shafts of the Springs mines.\footnote{RWA, Minutes, 1911-2, pp. 324-5: 148th ordinary meeting, Corner House, Johannesburg, 1911.06.16; RWA, Seventh annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1912, p. 29.} Within six months of its completion in December 1911 the plant was able to supply an average of 4 Mℓ/d. The board had the right to extract 20 Mℓ/d, but under no circumstances did it exceed, in \textit{de facto} terms, 9 Mℓ/d.\footnote{RWA, Seventh annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1912, p. 29.} The system was so effective that by the end of the 1911-1912 financial year operations at the old pumping station were halted. The old system cost £1750 annually to operate whereas the new system only cost the board £480. This represented a saving of £1270.\footnote{Ibid., p. 28.} For a short time it appeared as if a solution had been found for the dire shortage of water experienced in the supply network of the board. By 1912-1913 the supply from the Springs Mines declined to about 6 Mℓ/d. It then had to be augmented with
The Barrage 1912-1923

supplies from Welgedacht and Daggafontein.\textsuperscript{9} It however continued to diminish.\textsuperscript{10} By 1916-1917 the available daily supply had declined from 3 to 2 M\textsuperscript{ℓ}/d.\textsuperscript{11}

The first attempts of the board to use sources outside the immediate area of supply in Johannesburg – such as Springs – proved to be a failure. It underlined one principle – a more comprehensive and reliable source of water supply had to be found for the whole region the board served. That source of supply was to be the Vaal river.

The Vaal river scheme

In view of the fact that the Witwatersrand’s water supplies were on the decline, the chief engineer of the Rand Water Board, William Ingham, was instructed early in 1911 to investigate the most suitable water catchments within a radius of 80 km of Johannesburg. The objective was to find an ‘entirely new scheme of supply’.\textsuperscript{12} In the press the matter was described as an issue requiring great urgency because of the growth in the mining sector, the railway network and the number of municipalities on the Witwatersrand.\textsuperscript{13}

\begin{flushleft}
\textsuperscript{9} RWA, Eighth annual report of the Rand Water Board to the Administrator of the Province of Transvaal. Financial year ended 31st March, 1913, p. 22.
\textsuperscript{10} Ibid., p. 31.
\textsuperscript{11} RWA, Twelfth annual report of the Rand Water Board to the Honourable the minister of the interior, Union of South Africa. Financial year ended 31st March, 1917, p. 23.
\textsuperscript{12} RWA 450. Catchment area scheme. Report (confidential) by the water supply sub-committee to the committee of the whole board, 1913.09.16, p. 2.
\textsuperscript{13} ANON., “Rand water problem” in Rand Daily Mail, 1912.09.19.
\end{flushleft}
Johannesburg’s town councillors were aware that the existing dolomite water storage facilities would be unable to continue providing if drought conditions persisted.\textsuperscript{14} In addition the ratepayers of the city, which was to become South Africa’s largest urban centre, expressed a strong desire for a sustained and reliable water supply.\textsuperscript{15} Ingham’s investigations were extensive. At one point in time as many as 21 different schemes with a combined value of £25,3 million were under consideration.\textsuperscript{16}

The most important were: Kuilfontein on the Zuikerboschrand river in the Heidelberg district; the Mount Arabel scheme, situated on a site just below the confluence of the Zuikerboschrand river and the Blesbokspruit; the Koppiesfontein scheme 75.2 km upstream from Vereeniging on the Vaal river; and the Lindeque’s drift scheme, below Vereeniging.\textsuperscript{17} By 1913 it was apparent that the proposed Vaal river scheme (and particularly the Lindeque’s drift scheme) offered the best prospects. In a report submitted to a special committee of the board, its engineer W. Ingham, in February 1913 explained:

The Lindequees falls site is situated about 24 miles below Vereeniging, and, by building a dam 30 feet high at the Fall, the water would be backed up the river to Engelbrecht’s Drift

\textit{Illus. 4.2. William Ingham. Chief engineer 1911-23. Source: Rand Water.}

\begin{enumerate}
\item ANON., “Water supply: To-day’s meeting of the Council” in \textit{The Star}, 1912.11.18.
\item ANON., “The water problem” in \textit{Rand Daily Mail}, 1912.09.27.
\item RWA, 450/2 Water supply Catchment scheme. Lindequees (sic) scheme. 1. General correspondence, from 20 September 1913 to June 1914. Confidential report by the water supply sub-committee to the committee of the whole Board, 1913.09.16, pp. 3-4.
\end{enumerate}

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