

ENVIRONMENTAL CENTRE DELTA PARK HERITAGE PRECINCT



SOME INTERESTING INFORMATION ON THE ORIGINAL USAGE OF THE BUILDING

ROYAL SOCIETY OF SOUTH AFRICA THE SCIENCE OF SEWAGE BY JANE CARRUTHERS

Perhaps because humans are inherently romantic, when conjuring up a mental picture of a 'scientist' what probably first comes into mind is a shaggy-haired Einstein-like figure with mathematical formulae swirling around his head, a biologist in the field or laboratory studying a fascinating rare creature, or similar such images. A sewage expert would not top the list, nor would it be among the most enviable of scientific careers. This is so, despite the fact that dealing with our excrement is basic to human life, and given the planet's ever-growing population and its increasing urbanisation, sewage science is likely to become even more critically important in the future. Owing to the low public appeal of sewage, it is not well known that among long list of past Fellows of the Royal Society of South Africa is the country's most influential sewage engineer, Ernest John Hamlin – known as 'E.J.'. His achievements in ensuring the health of many millions of South Africans during his career as an innovative 'sanitation engineer' in Stellenbosch and Johannesburg are worthy of record.



Delta Sedimentation tanks

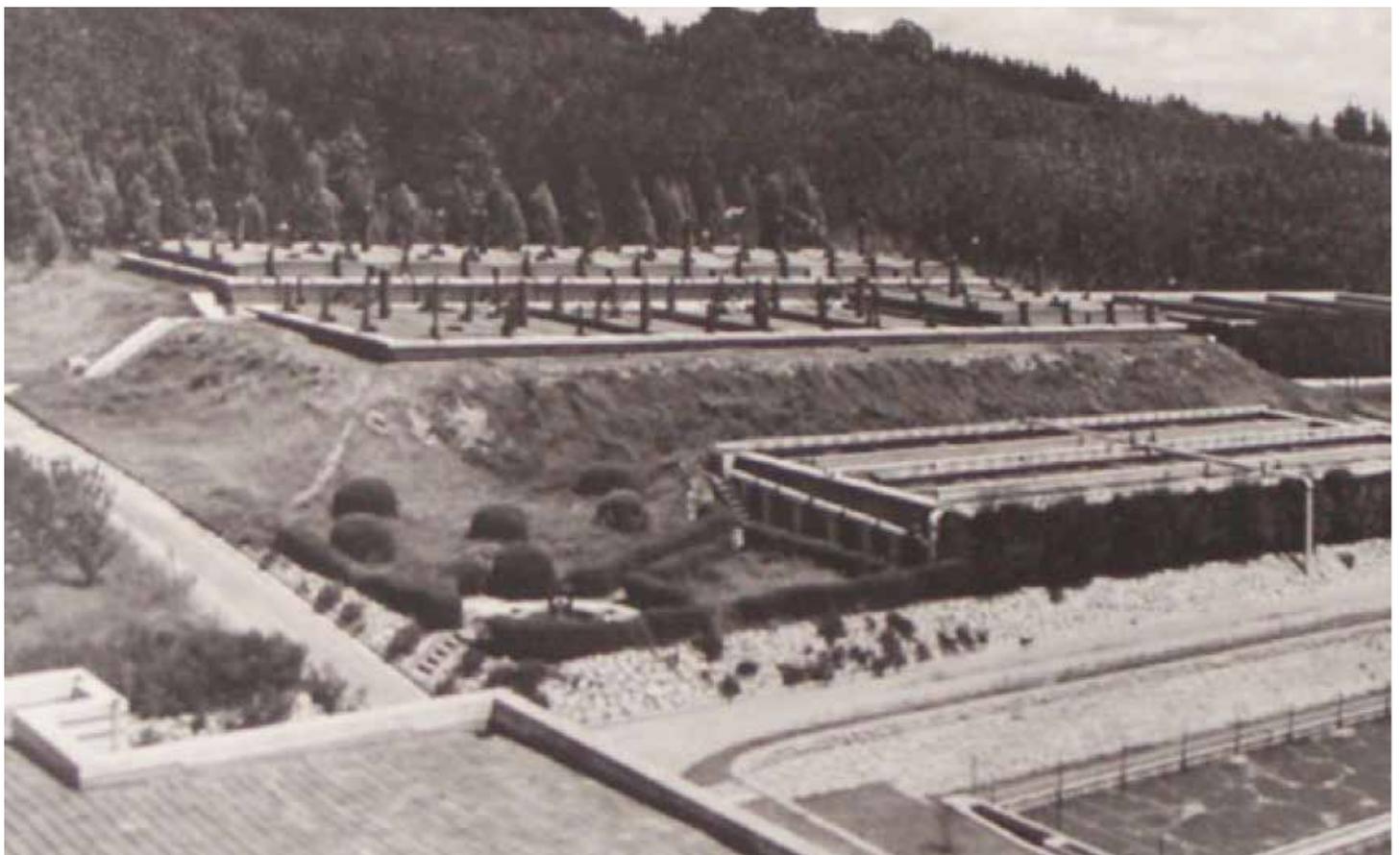
Hamlin was born in Bristol on 17 March 1887 and educated there, studying civil engineering at the University of Bristol. He immigrated to South Africa in 1911, the year after Union, and according to his Obituary in the 1957 Transactions of the Royal Society of South Africa³⁵⁽²⁾ took up an appointment as Lecturer in Civil Engineering at the South African College in Cape Town (after 1916, the University).¹ After two years of lecturing, he left to become Town Engineer of Stellenbosch, remaining in this position until 1927. During this period he obtained a D.Sc. from the University of Bristol, and in 1922 his accomplishments were recognised by his election to Fellowship of the Royal Society of South Africa, of which he had been a Member since 1913.

Hamlin's endeavours were certainly note-worthy, although his name is not lauded in any history of Stellenbosch that I could find. It is the preservation of the oak-lined streets, Cape Dutch homesteads and extensive vineyards that are given attention in such books. And yet Hamlin's work was perhaps more important than these external markers of Cape civilization: he ensured that beneath this benign exterior Stellenbosch was provided with a modern sewage scheme that did not detract from its pleasant ambience. In addition to dealing effectively with human waste, Hamlin also thoroughly researched the more deleterious effects of the alcohol industry – distillery effluents and river pollution – in order to mitigate them.

In 1927 Hamlin moved on to tackle the far larger and more complex city of Johannesburg. Appointed Assistant City Engineer, five years later he became City Engineer, holding this post until his retirement in 1947. Johannesburg is somewhat unusual in always having separated waste water (including sewage) from storm-water. Until a Town Engineer's Department was established in 1902 after the South African War, sewage was collected in tarred buckets and removed beyond the town's boundaries by horse-drawn night-soil carts to be used as fertilizer on neighbouring farms. Naturally, disease was a regular hazard.

Johannesburg is situated on the Witwatersrand watershed and rivers flow either to the south (into the Klip River, and thence into the Vaal) or to the north (streams that feed into the Crocodile River). Between 1902 and 1910 a very large gravity-fed sewage scheme (at a cost then of £335 000) was constructed for removing sewage from the city centre and its southern areas to Klipspruit, a council-owned farm on which the largest disposal works in South Africa were built. Over the years, the Klipspruit system was regularly updated and enlarged and it remains in use today.

Dealing with sewage on the northern side of the watershed was more difficult. The geology of many parts of the city is not suitable for septic tanks and well into the 20th century night-soil collection in suburbia was still common, the carts depositing their daily loads into a series of intakes along the main Klipspruit sewer. In 1927, the year that Hamlin arrived



Delta sand settling beds to the north of the building

in Johannesburg, it was decided to extend waterborne sewerage to the northern suburbs using the small natural drainage basins of four north-flowing streams. Gravity-fed plants were established and Hamlin gave them Classical-sounding names (denoting A, B, C, D) that would not prejudice the neighbouring suburbs by association. All are closed today. They were Antea (the smallest on the west, serving Industria township), Bruma (on the east, currently a lake and shopping mall), Cydna (on the north-east, now the Melrose Bird Sanctuary) and Delta (on the north-west, today an environmental

education centre and public park). These four schemes, together with the network of sewerage reticulation that had to be laid throughout the suburbs, were constructed during the Depression of the 1930s and were capital projects and poverty relief endeavours using only 'poor white', not black African, labour. Between 1932 and 1945 Hamlin's department laid more than 1100 km of reticulation, often overcoming considerable engineering and design challenges. The most scientifically interesting of the four schemes was Delta, planned between 1932 and 1934 to deal initially with 4.5 million litres a day and to serve a population of 35 000 living in the areas of Parkview and nearby suburbs. A network of smaller sewerage pipes fed into the main sewer leading directly to Delta, where the city had acquired a large area (about 110 ha) of open land close to the suburbs of Craighall, Linden and Blairgowrie along a small stream that flows into the Braamfontein Spruit. The Art Deco building that housed the sewage works (and cost £13 500), with its foundation stone laid in July 1934 was handsome – recently it has been declared a Heritage Building. Imposing, solid, square, geometric but elegant in shape, it now stands proud in the large open area epitomising the self-confident, progressive and modern international building style of the 1930s.

Not only was the building unusual for such public works, but the method of treating the sewage when the plant opened in April 1935 was unique in South Africa for its time. It was new international technology especially adapted, after experimentation, for Delta. The first stage in the process was to use sorting screens to remove any debris that might clog machinery by hand. Thereafter, the sewage flowed into tanks where large particles of sand and grit settled to the bottom and were removed by hoppers beneath the tanks. In the third stage organic material in suspension was moved into sedimentation tanks where some of the suspended solids were removed as sludge. Because only about half the organic matter could be removed mechanically, Delta used a pioneering process called 'activated sludge' – a process in which gelatinous sludge particles (known as 'floc') were suspended in an aeration tank and supplied with oxygen. Organic matter was absorbed by the floc and converted into harmless gasses and by-products. A microbiological process then converted the sludge to methane, carbon dioxide and 'digested sludge', an inoffensive humus-like material. In the final process the digested sludge was placed outdoors on sand beds and the water percolated into the ground or evaporated. At Delta, terraces of these sand beds were laid out on the north of the building. Any remaining dry sludge was used as fertiliser. Because of the unusual processes used at Delta, Hamlin and his colleagues presented and published academic papers that were well received internationally.

The building housed the sorting screens, the detritus pit and sedimentation tanks, the machinery rooms and the general offices. Much of the complex machinery was designed and constructed by Hamlin's department. The switchboard with its controls and recording instruments was state-of-the-art and could be operated remotely. There was ecological recycling as methane gas from the digestion tanks was collected and used as fuel for a gas engine alternator that generated 80 per cent of the electricity needed for the air compressors and for a ventilation system in the tank room. Waste heat was used for heating the crude sludge entering the digestion tanks.



Delta Sewage Works 1934

After only four years Delta had reached its optimum load of 18 million litres of sewage a day, and it was expanded almost every year, continuing to work well for a decade. However, at Johannesburg's altitude the diffused air method was not as effective as had been anticipated and the high water table together with an insoluble infiltration of fresh water proved a problem. However, the major reason for deciding in the 1940s to close Delta and the other three sewage plants over the next few years was that the population of northern Johannesburg had grown exponentially and overloaded all four plants. It became clear that a large-scale system for the north, akin to that of Klipspruit, was required.

In 1946, a year before his retirement, Hamlin began his design for the massive, costly, gravity-fed Northern Disposal Works with its outfall near Diepsloot in a locality where all the rivers of the northern Witwatersrand converge in a single drainage into the Crocodile River. Expressly planned to be as far as possible from any municipal boundary or population node, Hamlin could never have imagined that the upmarket Dainfern development would, in time, nestle snugly beneath what has been called the 'poo pipe', sharing its shelter with the huge informal African settlement of Diepsloot. In use from the late 1950s when reticulation from the four small schemes was almost complete, this (with modifications) is still the main sewer for northern Johannesburg, its complexity leading to its inclusion as one of the 'Seven wonders of civil engineering in South Africa'.

Eventually all four of Hamlin's smaller schemes were shut down and dismantled. Engineers regretted the close of Delta in June 1963, commenting that the plant had played a large part in determining the potential of the diffused air process at high altitudes. At Delta, the sand beds were removed, the area levelled, kikuyu lawns planted and the land was transferred to the municipal Parks and Recreation Department. With the ever-increasing density of the area it soon became one of Johannesburg's largest and most popular public open spaces with little physical trace of its previous incarnation. By contrast, the building, purpose-built and thus architecturally unsuitable for easy rehabilitation, fell into disrepair. In the 1970s it was rescued by a Johannesburg philanthropist who rented it from the city and established what has become the highly regarded Delta Environmental Centre that educates many thousands of learners and teachers every year.

Hamlin was more than a sewage engineer, however. An energetic man, a skilled manager and technical expert with a dominating personality, he was also actively involved in town planning. Shaping Johannesburg's urban development, even its traffic flow, is another of his achievements. During the war, with his staff depleted, his personal responsibilities increased. With the commission of Lieutenant-Colonel, he became engineer advisor to the Witwatersrand Military Command, and in 1944 he was appointed Director of Housing, in overall charge of planning housing and other infrastructural requirements for post-war South Africa.

During his career, Hamlin contributed significantly to his profession. He published his research in leading journals, he built capacity among young engineers and he was a member of, and energetically supported, almost every possible allied professional institution, including the Royal Society of Health. After retiring from the City Council of Johannesburg he set up as a consultant and worked on various projects until his death on 19 April 1956.

NOTES AND REFERENCES

Hamlin's entry in the Dictionary of South African Biography (vol. V, pp.319-320) more curiously has him assuming a post as lecturer in the English Department at that institution. Perhaps the abbreviation 'Eng. Department' was misunderstood by a typesetter.

Delta Environmental Centre <http://www.deltaenviro.org.za/>

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