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The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

TECHNICAL BRIEF

Sustainable service delivery

Reticulated sewerage infrastructure

The WRC has funded a study to investigate key issues surrounding reticulated sewerage infrastructure in South Africa.

Sewerage reticulation – an often-overlooked issue

Sewerage reticulation systems represent a considerable capital investment in the overall provision of waterborne sanitation. Depending on factors like materials of construction, installation techniques, operating conditions and quality and flow regimes, sewerage reticulation systems have a limited life span.

In the older metropolitan areas of South Africa, sewerage systems have in part already exceeded their anticipated service life. The rapidly expanding commercial and residential development in many urban areas, as well as the accelerated provision of housing and water and sanitation services to previously un-served sectors, has been accompanied by a rapid expansion of sewerage reticulation systems and increased the volumes of sewage produced. This, in turn, has placed pressure on the older existing networks to which the newer developments often need to be connected.

Whereas, in the context of integrated urban water management, considerable attention has been paid to issues and knowledge requirements concerning domestic water supply, sanitation and sewage treatment, the systems responsible for receiving and reticulating sewage flows have, by comparison, largely been overlooked. As a result, there has been a lack of up-to-date knowledge regarding technical, strategic and operational issues associated with sewerage reticulation in South Africa.

Addressing the lack of know-how

To address this lack of knowledge, a study was initiated to identify key issues and develop appropriate research responses concerned with reticulated sewer infrastructure in South Africa. More specifically, the study sought to:

- Characterise key sewerage reticulation issues against

the background of international and regional research reported in published literature;

- Prioritise those issues requiring attention within the context of integrated urban water resource management in South Africa; and
- Develop strategic guidelines on the way. Research should approach sewerage reticulation issues of high priority.

Central to the study was a series of workshops with stakeholders, designed to establish the concerns of local managers and operators regarding sewerage reticulation issues and also to confirm the research needs and priorities previously identified during the process of reviewing published literature.

It was anticipated that the results of the study would provide funding agencies like the WRC with a frame of reference against which to solicit research projects that would address the specific needs of the sewerage reticulation sector in a focused and effective manner.

Insights gained from international and local literature

Although basic reticulated sewer systems have been in existence throughout the millennia, only since the mid-19th century have significant advances been made towards a holistic understanding of health, social and technical issues associated with such systems. Of these, the technical issues, such as planning, design, construction, operation and maintenance of reticulated sewer systems have dominated the surveyed literature, with more than half of the pertinent publications (2 021 international and 113 local references) focusing on such issues.

While in South Africa sewer and stormwater systems are generally kept separate, much of the international research has been conducted on combined sewer and stormwater systems. Nevertheless, many issues associated with the



combined sewer systems resemble issues that merit research attention under the conditions prevailing in South Africa.

Current sewerage reticulation – where do we stand?

A series of workshops, held at eight main centres throughout South Africa and involving a total of 21 metropolitan, local and district councils, was a valuable source of information. The main constraint facing the management and operation of sewer reticulation systems in South Africa proved to be a lack of resources and, to a lesser extent, a lack of funding.

At the time of the workshops, it was estimated that 79 of the 231 municipalities responsible for sewerage services had no civil engineers, technologists or technicians, indicative also of the general shortage of engineering capacity in South Africa. A further constraint identified was the loss of institutional knowledge concerning the construction and operation of original sewer systems as a result of local government restructuring and the fact that relevant information had not been captured in suitable databases or information systems.

Owing to the serious loss in capacity and experience, a need had arisen for the production of guidelines to assist managers in understanding the full requirements of planning, designing, operating, and particularly maintaining, rehabilitating and upgrading of sewer infrastructure. Such guidelines, accompanied by the setting of minimum requirements, would also help the smaller local authorities, especially, to cope with the bewildering array of products, materials, software and methods available for various aspects of sewer management and also to ensure the maintenance of minimum service levels.

Research: what is it that we need to know?

Having identified the key sewerage reticulation issues requiring attention within the context of integrated urban water resource management in South Africa, the study team proceeded to establish where new research is required, where completed research needs to be revisited and where there is a need to disseminate existing results from past research to relevant professionals and administrators.

In general, the greatest needs for research and guidance were found to be in the fields of:

- Operations and maintenance
- Environmental issues
- Benchmarking, and
- Analysis of existing systems.

With the further help of gap analysis, specific research topics

were identified. These were consolidated into 31 projects and subsequently prioritised, based on the needs identified during the national workshops.

A comparison of the priorities of coastal and inland local authorities revealed that issues of benchmarking and education were of greatest importance to coastal areas, while operational and maintenance issues and environmental issues were of greater concern to professionals and administrators in the inland areas. For smaller local and regional councils, operational and maintenance issues and system analysis issues proved to be of greatest importance, while the larger metropolitan councils mainly required additional research to be conducted on benchmarking, social and educational issues.

Conclusion

In general, the larger metropolitan structures are well established, having comprehensive systems, resource structures and functional bylaws and procedures. The smaller councils, however, do not have the financial capacity to implement enterprise-wide information systems or the human-resources capacity to manage water service systems. The majority of their time is typically spent on keeping the existing sewer system operational, with little routine maintenance planning or master planning.

Both larger and smaller structures, however, have issues which require research attention. The main outcome of the study on sewerage-reticulation research needs has been the compilation of a list of 31 prioritised research projects for which funding support is desirable. For two of these, namely a fundamental research project (*Improving Sewerage for South Africa*) and an applied research project (*Sewer Master Planning Tools and Guidelines*), terms of reference have been developed. The recommendation is to treat these as solicited projects with a view to immediate implementation.

Along with these projects, there is a need to develop national standards with regard to buried flexible pipes, jointing systems and trenchless technologies, in partnership with appropriate organisations. There is also a need to address the dissemination to end-users of valuable information emanating from already-completed research in the field of sewerage reticulation.

Further reading:

To obtain the report, *A First Order National Audit of Sewerage Reticulation Issues* (**Report No: 1671/1/08**), contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; E-mail: orders@wrc.org.za; or Visit: www.wrc.org.za to download a free copy.