

Viable housing is more than houses: A report on South Africa's enabling infrastructure

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Abstract

Viable housing needs more than just the construction of the houses -- indeed it is about more than just the houses themselves. It is also about providing and then operating and maintaining municipal engineering infrastructure, and also public amenities.

However, despite obligations to sustainably manage infrastructure, the competing demands that are made on limited municipal operational budgets (and staff and other resources) severely constrain sustainable management.

The paper describes the finding of extensive research over the last three years into the state of South Africa's municipal infrastructure, and into concepts of sustainable management of that infrastructure. Inter alia, it points out the extent to which the viability and habitability of our housing is at risk because of the threats to the infrastructure. It also outlines what is needed in order that the infrastructure be sustainably managed.

1 Introduction

The quality of life and economic development of our country is underpinned by a vast infrastructure network of roads, water supply, sewerage, drainage, power supply, flood protection, recreational and other tangible assets. These are predominantly managed by local, provincial and national governments, and constitute a major investment over many generations, made in the expectation that benefits will accrue in terms of increased productivity, improved living conditions and greater prosperity.

Since the first universal suffrage elections in South Africa, in 1994, municipalities have been focusing on the delivery of basic housing and basic services such as water, sanitation, electricity and health services. In respect of only the engineering services, the Development Bank of Southern Africa (DBSA), the Department of Water Affairs and Forestry (DWAF) and the Department of Provincial and Local Government (DPLG) alone between 1994 and 2004 funded an at least R30 billion investment in engineering services new works, upgrading and rehabilitation. Including a proportion of the public sector housing expenditure, to reflect that which is spent on township infrastructure, and

estimating funding from other sources, including from municipalities themselves, raises the total to in excess of R 50 billion (8 billion US dollars at current exchange rates). This is an immense amount of money sunk into infrastructure that has become the responsibility of municipalities to operate and maintain. Furthermore, a significant proportion of our population does not enjoy basic housing, safe water and/or acceptable sanitation, so it can be expected that there will be continuing political pressure to keep capital infrastructure expenditure at a high level, or even to increase it appreciably. Our spheres of governments have a huge responsibility to construct new infrastructure and, after its construction, to ensure it will be "managed", that is, operated and maintained.

The replacement cost of engineering services infrastructure constructed prior to 1994 and still in service (or that ought to be in service, but needs repair or rehabilitation) is even larger than the replacement cost of that constructed since 1994.

The competing demands that are made on limited municipal operational budgets (and staff and other resources) severely constrain the proper management of existing and new infrastructure assets. There is strong evidence that insufficient attention has been paid by the majority of municipalities to the on-going commitments that they have incurred to manage their infrastructure.

The effect of lack of management will be that this infrastructure will deteriorate well before the end of its designed life. Depending on the infrastructure concerned, it could be that water pressures drop, water supplies are interrupted, pipes leak (at a cost for the purchase and treatment of the water, but with no benefit to the municipality), watercourses are polluted, the riding quality of roads deteriorates and wear and tear on vehicles increases - and other similar results will ensue.

In due course, many householders will be deprived of services, even if temporarily, at great inconvenience, and maybe even at risk to their health. If the budgets at that time permit, infrastructure will have to be rebuilt, at much higher cost than if the original infrastructure had only been properly managed since it had been constructed. And, until the infrastructure is rebuilt and back in service, there will be the cost to the community and the local economy of being deprived of the services - and/or in some instances in having to make expensive alternative arrangements.

Legislation requires municipalities to provide operational strategies that *"align the municipality's resources for the realisation of its development objectives..."* (Local Government: Municipal Systems Act, 1998) and must include a medium term financial plan setting out *"how the capital and operational expenditure ... is matched by its revenue raising strategy."*

If due regard is to be paid, in a manner that conforms with the requirements of the Municipal Systems Act, to the sustainability of the infrastructure that has been created, municipalities should simultaneously plan and provide for the long term management of all their infrastructure assets.

In this context, there is a need for a structured approach to and methodology of infrastructure management ("management" in this sense includes operations and maintenance) that addresses the needs of South African municipalities.

2 The state of serviceability of municipal engineering infrastructure

Overviews of the state of serviceability of the municipal engineering infrastructure that is underpinning our housing stock nationwide are invariably based on limited sample surveys. Even many individual municipalities and utilities are hard pressed to describe serviceability of the infrastructure for which they are responsible. They are able to describe sectors of their responsibility (many municipalities can tell you about their roads serviceability, because they have a "pavement management system"), but they are not able to describe the entire range of their responsibility. There are of course outstanding exceptions -- there is no shortage of South African good practice examples, public and private sector, against which owners of engineering services infrastructure could benchmark themselves if they wished.

Nonetheless there is a growing recognition that measuring the state of serviceability is an essential precursor to the correct targeting of infrastructure management. For example, at least two provinces have processes under way to measure, on the basis of fairly extensive samples, the state of serviceability of municipal infrastructure in their provinces.

3 The state of management of municipal engineering infrastructure

Investigations undertaken under the auspices of the Council for Scientific and Industrial Research (CSIR), DWAF, the Institution of Municipal Engineering of Southern Africa (IMESA), and others, and collated by the CSIR, provide a broad picture of the state of the management of the municipal infrastructure that is underpinning the habitability of our housing stock. In addition, there have been a number of initiatives aimed at investigating specific aspects, or the needs of specific owners of infrastructure assets.

One of the most useful surveys has been that undertaken by an IMESA team (including the present author) which benchmarked a selection of municipalities against New Zealand practice (acknowledged to be amongst the world's leading practice). The survey determined the municipalities' appreciation of and application of infrastructure management. The pertinent findings were:

- In respect of many of the aspects of infrastructure management surveyed (such as knowledge of assets, demand analysis, asset creation and disposal, asset utilisation, and asset operation and maintenance), the South African authorities compare well with the chosen benchmark.
- However in respect of other aspects (in particular strategic planning, asset accounting, and planning and making financial provision for improvement of infrastructure), the South African authorities compare very unfavourably with the benchmark.

The latter is in large part ascribable to the fact that in New Zealand these provisions are required by national legislation.

A less in-depth questionnaire survey by an IMESA team of a much wider sample of municipalities indicated a far lower level of infrastructure management capability. Also, whereas a high percentage of municipalities indicated that they prepared the statutory development plans required by national government (such as Integrated Development Plans (IDPs) and Water Services Development Plans (WSDPs)), anecdotal evidence and the general level of capability identified by the questionnaire survey suggested that these plans were not supported by sound analysis of infrastructure needs or definition of service levels.

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The CSIR has since investigated selected municipalities in more depth. Much encouraging practice has been found. For example:

- Good rapport between councillors and officials in respect of infrastructure management.
- Infrastructure asset registers that held information really useful to infrastructure management.
- The making of improved financial provision for renewal of infrastructure. And, although budgets remained inadequate, instances were found (for example) of understanding that expenditure on infrastructure management can, for example by reducing water losses, repay its own cost many times over.
- The attempt being made before purchasing infrastructure to project the operations and maintenance requirements into the foreseeable future -- and in some instances changing the new works infrastructure proposals in the light of these projections.

On the other hand, some current practices were discovered that can only be described as blindness to the long term view, with actions dictated by short-term gain. (An example is one large municipality's decision to extend free basic services; to "go easy" on a property rates increase; and to halt retrenchment, while at the same time cutting budgets for infrastructure refurbishment and renewal.) This cannot only be ascribed to decision-makers focusing on the then forthcoming (April 2004) elections -- there were also, for example, disheartening signs of politicians' at times intense mistrust of officials.

In between were examples of municipalities for the first time realising that it is all very well to enjoy good infrastructure management practice in individual sectors of their organisations, but that a comprehensive infrastructure management approach, with adequate budgets, is now necessary. In part this change of heart is dictated by the improving statutory and regulatory environment towards infrastructure management. In part also it is in response to pressure from their constituencies (such as consumers expressing dissatisfaction with service, and especially dissatisfaction with perceived or real declining reliability of service (for example: Paton 2005.)). However, encouragingly, this change of heart is also due to greater understanding, not confined to engineers, of all of the following and more:

- How great the backlog in maintenance and refurbishment has become, and how close key facilities are to failure.
- How demand has grown faster than has the provision of new infrastructure (especially bulk infrastructure), and thus how little spare capacity there now is in some key facilities. And how this manifests itself -- for example in that it has in some instances become impossible to close elements down for their routine maintenance because, if they were to be closed down even for the period of maintenance, acceptable limits of customer service would be breached.
- How targeted investment in specific facilities or areas can significantly reduce risk and/or can produce spectacular financial rates of return.
- How necessary it is to improve management across all parts of a system -- for example that it is no good just looking after assets in the form of physical infrastructure, if equivalent attention is not paid to personnel (the "intellectual assets"), for example by career-path planning, actively trying to retain the services of experienced staff, and succession planning. This in a context of understanding that there is a general shortage of suitable and trained professional staff in the job market.

To summarise, therefore, the two most important threats to the infrastructure, which must be addressed with the highest priority in order that infrastructure be sustainably managed:

- Loss of key technical staff.
- Insufficient understanding by municipal politicians of the importance of infrastructure management, and the consequent under-provision of infrastructure management budgets. This is

sometimes exacerbated during the course of a financial year by reallocation of some of these budgets to other purposes.

4 The need for a package of incentives and facilitative measures

CSIR identified that the following are the principal needs if infrastructure management is to be adequate: appropriate legislation, incentivising and convincing (and compelling, if necessary) those responsible for budgetary allocation (without the political will to allocate adequate budgets, the beneficial impact of any training, or management systems, will be limited); staff planning and skills training; the buy-in by national government and other big spenders on or funders of public infrastructure; alternative delivery models and delivery agents for infrastructure management (and indeed for infrastructure services delivery itself); and the determination of norms, standards, levels of service, and key performance indicators.

The above requirements need to be identified, and then tied together into a package of prioritised incentives and facilitative measures. This package would:

- Outline how infrastructure management must be incorporated into: agendas of programmes and statutory development plans; the culture of organizations such as the South African Local Government Association (SALGA); the lending practices of major funders; and the budgeting practices of all municipalities and national and provincial departments with major infrastructure assets.
- Outline the legislation, IT systems, budgets, incentives and guidelines and norms etc necessary to ensure that this incorporation takes place.

A report motivating and setting out in some detail the rationale for, the environment of, and steps towards identifying the components of such a prioritised package, could serve several purposes. Not the least important of these purposes is that the report could be used as a vehicle for advocacy to those who have the greatest power at national level to improve municipal infrastructure management in South Africa. These could include, but might not be limited to, the National Treasury Department, DPLG, and SALGA. Of course, it is hoped that the CSIR findings would also inform and influence municipalities directly.

Any framework for improved infrastructure management must recognise the great range in the resources and capabilities of municipalities in South Africa. At the one end there are the metropolitan municipalities, with strong income bases (and significant ability to cross-subsidise services provision to indigent households), and the other end are many of the rural-based municipalities. Gibson observed that many of the latter are "impoverished" and, where basic levels of water services (for example) have been provided, "subsequent lack of maintenance coupled with no control over the high levels of informal connections means that the majority of these schemes are no longer capable of providing a consistent daily basic water supply". (Gibson 2004.)

5 The CSIR investigation

In 2003 CSIR Boutek commenced an investigation of the gap between much of current South African municipal infrastructure management practice and the current environment of infrastructure

management on the one hand, and on the other hand more acceptable practices and a more proactive environment, brought about by means of the package of incentives and facilitative measures. The investigation also has the objective of formulating this more proactive environment.

Briefly, the following have almost been completed:

- Formulated an infrastructure management framework as a theoretical construct.
- Established links with key stakeholders (among them, National Treasury, DPLG, DWAF, SALGA, DBSA and the Construction Industry Development Board (CIDB)), and started a process designed to achieve their buy-in.
- Undertaken a first level study (that is, trying to gain an overall rather than detailed impression - relying on available information rather than commencing more than a selected number of new investigations), of the following with respect to the South African municipal sector -
 - the status of infrastructure, with respect to its current serviceability, and with respect to management budgets and other resources that are programmed;
 - current infrastructure management norms and practices;
 - some other issues that may lie behind serviceability, such as levels of service, usage/loading, and maintenance practice;
 - capital programmes at national level responsible for infrastructure delivery (e.g. by DWAF), their quantum and characteristics, and the provision they make (or do not make) for on-going operation and maintenance of the infrastructure that is delivered;
 - legislation (including development plans, the Generally Accepted Municipal Accounting Practice (GAMAP) and the Municipal Financial Management Act (MFMA) of 2004);
 - infrastructure management manuals and IT systems available commercially, and their use and usefulness; and
 - the norms, standards, levels of service and key performance indicators for performance-based sustainable infrastructure services – what they should or could be.
- Undertaken a study of equivalent issues, but outside of the South African public service sector.

It needs to be noted that some of the stakeholders have during these last two years begun to strongly embrace the need for infrastructure management. Of the national government departments, DWAF has taken the furthest steps, acknowledging that "many water services authorities do very little asset management and do not budget sufficiently for asset maintenance and replacement. It becomes a vicious circle once infrastructure is allowed to deteriorate. Expensive refurbishment becomes necessary and there is even less money for ongoing maintenance. In addition, deteriorating infrastructure leads to poor service delivery and reduced payment by consumers, exacerbating lack of cost recovery." In May this year, DWAF called for proposals from organisations "identified as having the required expertise and experience" to assist it with preparing a "water services sector infrastructure asset management strategy ", so that it (DWAF) could "investigate the asset management situation and provide guidance to water services institutions". (DWAF 2005b.)

It is pleasing to report that the CSIR has at the time of writing just been appointed by DWAF to provide this assistance.

6 The findings thus far

Selected findings are:

- Whereas there is much guidance available on how to do life-cycle planning, and how to use life-cycle plans of technological alternatives in order to decide between them prior to commencement of initial capital works, there is a dearth in the literature of public sector worked examples. It is at least possible that the reason for this is that in practice life-cycle planning is not made that much use of, or it lacks credibility. In turn it is at least possible that the reason for this is recognition of the great uncertainty surrounding assumptions of the operations and maintenance regime into the future -- and should these assumptions prove incorrect, this would negate the care put into the life-cycle planning.
- South African legislation (such as the MFMA and statutes and regulations relating to development plans), where it relates to infrastructure management, sets very broad parameters. As a result, whereas legislation creates a conducive climate, it does not compel a municipality to perform adequate infrastructure management.
 - GAMAP, for example, requires municipalities to depreciate infrastructure assets, but does not prescribe that a depreciation model must be used that will determine adequately the funding to be put aside each year to meet future liabilities for infrastructure renewal. Nor does it prescribe that the money actually be put aside. However New Zealand municipalities are obliged to put this money aside, and South African legislation should require the same of our municipalities.
 - GAMAP requires that an infrastructure asset register be drawn up, but does not specify that the register should record the capacity, condition, importance and risk, and other factors essential to the register being of use to infrastructure management.
- South African legislation is less than satisfactory on defining "value". In particular, in terms of GAMAP, valuation is determined on the basis of historical cost adjusted by depreciation and expenditure on refurbishment. This is not of much assistance to infrastructure management.
- A section of the CSIR investigation reviews the history of infrastructure in each of a small sample of areas over a couple of decades -- paying attention to (inter alia) construction practice and choice of materials, usage/loading and maintenance practice, and skills and management quality in the area. Of particular interest are those areas formerly administered by the apartheid-era system of separate "Black Local Authorities", with their chronic parlous financial status at the time. Clearly, their political legacy was the dominant factor determining their past infrastructure management regime.
- A review of a sample of infrastructure management IT systems available commercially in South Africa reveals that:
 - a minimum level of capacity is needed within a municipality to justify even an entry-level IT infrastructure management package;
 - a number of IT systems are commercially available in South Africa -- all of them working on the basis of integrating a number of functionally specialised software packages (for sectors such as roads and water supply), functioning through a set of related integrated management systems and linkages with conventional database and GIS software systems, to provide an infrastructure management system tailor-made to the client's requirements. Usually the database and GIS facilities are shared with other applications to serve the various other needs of the client; and
 - a municipality that purchases an IT package needs to commit substantial in-house resources to collecting and verifying data.
- Finally, a section of the investigation reviews infrastructure management by a selection of parastatals and private sector infrastructure owners in South Africa. Much good practice that is useful as a source of information or comparison for municipal policy and practice is discovered. Examples are: keeping adequate infrastructure asset registers; doing life-cycle projections of alternative equipment or processes and using these projections to decide between the alternatives; and linking part of the bonus system of all staff to a single performance measure, to the achievement of which all can contribute and that is linked to the service's availability and reliability.

7 In conclusion

Viable housing needs more than just the construction of the houses. If the householders do not have access to water and sanitation, for example, the houses are not habitable. DWAF, for one, is so very well aware of the indispensability of enabling infrastructure, that this department's single most important document on water services is for good reason subtitled "water is life, sanitation is dignity." (DWAF 2003.)

Thus the habitability of housing is hugely dependent on the provision of municipal engineering infrastructure and, as this paper has sought to show, on the sustainable management, that is the sustainable operation and maintenance, of this infrastructure.

As the Minister of Water Affairs and Forestry stated in her most recent budget speech – announcing her intention to "emphasise the quality of the service we have to render rather than the quantity or statistics thereof", she went on to say:

"The monitoring of service quality is just starting but already the results show how important it is to manage infrastructure effectively. Last year, I reported that water supply to 37% of households was interrupted for more than a day during the previous year – mainly for technical reasons rather than for non-payment, however this was still not acceptable. The survey will be repeated shortly and I hope to be able to report improved performance by the end of this year.

This year, we focused on the quality of drinking water and I regret to say that 63% of municipalities could not confirm that they met the Drinking Water Quality guidelines. Many of them may be achieving the standard but their controls could not show it." (DWAF 2005a.)

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