

MUNICIPAL INFRASTRUCTURE ASSET CARE IN SOUTH AFRICA: A REALITY CHECK

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1. INTRODUCTION

South African municipalities provide a wide range of asset-based services to businesses, government institutions, social institutions and households. These services generally include potable water and sanitation, electricity supply (and in some places electricity generation), the provision of roads and stormwater, solid waste treatment and street cleansing, and a range of public amenities such as sports and recreational, cultural, health, educational and agricultural market services. These services, and the assets utilised to produce such services, should ensure social health and well-being, and support economic growth.

Experiences of the past decade or so have indicated otherwise. Indications are that infrastructure assets are deteriorating faster than planned, and that many infrastructure facilities that should be in good working order are overloaded, no longer operational or are in need of complete renewal. Whereas service delivery protests traditionally centered on the lack of access to services, recent protests now include failing service delivery as well.

The lack of maintenance of existing infrastructure has been highlighted as perhaps the key contributor to the current state of municipal infrastructure. Literature that exists on the state of affairs points to a number of causes, most notably the lack of sufficient and competent technical staff, and insufficient funding.

2. OVERVIEW OF THE NATIONAL MUNICIPAL INFRASTRUCTURE ASSET PORTFOLIO

Details on the extent, value and condition of assets are key to determining the delivery potential of a municipality and the post-acquisition funding required to realise the economic and service potential of assets. At present municipal asset information at the aggregate level is mostly either outdated, unreliable, or simply non-existent.

2.1 Value of municipal infrastructure

Based on results of several dozen municipal network assessments funded through the Department of Cooperative Governance and Traditional Affairs, the European Union, the Limpopo Government and through direct municipal appointments, it is estimated that the national municipal infrastructure portfolio has a current replacement cost of R 723 billion. This value is limited to the infrastructure under direct control of municipalities; that is water and sanitation, roads and stormwater, electricity distribution and solid waste facilities. It excludes operational buildings, community facilities, investment properties, the value of infrastructure of municipal entities and water boards, provincial roads and Eskom's reticulation infrastructure.

2.2 Condition of municipal infrastructure

Condition data generated from a study of the National Department of Transport and several dozen municipal infrastructure network assessments suggest that some 45% - 50% of the economic and/or service potential of the nation's municipal infrastructure portfolio has been consumed¹.

Not only is condition data per sector incomplete, fragmented and generally outdated, but also inconsistent. It is established practice to assess roads infrastructure using a 5-point condition grading system – a practice that is being adopted for all civil infrastructure. Recent national municipal electrical infrastructure assessments employed a 3-band condition grading system, as the main focus was on valuation for the Regional Electricity Distributors as opposed to condition assessment.

Despite sketchy data, some idea of the condition of municipal infrastructure per sector is possible. This is done by extrapolating available data and expressing the condition and remaining potential of the infrastructure of a particular sector as a depreciated replacement cost to current replacement cost ratio (% DRC/CRC). The resulting figure indicates the remaining service potential of an asset group, or in the inverse, deterioration in the condition or consumption of the network.

- **Roads and stormwater:** There are 150 279 kilometers of municipal road, including paved and unpaved roads, with an estimated current replacement cost of R 295 billion, with a 58% DRC/CRC ratio². Municipal roads are particularly vulnerable to condition deterioration as a result of constant exposure to forces of nature, movement and overloading, and because municipal roads do not directly generate income with which to finance asset care activities.
- **Water and sanitation:** The current replacement cost of these networks is in the order of R 200 billion, with a 52% DRC/CRC ratio.
- **Electricity:** The current replacement cost of these networks is estimated at R 216 billion, with a 48% DRC/CRC ratio.
- **Solid waste facilities:** The current replacement cost of these facilities is estimated at R 10 billion, with a 44% DRC/CRC ratio.

3. ADEQUACY OF CURRENT MAINTENANCE AND RENEWALS REGIMES

3.1 Defining asset care activities

Maintenance is an often loosely used term meant to refer to post-construction care activities that includes both asset maintenance and renewal. This tends to create problems in terms of planning, budgeting and securing financing for asset care activities.

Maintenance is defined as the actions required for an asset to achieve its expected useful life³. Maintenance can be planned or unplanned. Planned Maintenance includes asset inspection and measures to prevent known failure modes and can be time or condition-based. Repairs are actions undertaken to restore an asset to its previous condition after failure or damage. Expenses on maintenance are considered operational expenditure.

¹ Boshoff et al. [A basis for estimating the extent of current infrastructure renewals requirements in the South African municipal space](#). May 2009

² NDOT. [Assessment of municipal road network](#). Final Report Version 7. March 2007.

³ Boshoff et al. [Guidelines for Infrastructure Asset Management in Local Government 2006 – 2009](#). 2007. DPLG: Pretoria

Renewal entails the replacement or rehabilitation of an asset. Rehabilitation encompasses works to rebuild or replace parts of an asset to restore it to the original capacity and performance, and materially extend its useful life. Expenses on renewal works are considered capital expenditure as they extend the service potential of the asset through extension of life.

3.2 Assessing the effectiveness of current maintenance regimes

Lack of maintenance is often blamed for poor service quality and the failing condition of infrastructure. But is maintenance really the problem? There is ample anecdotal and empirical evidence that points to maintenance being a problem in all spheres of government, including local government.

There is however little firm evidence that sub-standard maintenance is the cause of the current condition of the national municipal asset portfolio. There are essentially two ways to assess whether proper maintenance regimes are followed, and for best results they should be used together. The first would be to assess the level of spending on maintenance against some standard, whilst the second would be to assess infrastructure against failure modes, typically condition.

Traditional South African practice in budgeting for asset maintenance would be to earmark 10% of the operating budget for maintenance. This method is flawed as maintenance funding requirements are a function of the assets' needs, not of the total operating activity of a municipality. International best practice requires the establishment of a lifecycle strategy for assets, which informs the useful life that can be expected, and the maintenance effort required to achieve this life and required performance based on its criticality. For benchmarking purposes, this can be expressed in the form of an assessed annualised percentage of the asset's current replacement cost on maintenance. So when spending on maintenance is assessed, the wrong benchmark is often used. In any event, cost accounting practices in municipalities to date have not been sufficiently sophisticated to quantify the amounts spent on maintenance.

The National Treasury estimated that total municipal operating expenditure for 2008/9 would amount to R 121 billion, and that repairs and maintenance would constitute 7% (R 8.9 billion) of annual operational expenditure⁴. This amount is not solely available for maintenance and repairs of infrastructure assets – a municipality also has to maintain movable assets such as vehicles that are not associated with infrastructure services, office furniture and computer equipment, operational buildings and investment properties. The percentage split of a municipality's maintenance budget between infrastructure related maintenance and maintenance of other assets may vary substantially depending on local preferences and capacity, the size of a municipality's property portfolio, whether it has a bus fleet, the size and extent of its information technology and communication network, and other factors. For purposes of this paper it is assumed that on average 80% of a municipality's maintenance budget is allocated to infrastructure, and the remaining 20% for other assets.

A weighted annualised repairs and maintenance provision across municipal infrastructure sectors of 1.68% of current replacement cost indicate that R 12.1 billion per annum is required to maintain infrastructure assets. A further R 3 billion is then required for the maintenance and repairs of non-infrastructure assets. The current national funding shortfall for total municipal maintenance and repairs is then in the order of R 6.2 billion.

⁴ 2008 Local Government Budgets and Expenditure Review 2003/04 – 2009/10, National Treasury

3.3 Is sufficient provision made for renewals?

It is a fallacy to assume that all infrastructure must be in pristine condition – this is not the case anywhere in the world. South Africa has been creating municipal infrastructure for more than a century, and with average infrastructure network lives ranging between 30 and 50 years, one would expect a spread of condition gradings. So, regardless of the quality of the maintenance regime followed, the condition of infrastructure will deteriorate over time to the point where renewal is required.

Given a DRC/CRC ratio in the range of 50% - 55% and analysis of asset age and condition distribution data, some R 338 billion of the value of the existing municipal infrastructure portfolio has been consumed. About 10.3% of current replacement cost is required to address the probable renewals backlog, and a further annualised weighted 2.6% of this value is required to provide for asset renewal. Consequently the renewals backlog is in the order of R 74.4 billion, and R 19 billion per annum is necessary for ongoing asset renewal.

4. CAUSES OF THE CURRENT CONDITION OF INFRASTRUCTURE

Infrastructure monitoring systems that track the condition of assets over time, and the causes of varying condition levels, mostly do not exist. Asset age data is also weak. As a result, it is not known to what extent the current condition of municipal infrastructure can be attributed to normal deterioration patterns, sub-standard maintenance, or to insufficient renewals activity. What is however known is that many infrastructure facilities created since 1994 have prematurely failed, and that many more facilities are on the brink of service failure. This state of affairs can be attributed to a number of factors that include, but are not limited to:

- Sustained political preference for directing financial resources at the creation of new assets, at the expense of the health of existing assets
- National departments that primarily monitor infrastructure delivery, as opposed to service delivery
- Institutional overload
- Poor or inappropriate design
- Sub-standard construction and oversight of contractor's performance
- Poor operating and maintenance practices, including the overloading and/or under-utilisation of existing facilities
- Lack of asset knowledge on the nature, location, extent, control issues and criticality of assets
- An inability to properly assess maintenance needs and funding requirements, and to implement approved budgets
- Maintenance budget provisions that are often treated as "discretionary" budget items to be trimmed first when the need arises to realise budget savings
- Weak technical and financial skills
- Absence of asset lifecycle planning
- Selection of inappropriate service levels and infrastructure solutions
- Unrealistic development planning practices
- Inadequate revenue base and/or cost recovery
- Vandalism and theft
- Explosions in local economic growth and shrinking populations and economies

Not all municipalities face the same challenges to the same extent, and one has to be careful to generalise on the causes of perceived poor condition of assets. Care also has to be taken to simply assume that larger municipalities perform better as a result of superior capacity.

Metros are generally able to perform better at operations and maintenance as a result of economies of scale. South Africa's land mass totals 1.22 million km². The six metros collectively cover an area equivalent to 1% of this land mass, but contain 39% of the value of all municipal infrastructure in the country.

Some municipalities, in particular district and local water service authorities with a predominantly rural character, are often faced with problems of asset overload. They tend to serve large subsidised populations spread over several thousand square kilometers with a multitude of water schemes and facilities. The extent of these infrastructure facilities can match that found in a metro. But they do not have economy of scale in operations and benefits associated therewith. The Greater Sekhukhune District Municipality, for example, serves a geographic area of 13 426 km², an area seven times the size of the Ekurhuleni Metropolitan Municipality. Sekhukhune has 4 168 fixed point water assets, compared to the 1 018 of Ekurhuleni. In Sekhukhune there is currently an ongoing programme to consolidate the large number of borehole schemes into fewer, more reliable reticulated schemes.

Much of the rural infrastructure schemes are not cost-effective to operate and maintain. A 2006 study led by Dr. Shaker to consider a reticulated water supply scheme for mines and villages in Mogalakwena found that the cost of delivering a kiloliter of water exceeds R 17 in several localised schemes, about four times as high as in metropolitan areas – and this cost is purely related to operating and maintenance expenses. Yet many of these local schemes do not yield water for protracted periods of time.

This type of situation is not unique to potable water supply, but to other infrastructure services as well. Gravel roads, for example, are compared to paved roads, inexpensive to construct, but require much more funding by way of ongoing care.

The above point to problems in land use planning and spatial development, the way infrastructure is employed to promote or dissuade such practices, and the types of infrastructure solutions offered. It also calls into question the appropriateness of current institutional arrangements.

One should however not assume that metropolitan municipalities have an easy task in caring for assets, as compared to municipalities in more rural settings. Metros and other high capacity local municipalities with a strong urban center are generally expected to deliver infrastructure services at a higher standard, and face challenges such as consumer sophistication, media attention and infrastructure renewal in mostly a brownfields setting, to mention some challenges.

Despite applying sound engineering practices, New Zealand and Australia experienced significant infrastructure failures in the eighties. They consequently set about developing sound infrastructure asset management practices, and are today considered the international leaders in the management of infrastructure. It also illustrates the need for robust infrastructure asset management planning, including the setting of appropriate service levels and user affordability, and applying a range of asset and non-asset solutions to respond to service needs. Key to asset management is the application of lifecycle management to ensure lowest life cost and optimised decision-making that ensures that the asset portfolio is matched to service needs. In the case of the water schemes in Sekhukhune, steps are being taken to apply optimised decision-making by rationalising ineffective schemes.

5. IMPLICATIONS OF NOT PROPERLY CARING FOR ASSETS

Every individual and organisation is adversely affected when municipal infrastructure does not receive proper care. These impacts are of a political, social, financial, economic and environmental nature.

When service delivery failures become endemic there tends to be a loss of confidence in a government's ability to provide constitutionally guaranteed services, which in turn may lead to the types of civil protests witnessed earlier this year in places such as Piet Retief, Balfour, Sannieshof and elsewhere. Such protests may be violent in nature, and destruction of municipal and private property may occur, or else protests may take the form of ratepayers withholding payment of municipal accounts, as is currently the case in municipalities such as Makhado. Repeated protests over time may also affect the national psyche, and change social attitudes such that respect for the rule of law and other key values are undermined.

Social and environmental health is also affected when infrastructure assets are not cared for. Outbreaks of waterborne diseases such as cholera, and pollution of water sources and the surrounding fauna and flora, are typically associated with dilapidated water infrastructure. When street lights are not working, potential for crime is increased. Roads in poor condition have been known to result in accidents and even loss of life.

Failing infrastructure have financial consequences that potentially include the cost of occupational injury, damage to property, third party costs, repair or renewals cost, the cost of loss of sales, and pressure to construct additional bulk infrastructure at great cost. At a macro scale, not properly caring for municipal infrastructure can lead to early asset disposal that at the aggregate level amounts to R 19 billion for every year that the life of the portfolio is shortened with. Unaccounted for water losses due to the poor condition of reticulation systems may directly cost the country in the order of R 2 billion per annum.

6. NATIONAL INITIATIVES

A number of national initiatives have been launched in recent years to enable municipalities to practice sound asset management, of which maintenance is a sub-set. These initiatives can be broadly classed into regulatory and support interventions.

6.1 Regulatory initiatives

Regulatory initiatives have been driven largely by National Treasury and to a more limited extent, by the Department of Cooperative Governance and Traditional Affairs and the Department of Water Affairs.

The Municipal Finance Management Act specifically requires the accounting officer of a municipality to establish and maintain a system of safeguarding and control over assets. Several accounting standards have been introduced that require municipalities to prepare asset registers, to periodically review asset useful lives and depreciation methods, to revalue assets, conduct impairment testing, and that provide guidance on asset accounting treatment and how to deal with production and investment assets held for sale. More accounting standards related to assets are in the process of formulation.

In 2008 National Treasury published the Municipal Asset Transfer Regulations that require a municipality to ensure that when assets are transferred or otherwise disposed of, a reasonable value is coupled to them, that risks are transferred with the assets, and that continuity of service is protected.

More recently National Treasury published the MFMA Budget Formats Guide (July 2008) as well as MFMA Circular No. 48 which provides guidance on the preparation of the 2009/10 Medium Term Revenue and Expenditure Framework. This circular notes⁵ that serious municipal infrastructure repairs, maintenance and renewals backlogs exist, and that consequently this budget format identifies these lifecycle activities as a special focus area. The circular further instructs municipalities and municipal entities to prioritise the health of their asset base, especially revenue generating assets, by increasing spending on repairs and maintenance. Consequently the new format amongst other requires a breakdown of repairs and maintenance, and asset renewals for assets held for production purposes.

The Treasury initiatives collectively present steps in the right direction – toward professional asset management. But compliance is becoming very technical, representatives of the Auditor General interpret requirements differently which increases risk to municipalities, and sufficient practice guidance is lacking to properly implement all of Treasury's requirements.

Regulatory sectoral planning instruments were conceptualised before widespread recognition of the need to practice sound, holistic asset management. As a result existing sectoral plans focus on development planning and sector specific issues, with little regard to the assets that support sectoral services.

The Department of Cooperative Governance and Traditional Affairs in 2007 published the Local Government Infrastructure Asset Management Guidelines in lieu of municipal asset management regulations. These guidelines promoted the creation of robust asset registers with sufficient detail to inform development, engineering and financial planning. Based on known service requirements and asset knowledge, asset management plans per sector would be prepared that would indicate appropriate asset and non-asset responses to service requirements, and the funding required. A Comprehensive Municipal Infrastructure Plan (CMIP) would then be prepared to consider all lifecycle requirements across municipal sectors (fed from asset management plans) and to prioritise projects (both asset and non-asset propositions) for inclusion in the Integrated Development Plan based on national policy, service criteria, financial affordability and other pre-established municipal criteria.

Though the Department of Cooperative Governance published this Guideline, it never implemented this framework, though several municipalities are doing so of their own accord. Instead, the CMIP was retitled and became the "Comprehensive Infrastructure Plan (CIP)". Whilst the intention remains the same, there are some very important differences to the original recipe, some of which are outlined below⁶:

- There is no requirement for the preparation of asset registers and sector-based asset management plans to inform the CIP – instead the CIP Guidelines depend on any existing sector documentation to inform the CIP, or in the absence of such documents, to make assumptions on asset extent, capacity, lifecycle requirements and funding needs.
- Though there is a requirement to assess the condition of assets, no guidance is given on how to assess condition and the condition grading system differs from sector to sector, which would make it difficult to prioritise condition-based renewals between sectors given limited funding.
- Prioritisation on the basis of asset criticality is not done.
- Guidance is given in respect of water services, roads and stormwater – but not for electricity distribution, solid waste services or public amenities. Given the significant investment in particularly electricity distribution infrastructure and the revenue potential of this service, the omission of electricity is serious.

⁵ National Treasury. [MFMA Circular No. 48: Municipal Budget Circular for the 2009/10 MTREE](#). 2 March 2009.

⁶ DPLG. [Guidelines for Compiling a Comprehensive Infrastructure Plans for a Municipality](#). Version 1. 27 June 2008.

- The CIP is biased towards capital projects.
- Very importantly, the CIP does not address financial planning, budgeting or viability⁷.
- Most importantly, whilst the CIP consolidates information across sectors, it does not fulfill a multi-sectoral prioritisation function.

In conclusion the CIP relies too heavily on guesswork, does not address all municipal service infrastructures or asset lifecycle needs, and does not assist with assessing the costs, affordability, viability or prioritisation between competing budget needs. There is a general perception that the CIP is not meant to assist municipalities to improve the management of their infrastructure, but rather to feed the Municipal Infrastructure Grant's Management Information System with municipal profiles and new capital project proposals.

The Department of Water Affairs published its "National Water Services Infrastructure Asset Management Strategy" in 2009. This high-level strategy took two years to develop, which is indicative of the complexity of the subject matter and developments in the field. The strategy provides a framework for the development of priority actions or interventions, and presents a draft roles and responsibility asset management framework for officials and organizations in the sector. It also notes that a number of support tools are required to assist municipalities to effectively practice asset management.

6.2 Support initiatives

A number of support initiatives have been launched in the past few years that mainly took the form of capacity building initiatives through training, mentoring and associated instruments, and through the publication of manuals and guidelines.

Some of the capacity building initiatives include the training and preparation of asset management planning instruments by the Department of Cooperative Governance and Traditional Affairs, the European Union and the Limpopo Department of Local Government and Housing. The LGSETA, DBSA and IMESA are all actively engaged in training municipal employees in infrastructure asset management. The DBSA and its partners are also engaged in an operations and maintenance (O&M) project in the Northern Cape that focuses on improving municipal capacity through O&M standards and handbooks.

A number of manuals and guidelines have been issued in recent years to support sound municipal infrastructure asset management practice, including:

- the 2006 International Infrastructure Management Manual by IMESA;
- the Local Government Infrastructure Asset Management Guidelines by the Department of Cooperative Governance and Traditional Affairs; and
- the Local Government Capital Asset Management Guidelines by the National Treasury.

The above guides all made valuable contributions in articulating the framework, core practices and techniques for the management of infrastructure assets. At the time of preparing the South African guides, much less local experience existed in these disciplines, and much regulatory and practice developments have taken place since then. Consequently these guides are outdated and thin on practical advice. In particular there is a need to improve practical guidance in the generation and upkeep of asset knowledge, and in setting provisional

⁷ www.cip.gov.za. [Accessed: 27/07/2009]

maintenance and repair benchmarks for various asset types that can be reviewed, updated and improved over time, taking cognisance of local influencing factors such as the spatial distribution of assets.

7. MOVING FORWARD

Maintenance is a problem, but the answer to improved service delivery only partly lies in better maintenance.

There is a definitive need to increase funding provisions for the maintenance, repair and renewal of municipal infrastructure. But doing so may not be viable. Total annual current municipal capital spending averages about R 29 billion, and should be in the order of R 40 billion simply to meet Government's targets for the provision of basic municipal services. Clearly there is an inability to fully gear to required capital spending performance levels. In addition about R 74.4 billion is required to address the renewals backlog, and a further R 19 billion per annum for ongoing renewals. Then there is the matter of funding for maintenance and repairs, which would have to increase in the order of R 6.2 billion per annum to ensure that assets last their expected useful lives and deliver at expected performance standards.

In short, South Africa has achieved notable successes with the expansion of its municipal infrastructure portfolio, but more is required to provide basic services to all, to invest in infrastructure for economic growth, and very importantly, to take proper care of the existing infrastructure without which the above objectives can't be achieved. So, more than ever, the country is faced with the most fundamental economic problem of all: how to apply limited resources to best effect.

The above points to the need to look beyond just maintenance to total lifecycle management of assets. This entails selecting the right infrastructure solution to meet service needs at the lowest lifecycle cost. It will require adjustments in grant funding approaches, service levels, and consolidation and rationalisation of infrastructure systems. At a higher level, it will require a rethink in the way in which spatial development planning is done, and in how infrastructure is employed to achieve developmental planning objectives. Such thinking, and adjustments to policy, fiscal and practice frameworks may take some years to come to fruition.

In the meantime, regardless of the course of action taken, effort is required for municipalities to come to grips with the extent, location, condition, criticality and remaining useful lives of their assets. This is a critical precondition to developing maintenance plans and budgets. National support can and should be provided in the form of guidelines on asset componentisation structures, useful life schedules, and condition grading indices at the asset component level. Once asset knowledge has been created, asset care needs and funding requirements can be formulated, and here indicative operations and maintenance budget provisions can be published to assist municipalities to plan and budget, and for regulatory agents to assess the operating viability of new capital grant funding proposals, and the general adequacy of maintenance and repair budget provisions.

Even if maintenance, repair and renewal budget provisions are substantially increased, there will probably be limited spending performance in the short to medium term, as municipalities will have to improve internal delivery capacity, or set up arrangements for external agents to do this. More work is required in considering maintenance and repair delivery strategies, particularly in areas where economies of scale do not apply.

Whilst lifecycle management capacity is being addressed, the need exists to prioritise asset care activities and funding, and to apply risk-based strategies to deal with various types of asset failure that will inevitably occur.

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