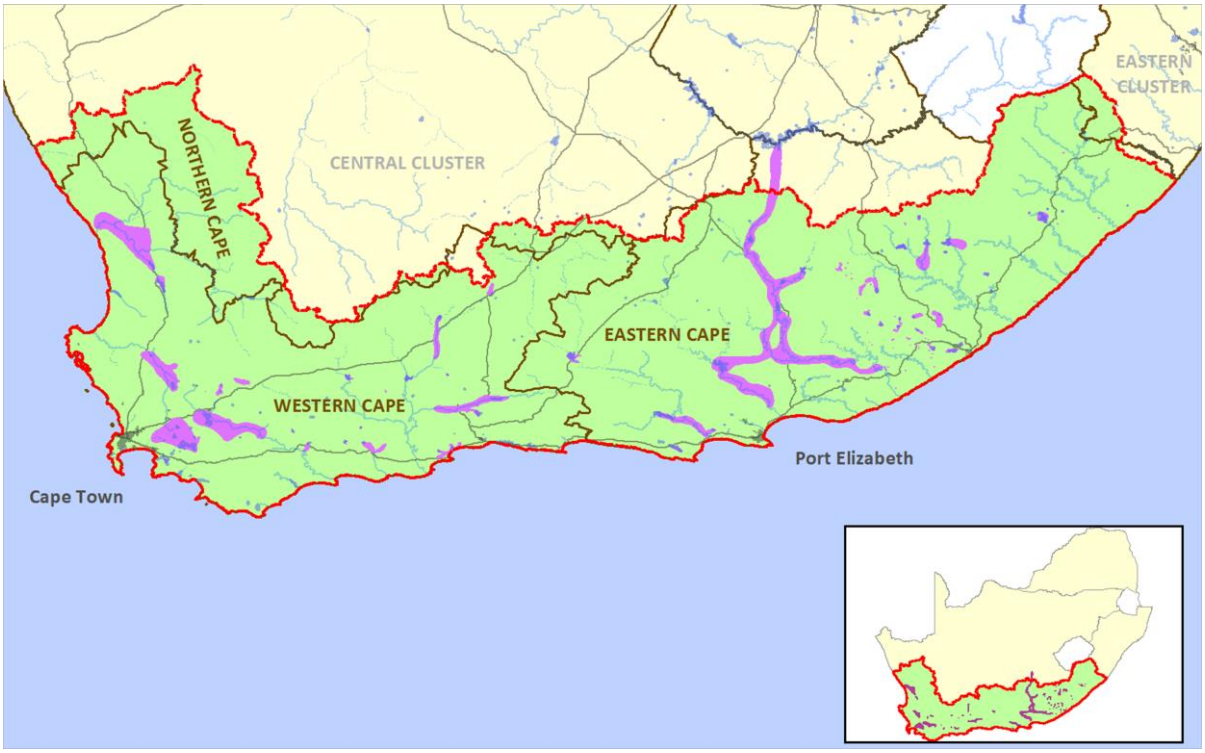
National Water Resources Infrastructure (NWRI)

Immovable Asset Management Plan

Southern Operations Cluster

March 2017



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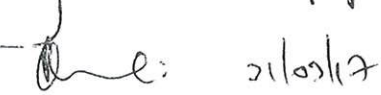
Approved by	Project Manager (DWS NWRI)	Paradzai Muneka		31/03/17

EXECUTIVE SUMMARY

1. Introduction and Service Description

This document is an infrastructure Asset Management Plan (AMP) for the Southern Operations Cluster, hereinafter referred to as the Cluster, of the National Water Resources Infrastructure (NWRI) branch of the Department of Water and Sanitation (DWS). It outlines a ten-year plan for the acquisition, operation and maintenance (O&M), renewal, upgrading, new capital investments, and disposal of the Cluster's immovable assets, aiming at maximising the assets' service delivery potential and benefits, and minimising their related risks and costs over the assets' life cycle.

This AMP was produced in accordance and compliance with the provisions of the Government Immovable Asset Management Act (GIAMA), Act No. 19 of 2007. In addition, the DWS is required to annually update this AMP, as contemplated in Section 12 of the GIAMA. This AMP is also aligned to other relevant South African legislation, DWS's strategic plan, and international standards such as ISO 55000.

1.1 Key Data Sources Used to Develop this AMP

The key sources of data used to develop this AMP are: NWRIB Immovable Asset Register for the financial year 2015/16; NWRIB Infrastructure Asset Hierarchy (latest version updated in the financial year 2013/14); Condition Assessment Audit of Irrigation Scheme Infrastructure – Scheme Reports for the Cluster, dated September 2016; financial information (obtained mainly from the Cluster Office and DWS Head Office); and face-to-face scheme visit interviews conducted with the relevant DWS personnel at cluster and national level. The overall confidence rating for the data used in the development of this AMP is four (4) on a rating scale of 1 to 5, which means some of the data used was derived.

1.2 Cluster Description and Location

The Cluster encompasses the Eastern Cape Province, Western Cape Province, and some parts of the Northern Cape Province. It constitutes two area offices Eastern Cape (Port Elizabeth) and Western Cape (Bellville), and has 111 government water schemes, of which 66 are active and 45 are inactive.

1.3 Service Description

The primary service offered by the Cluster is the delivery of bulk raw water to its domestic and industrial (D&I), and irrigation water users (customers). Total raw water registered volume for the Cluster is 4 169.137 Mm^3 per annum, of which 24.39% is for domestic and industrial and 75.61% is for irrigation use.

2. Levels of Service

There are three key desired levels of service applicable to the Cluster's raw water supply service, namely: volume of raw water supplied; assurance level of raw water supply; and quality of raw water supplied. The first two fall under the direct responsibility of the Cluster's Operations unit; whilst 'quality of raw water supplied' falls under the responsibility of the Catchment Management Agency (CMA). The Cluster is expected to supply an annual total of: 1 016.936 Mm^3 of raw water to D&I water users for which it assures 97% non-interruption; and 3 152.201 Mm^3 to irrigation water users for which it assures 91%.

3. Future Raw Water Demand

Insight of the Cluster's future raw water demand helps in optimised planning for future upgrade and new capital needs (capital acquisitions), as contemplated in Sections 5 and 6 of the GIAMA. Figure 0.1 shows projected raw water demand for the Cluster, based on the Cluster's registered volumes for both domestic and industrial (D&I), and irrigation (IRR) water use. Ideally, the Cluster's future raw water demand determined by the DWS's Planning Office needs to take precedence; this will be addressed in the next update of this AMP.

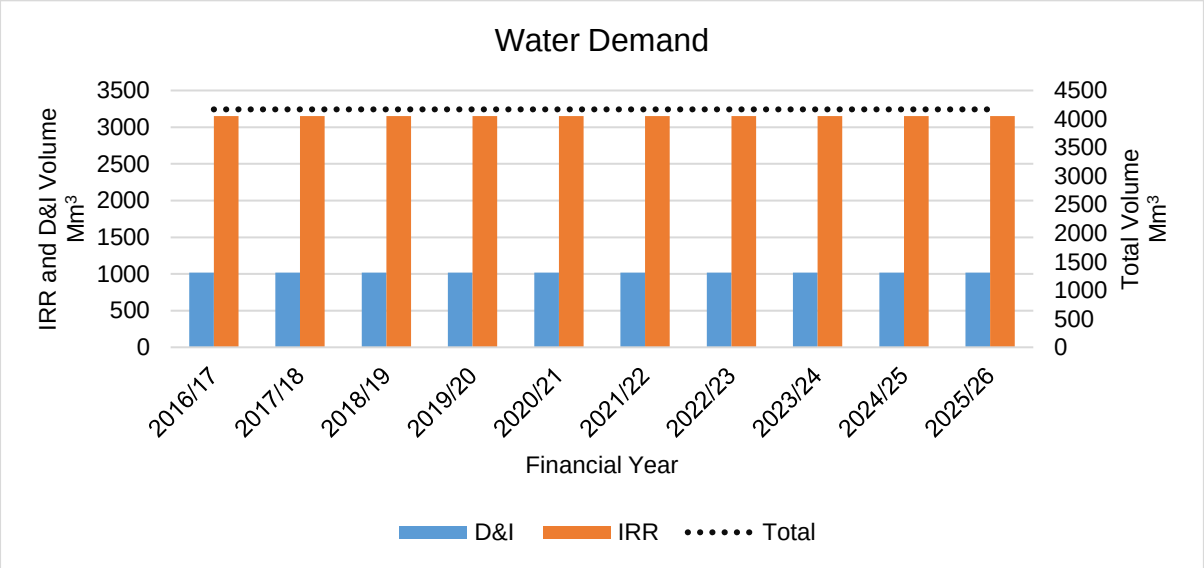


Figure 0.1: Projected raw water demand

4. Asset Details, Risk and Life Cycle Works

4.1 Asset Information

Table 0.1 shows the extent (number of asset components), acquisition cost, CRC, DRC and asset carrying values for the Cluster's assets per asset facility category. The Cluster's immovable asset components have a total DRC and CRC of about R50.845 billion and about R55.630 billion, respectively. They can be grouped into two: infrastructure asset components with a total DRC and CRC of about R46.683 billion and about R51.468 billion, respectively;

and land with a total of about R4.161 billion for both DRC and CRC. The DRC/CRC ratio for infrastructure assets is about 91%, indicating that about 9% of the infrastructure asset base has been consumed so far.

For infrastructure assets, dams-related asset components have the highest CRC of about R28.250 billion, followed by tunnels, canals, measuring facilities, pipelines and pump stations related asset components with CRC of about: R10.015 billion, R7.632 billion, R2.704 billion, R1.436 billion, and R0.656 billion, respectively. A similar pattern is evident for DRC.

Table 0.1: Asset extent, acquisition costs, CRC and values

Asset Facility Category	No. of Asset Components	Acquisition Cost (R Million)	Asset Carrying Value (R Million)	CRC (R Million)	DRC (R Million)	DRC / CRC (%)
Borehole	2	1.11	0.79	3.06	2.75	89.84
Buildings	807	188.97	104.13	518.32	433.48	83.63
Canals	1 506	2 767.47	1 492.94	7 631.99	6 357.46	83.30
Dams	2 735	10 329.63	8 429.73	28 249.81	26 349.91	93.27
Measuring facilities	1 035	980.24	694.67	2 703.65	2 418.09	89.44
Pipelines	219	540.24	383.91	1 436.48	1 280.16	89.12
Power supply	9	0.77	0.38	2.14	1.75	81.64
Pump stations	426	255.92	146.75	656.41	547.24	83.37
Reservoirs	24	49.06	35.50	135.7	122.1	90.01
Roads	94	43.27	32.48	101.83	91.04	89.41
Telemetry	11	2.97	2.00	6.40	5.43	84.82
Tunnels	105	3 621.01	2 673.58	10 015.30	9 067.87	90.54
Water Treatment	11	2.64	1.24	7.31	5.91	80.81
Sub-total Infrastructure	**6 984**	**18 783.30**	**13 998.11**	**51 468.40**	**46 683.21**	**90.70**
Land - owned land	133	1 311.60	3 602.40	3 602.40	3 602.40	100.00
Land - servitudes	1 196	202.68	559.22	559.22	559.22	100.00
Sub-total Land	**1 329**	**1 514.28**	**4 161.62**	**4 161.62**	**4 161.62**	**100.00**
TOTAL	**8 313**	**20 297.58**	**18 159.72**	**55 630.01**	**50 844.82**	**91.40**

4.2 Risk Management and Asset Life Cycle Works

Key asset-related risks for the Cluster include: *condition risk* (failure by the asset to deliver the required service due to deteriorated physical condition); *capacity risk* (failure by the asset to deliver the required service as a result of it exceeding its design capacity/stressed); and *not in use / under-utilisation risk* (resulting in misallocation of resources, e.g. financial, human resources, material, etc.).

To minimise the abovementioned risks, and in order for the Cluster to meet its set levels of service and the projected future raw water demand, the following asset life cycle management activities and works are recommended for the Cluster in this AMP: appropriate and adequate operation, maintenance and renewals (condition risk); upgrades and new capital investments (capacity risk); and disposals (not in use / under-utilisation risk).

- *Maintenance and Renewal Works:*

  The Cluster has about 73% of its infrastructure asset components (with a total CRC of about R48.350 billion) in fair, good and very good conditions. Appropriate maintenance strategies, recommended and prioritised based on criticality and condition for each of these asset components in the individual scheme AMPs, have been summarised per asset facility category in this AMP.

  The Cluster also has about 27% (with a total CRC of about R3.118 billion) in poor and very poor conditions. Appropriate renewal strategies, recommended and prioritised based on criticality and condition for each of these asset components in the individual scheme AMPs, have been summarised per asset facility category in this AMP. In addition, a prioritised list of the asset components, per scheme and per facility category, has been included in this AMP.

  For those schemes that are not being operated and maintained by the DWS, it is crucial that the DWS makes regular inspections to be sure that the Cluster's assets are adequately maintained and renewed.

- *Upgrades and New Capital Works:*

  Upgrade works are recommended for the Cluster's infrastructure asset components, about 0.4% and with a total CRC of about R8.3 million, that are stressed (exceeding design capacity on utilisation, based on the Asset Register used in the development of this AMP). These are mainly: dams and pump stations related asset components. Such upgrade works are aimed at avoiding stress related failures, and to ensure the Cluster meets the required level of service.Such upgrade works are aimed at avoiding stress related failures, and to ensure the Cluster meets the required level of service. However, before such upgrade works are executed, it is imperative that the utilisation gradings (captured in the Asset Register) of the affected asset components are first verified to confirm the necessity of the upgrades.

  Furthermore, 2016 reports on the Condition Assessment Audit for the Cluster's irrigation infrastructure (for 11 schemes) identified some canal-related upgrade works with a total acquisition cost of R1.835 billion; these have been considered in this AMP.

- *Impairments and Disposals:*

  There are some impaired asset components for the Cluster (mainly dams, measuring facilities, buildings, and canals related) with a total CRC of about R1.4 billion. The DWS needs to take further steps on these asset components to determine appropriate disposal plans for them.

Furthermore, about 4% of the Cluster's infrastructure asset components (with a total CRC of about R785 million) are under-utilised. These asset components, which are mainly dams, roads, buildings and canals related, could be candidates for disposal. Indeed, 45 out 111 schemes in the Cluster are currently inactive and, thus, under-utilised. It is, thus, recommended that the DWS strongly assess the reasons for the under-utilisation and consideration be made for decommissioning and disposal, where necessary. Possible disposal of the Scheme's assets could be by transferring to the local community through the local municipality.

Based on previous assessments and the Asset Register, the Cluster does not have any assets that are not in use and/or identified for disposal in the foreseeable future.

Noteworthy is that the quality and usefulness of an AMP is highly dependent on the completeness and accuracy of the asset register used in the development of the AMP. Accordingly, the abovementioned asset life cycle management activities and works recommended for the Cluster in this AMP are highly dependent on the asset component condition, criticality and utilisation gradings captured in the asset register used in the development of this AMP. As such, execution of the asset life cycle management activities and works need to be adapted in line with the prevailing situation on the ground. Refer to Section 6 of this Executive Summary regarding some recommendations on how to improve on the current NWRI immovable asset register.

5. Asset Life Cycle Financial Plan

Figure 0.2 present the Cluster's modelled identified optimal total cost requirement over the next 10 years.

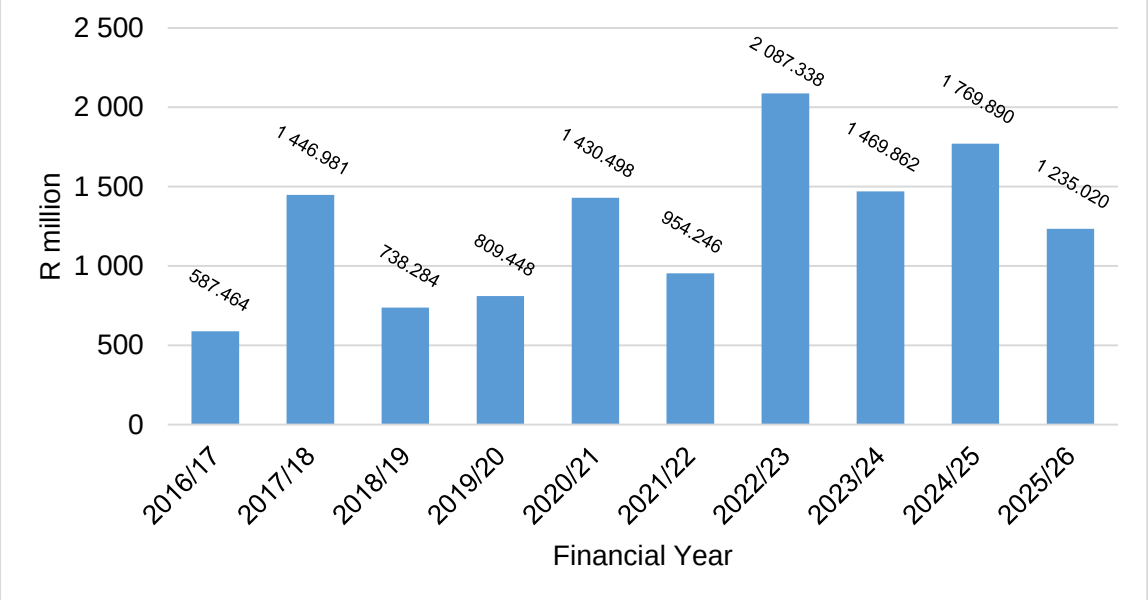


Figure 0.2: Modelled identified optimal total cost requirement per asset facility category

The Cluster's projected modelled identified optimal total cost requirement for the first three years (2016/17, 2017/18 and 2018/19) are about: R587.464 million; R1.447 billion; and R738.284 million, respectively, as shown in Figure 0.2. The projected sharp increases in total optimal cost in the financial years 2017/18, 20120/21, 2022/23 and 2024/25 are attributed to significant renewal, and upgrade and new capital cost requirements. Such significant increases, compounded by the current economic and financial constraints facing the country, present some implementation challenges for the Cluster's modelled identified optimal total cost requirement. As such, for practical implementation purposes, the identified optimal cost requirements for the Cluster are adjusted as presented in Tables 0.2 and 0.3, and Figure 0.3.

Table 0.2: Modelled adjusted optimal total cost requirement per cost component

Cost Component	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
O&M	587.464	623.142	661.141	699.194	743.221	788.230	835.930	886.420	940.590	997.634
Renewal	-	122.961	141.983	145.264	218.992	255.967	386.704	414.988	532.614	602.736
Upgrade & New	-	0.615	11.700	18.622	35.167	66.834	161.983	282.765	495.503	603.496
Disposal	-	-	-	-	-	-	-	-	-	-
Total	**587.464**	**746.718**	**814.825**	**863.080**	**997.380**	**1 111.031**	**1 384.617**	**1 584.173**	**1 968.707**	**2 203.865**

Table 0.3: Modelled adjusted optimal total cost requirement per asset facility category

Asset Facility Category	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	29.026	35.861	38.498	40.024	54.000	61.654	62.636	60.176	61.724	61.757
WR: Canals	139.688	204.600	233.092	252.697	327.674	389.835	552.350	693.205	932.886	1 068.307
WR: Dams	247.666	294.476	315.261	332.079	359.766	383.647	426.790	444.719	469.613	512.753
WR: Power Supply	0.143	0.164	0.174	0.271	0.301	0.317	0.312	0.294	0.378	0.418
WR: Pump stations	19.167	23.344	25.036	26.541	27.801	29.251	31.933	33.377	38.030	41.660
WR: Reservoirs	1.086	1.151	1.222	1.292	1.376	1.460	1.549	1.641	12.132	17.778
WR: Roads and bridge	3.035	3.635	3.893	4.061	4.233	4.417	5.415	5.833	6.220	6.405
WR: Steel Pipelines	15.801	23.959	26.061	27.249	33.297	41.712	42.440	58.517	66.660	67.589
WR: Telemetry	0.351	0.386	0.411	0.433	0.458	0.483	0.508	0.536	0.631	1.695
WR: Tunnels	50.445	53.628	56.909	60.168	66.752	71.966	75.892	79.321	154.911	197.217
WR: Water Treatment	0.251	0.266	0.282	0.298	0.317	0.433	0.810	0.920	0.996	0.976
WS: borehol	0.214	0.227	0.241	0.255	0.271	0.287	0.304	0.323	0.343	0.363
WS: Measuring facili	80.591	105.022	113.745	117.713	121.135	125.570	183.674	205.313	224.182	226.947
Total	**587.46**	**746.72**	**814.82**	**863.08**	**997.38**	**1 111.03**	**1 384.61**	**1 584.17**	**1 968.71**	**2 203.86**

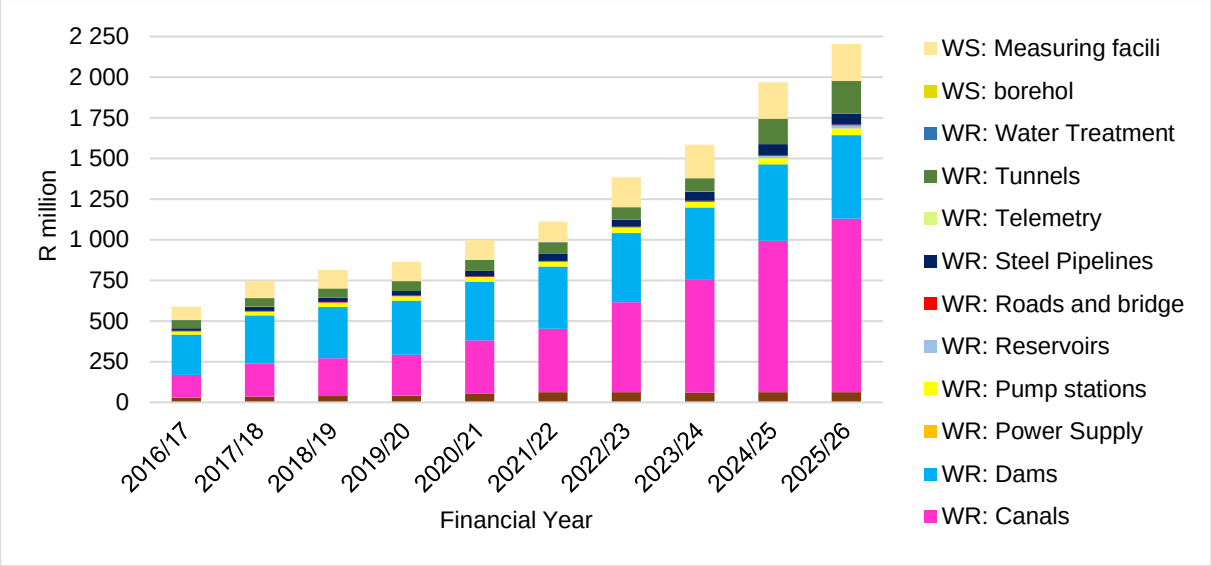


Figure 0.3: Modelled adjusted optimal total cost requirement per asset facility category

The Cluster's projected modelled adjusted optimal total cost requirement for the first three years (2016/17, 2017/18 and 2018/19) are about: R587.464 million; R746.718 million; and R814.825 million, respectively. The projected total cost breakdown for the Cluster is as follows:

- Optimal annual O&M cost requirements for the first three years (2016/17, 2017/18 and 2018/19) are about: R587.464 million; R623.142 million; and R661.141 million, respectively. Dams and Canals related asset components are the main cost drivers.
- Optimal annual renewal cost requirements for the first three years (2016/17, 2017/18 and 2018/19) amount to about: R0, R122.961 million and R141.983 million, respectively. Canals, dams and measuring facilities related asset components are the main cost drivers.

  The projected renewals cost for 2017/18 is attributed to condition backlog from the past years. It is crucial that these renewals be given high priority in the year indicated to minimise asset component condition risk and, consequently, deteriorating service delivery.
- Optimal annual upgrades and new capital cost requirements for the first three years (2016/17, 2017/18 and 2018/19) amount to: R0, R0.615 million and R11.700 million, respectively. Canals related asset components are the main cost drivers.

  There is a significant increase in the upgrades and new capital cost requirement from 2022/23 and 2025/26, mainly for canals-related asset components; traced from the 2016 reports on the Condition Assessment Audit for the Cluster's irrigation infrastructure.

The Cluster's projected optimal annual revenue requirements for the first three years (2016/17, 2017/18 and 2018/19) amount to about: R587 million, R747 million and R815 million,

respectively. Over the projected 10-year period, the revenue which needs to be generated by the Cluster to fund the required immovable asset life cycle works varies between about R 587 million and about R2.2 billion. In the event that such revenue cannot be generated through user charges (an indication that the Cluster is not financially self-sustainable), external funding would need to be considered. Such funding can be in the form of fiscal support, cross subsidisation or debt raised through such institutions as TCTA.

6. Recommendations

Some of the key areas of concern, identified for this Cluster, and recommended improvement actions thereof are presented in Table 0.4.

Table 0.4: Recommended areas for improvement

No.	Area for Improvement	Issue Description	Recommended Action
1	**Asset Information Management**		
1.1	Asset Register as the indispensable key data source for AMP development	The quality and usefulness of an AMP is highly dependent on the completeness and accuracy of the asset register used in the development of the AMP. Accordingly, the asset life cycle management activities and works (such as maintenance, renewals, upgrades and new capital, and disposals) recommended for the Cluster in this AMP are highly dependent on the asset component condition, criticality and utilisation gradings captured in the asset register used in the development of this AMP. However, during the AMPs review workshops conducted during the development of this AMP, the Cluster and scheme personnel did not fully concur with some of the asset component counts, condition as well as utilisation gradings; indicating the possibility of misalignment between the asset register and the prevailing situation on the ground.	The NWRI needs to urgently conduct physical asset verification and assessments (extent, condition, criticality, utilisation, etc.) for all its immovable assets and develop a comprehensive asset register, inclusive of all crucial asset component details, such as asset component sizes, material of construction, condition, criticality, utilisation, etc. Thereafter, the NWRI needs to conduct similar assessments at least every five years as contemplated in Section 13 of the GIAMA. The abovementioned asset assessments need to be conducted by adequately experienced professionals.

No.	Area for Improvement	Issue Description	Recommended Action
1.2	Current Replacement Cost (CRC)	Each and every asset component in the asset register needs to have a corresponding CRC. The CRCs are useful in the determination and projection of optimal asset life cycle management works, such as O&M, renewals, upgrades and new capital, etc., in line with international best practices. Ideally, the CRC of an asset component needs to be determined by multiplying the unit cost rate (cost per unit size, ideally obtained from suppliers) by the size of the asset component. Thus, the asset register needs to adequately capture such details as asset component sizes, material of construction, etc. However, such asset component details are not fully captured in the asset register used in the development of this AMP. As a result, the CRCs presented in this AMP were determined by adjusting the provided acquisition costs with PPI and an uncertainty factor; hence the projected optimal asset life cycle management costs may be on the conservative side.	The above-recommended assessments for the NWRI immovable assets need to adequately capture such asset component details as sizes and material of construction. This will enable the determination of more accurate CRCs, and consequently projection of more accurate optimal asset life cycle management costs.
2	**Financial Management**		
2.1	O&M Costs reporting	The DWS is unaware of O&M costs currently being incurred by the Schemes being operated and maintained by other institutions, such as irrigation boards, water boards and water user associations, and no financial reports are being sent to DWS.	The DWS needs to liaise with the respective institutions and agree on frequent O&M reports, preferably on a quarterly basis.
2.2	O&M Costs splitting	O&M costs in the individual schemes are currently not being budgeted and recorded separately per asset facility category.	Budget for and record O&M costs: separately (separate operations from maintenance). Budget for and record O&M costs per asset facility category.
3	**Risk Management**		
3.1	Risk Management	Risk (expected loss) is calculated by determining the product of the likelihood of the risk and the total amount of loss (impact) when the risk occurs: *Expected Loss (Risk) = Risk Likelihood x Total Loss (Impact)* For this Scheme, however, risk likelihood per asset component was not captured in the Asset Register used in the development of this AMP. Hence, an in-depth risk analysis could not be conducted.	Capture risk likelihood per asset component in the infrastructure asset register, so that the next update of this AMP can incorporate an in-depth risk analysis.

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GLOSSARY

Activity	An activity is the work undertaken on an asset or group of assets to achieve a desired outcome.
Asset	A resource controlled by the DWS as a result of past events and from which future economic benefits are expected to flow to DWS.
Asset Hierarchy	A framework for segmenting an asset base into appropriate classifications.
Asset Management	A process of decision making, planning and control over acquisition, use, safeguarding and disposal of assets to maximise their service delivery potential and benefits, and to minimize their related risks and costs over their entire life.
Asset Management System	A system (usually computerised) for collecting, analysing and reporting data on the utilisation, performance, lifecycle management and funding of existing assets.
Asset Management Plan	Documented information that specifies the activities, resources and timescales required for an individual asset, or a grouping of assets, to achieve the organization's asset management objectives.
Asset Management Policy	The overall intentions and direction of an organisation related to the assets and the framework for the control of asset related processes and activities.
Asset Management Strategy	A strategy for asset management covering, the development and implementation of plans and programmes for asset creation, operation, maintenance, renewal, disposal and performance monitoring to ensure that the desired levels of service and other operational objectives are achieved at optimum cost.
Asset Management Team	The team appointed by an organisation to review and monitor the corporate asset management improvement programme and ensure the development of integrated asset management systems and plans consistent with organisational goals and objectives.
An active market	a market in which all of the following conditions exist: • The items traded in the market are homogeneous • Willing buyers and sellers can normally be found at any time • Prices ae available to the public
Asset carrying amount/value	The amount at which an asset is included in the statement of financial position after deducting any accumulated depreciation and any impairment losses thereon.
Asset Register	A record of asset information considered worthy of separate identification including inventory, historical, financial, condition, and construction, technical and financial information about each.
Condition Monitoring	Continuous or periodic inspection, assessment, measurement and interpretation of resulting data, to indicate the condition of a specific component so as to determine the need for some preventive or remedial action
Critical Assets	Assets or assets components, that are identified as being critical in achieving the organisation's strategic objectives (note that assets can be safety critical, environmental critical or performance critical).
Current Replacement Cost	A measure of replacement value – the cost of replacing an existing asset with a modern asset of equivalent capacity.
Deferred Maintenance	Planned maintenance that has been deferred (backlog in maintenance).
Demand Management	The active intervention in the market to influence demand for services and assets with forecast consequences, usually to avoid or defer CAPEX expenditure. Demand management is based on the notion that as needs are satisfied expectations rise automatically and almost every action taken to satisfy demand will stimulate further demand.
Depreciated Replacement Cost	A measure of current value of an asset, based on its current replacement cost less an allowance for deterioration of condition to date (based on the fraction of remaining useful life/expected useful life).
Depreciation	The systematic allocation of the depreciable amount of a physical asset over its useful life.
Disposal	Activities necessary to dispose of decommissioned assets.

Economic life	The period from the acquisition of the asset to the time when the asset, while physically able to provide a service, ceases to be the lowest cost alternative to satisfy a particular level of service. The economic life is at the maximum when equal to the physical life however obsolescence will often ensure that the economic life is less than the physical life.
Expenditure-based cost	Projected cost based on historical actual expenditures.
EUL	Expected Useful Life of an asset
Facility	A complex asset comprising many assets (e.g. a hospital, water treatment plant, recreation complex, etc.) which represents a single management unit for financial, operational, maintenance or other purposes.
Geographic Information System	Software which provides a means of spatially viewing, searching, manipulating, and analysing an electronic database.
Impairment	The loss of future economic benefits or service potential of an asset over and above the systematic recognition of the loss of the asset's future economic benefits or service potential through depreciation.
Infrastructure Assets	Stationary systems forming a network and serving whole communities, where the system as a whole is intended to be maintained indefinitely at a particular level of service potential by the continuing replacement and refurbishment of its components. The network may include normally recognized 'ordinary' assets as components.
Key Performance Indicator	A qualitative or quantitative measure of a service or activity used to compare actual performance against a standard or other target. Key performance indicators commonly relate to statutory limits, safety, responsiveness, cost, comfort, asset performance, reliability, efficiency, environmental protection and customer satisfaction.
Level of service	The defined service quality for a particular activity or service area against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental acceptability and cost.
Life	A measure of the anticipated life of an asset or component; such as time, number of cycles, distance intervals etc.
Life cycle	The cycle of activities that an asset (or facility) goes through while it retains an identity as a particular asset i.e. from planning and design to decommissioning or disposal.
Lifecycle Cost	The total cost of an asset throughout its life including planning, design, construction, acquisition, operation, maintenance, and rehabilitation and disposal costs.
Maintenance	All actions necessary for an asset to achieve its expected useful life as near as practicable to its original condition, but excluding rehabilitation or renewal.
Maintenance Plan	Collated information, policies and procedures for the optimum maintenance of an asset, or group of assets.
Maintenance Standards	The standards set for the maintenance service, usually contained in preventive maintenance schedules, operation and maintenance manuals, codes of practice, estimating criteria, statutory regulations and mandatory requirements, in accordance with maintenance quality objectives.
Objective	An objective is a general statement of intention relating to a specific output or activity. They are generally longer term aims and are not necessarily outcomes that managers can control.
Operating Expenditure	Expenditure necessary to provide services such as water catchment or water distribution. Examples of OPEX include staff costs, administration costs, consumables, maintenance and repairs and feasibility studies.
Operation	The active process of utilising an asset which will consume resources such as manpower, energy, chemicals and materials. Operation costs are part of the lifecycle costs of an asset.
Optimal cost	Cost determined based on established ratios of CRCs, and is deemed sufficient to cover all the expenditure requirements of an entity.
Performance Monitoring	Continuous or periodic quantitative and qualitative assessments of the actual performance compared with specific objectives, targets or standards.
Planned Maintenance	Planned maintenance activities fall into 3 categories:

	▪ Periodic – necessary to ensure the reliability or sustain the design life of an asset. ▪ Predictive – condition monitoring activities used to predict failure. ▪ Preventive – maintenance that can be initiated without routine or continuous checking (e.g. using information contained in maintenance manuals or manufacturers' recommendations) and is not condition-based.
Rehabilitation	Works to rebuild or replace parts or components of an asset, to restore it to a required functional condition and extend its life, which may incorporate some modification. Generally, involves repairing the asset using available techniques and standards to deliver its original level of service (e.g. relining bulk raw water pipelines) without resorting to significant upgrading or replacement.
Renewal	Works to refurbish, rehabilitate or replace existing facilities with facilities of equivalent capacity or performance capability.
Repair	Action to restore an item to its previous condition after failure or damage.
Replacement	The complete replacement of an asset that has reached the end of its life, so as to provide a similar, or agreed alternative, level of service.
Remaining Useful Life	The time remaining over which an asset is expected to be used.
Residual Value	The net amount which the entity expects to obtain for an asset at the end of its useful life after deducting the expected costs of disposal.
Risk Management	The application of a formal process to the range of possible values relating to key factors associated with a risk in order to determine the resultant ranges of outcomes and their probability of occurrence.
Routine Maintenance	Day to day operational activities to keep the asset operating (e.g. repairing leaks) and which form part of the annual operating budget, including preventative maintenance.
Strategic Plan	Strategic planning involves making decisions about the long-term goals and strategies of an organisation. Strategic plans have a strong external focus, cover major portions of the organisation and identify major targets, actions and resource allocations relating to the long-term survival, value and growth of the organisation.
Unplanned Maintenance	Corrective work required in the short term to restore an asset to working condition so it can continue to deliver the required service or to maintain its level of security and integrity.
Upgrading	The replacement of an asset or addition/ replacement of an asset component which materially improves the original service potential of the asset.
Useful life	The period over which a depreciable asset is expected to be used. (GAMAP: Either (i) the period of time over which an asset is expected to be used by the entity, or (ii) the number of production or similar units expected to be detained from the asset by the entity).
Valuation	Estimated asset value, which may depend on the purpose for which the valuation is required, i.e. replacement value for determining maintenance levels or market value for lifecycle costing.
Yield	Water which can reliably be withdrawn from a water source at a relatively constant rate.

ABBREVIATIONS

AM	Asset Management
AMP	Asset Management Plan
AMIP	Asset Management Improvement Plan
AMS	Asset Management System
CAPEX	Capital Expenditure
CBM	Condition Based Maintenance
CPI	Consumer Price Index
CRC	Current Replacement Cost
DRC	Depreciated Replacement Cost
D&I	Domestic and Industrial
DWS	Department of Water and Sanitation
EUL	Expected Useful Life
GIAMA	Government Immovable Asset Management Act
GIS	Geographic Information System
GFMAM	Global Framework for Maintenance and Asset Management
GPS	Global Positioning System
GRAP	Generally Recognized Accounting Practices
GWS	Government Water Scheme
ISO	International Standards Organization
IAS	International Accounting Standards
IFMS	Integrated Financial Management System
IRR	Irrigation
KPI	Key Performance Indicator
LCC	Life Cycle Costing/Cost
MTEF	Medium Term Expenditure Framework
NWRI	National Water Resources Infrastructure
NWRIB	National Water Resources Infrastructure Branch
NWA	National Water Act
OPEX	Operating Expenditure
O&M	Operation and Maintenance
OSH	Occupational Health and Safety
PFMA	Public Finance Management Act
PPE	Property, Plant and Equipment
PPI	Producer Price Index
PM	Preventive Maintenance
PdM	Predictive Maintenance
RAMS	Reliability, Availability, Maintainability and Safety
RUL	Remaining Useful Life
RTF	Run to Failure
RCM	Reliability Centred Maintenance
WARMS	Water-Use Authorization and Registration Management System
WDCS	Waste Discharge Charging System
WMA	Water Management Area
WTE	Water Trading Entity

1. INTRODUCTION AND SERVICE DESCRIPTION

1.1 Overview

This document is a 10-year infrastructure Asset Management Plan (AMP) for the Southern Operations Cluster, hereinafter referred to as the Cluster, of the National Water Resources Infrastructure (NWRI) branch of the Department of Water and Sanitation (DWS). This section begins with a brief background as well as the key sources of data used in the development of this AMP. It proceeds with outlining: the purpose of this AMP; and alignment of this AMP with the South African legislative framework, international standards, and the DWS's strategic plan. Finally, it: indicates the physical location of the Cluster; highlights the service provided by the Cluster; and also, provides an overview of the Cluster's immovable assets.

1.2 Background

The NWRI is responsible for operating, maintaining and managing a number of raw water schemes spread throughout South Africa. The NWRI divided the country into four operational clusters: Northern; Eastern; Southern; and Central. Each cluster is responsible for a number of raw water schemes.

In 2010, the NWRI prepared the second set of infrastructure AMPs: one AMP for each of its four operational clusters, and one National AMP; hereinafter all referred to as the 2010 AMPs. However, the 2010 AMPs needed some updating and improvements, in view of the following:

- the 2010 AMPs were produced at a relatively high level of detail and ultimately needed to be improved in accordance and compliance with the provisions of the Government Immovable Asset Management Act (GIAMA), Act No. 19 of 2007.
- no AMP was prepared at the GWS level (the 2010 AMPs were only prepared at the Cluster and National levels).
- no analysis was done, and no life cycle works and strategies were prescribed at asset component level; and hence
- the 2010 AMPs only partially complied with the provisions of the GIAMA.

In addition, the DWS is required to annually update its AMPs, as contemplated in Section 12 of the GIAMA. It is against this background that this AMP has been prepared for NWRI's Southern Operations Cluster as an update and improvement to the 2010 AMP.

1.3 Data Sources and Overall Data Confidence

1.3.1 Key Data Sources Used to Develop this AMP

The key sources of data used to develop this AMP are:

- *NWRI Immovable Asset Register* for the financial year 2015/16 (refer to Appendix A).
- *NWRI Infrastructure Asset Hierarchy* (latest version updated in the financial year 2013/14).
- *Condition Assessment Audit of Irrigation Scheme Infrastructure – Scheme Reports for the Cluster, dated the 30th of September 2016.*
- *financial (revenue and expenditure) information* (obtained mainly from: the Southern Operations Cluster Office and the DWS Head Office.
- *face-to-face scheme visit interviews* conducted with the relevant DWS Southern Cluster operations personnel.
- *Other relevant NWRI documentation*, such as water use registrations records.

1.3.2 Data Confidence Rating

Table 1.1 shows the confidence grading criteria used for rating the data used in this AMP.

Table 1.1: Data confidence grading scale

Data Confidence Grade	Description	Margin of Error
5	**Highly accurate** Data based on sound records, procedure, investigations and analysis which is properly documented and recognised as the best method of assessment.	1 – 20 %
4	**Minor inaccuracies** Data based on sound records, procedures, investigations and analysis which is properly documented but has minor shortcomings; for example, the data is old, some documentation is missing and reliance is placed on unconfirmed reports or some extrapolation.	21 – 30%
3	**50% estimated** Data based on sound records, procedures, investigations, and analysis which is incomplete or unsupported, or extrapolation from a limited sample for which grade 1 or 2 data is available.	31 – 40%
2	**Significant data estimated** Data based on incomplete or outdated data, or conflicting data sets exists requiring the assessor to apply judgement as to which portions of data would be most appropriate.	41- 50%
1	**All data estimated** No written records, procedures or other supporting documentation available. Data based on unconfirmed verbal reports and/or cursory inspection and analysis	> 51%

Source: Adapted from DWS Valuation Guide (2008)

Table 1.2 summarizes the confidence rating for the data used to develop this AMP.

Table 1.2: Overall data confidence rating

Section of this AMP	Data Description	Data Confidence Rating	Reason for rating
1	Cluster location and service description	5	Data gathered during interviews and also obtained from other relevant NWRIB documentation, such as the WARMS registrations (DW760).
2	Levels of service, performance measures, targets	4	Data obtained from DWS Raw Water Pricing Strategy; raw water supply agreements; and some data verified/provided by the DWS Southern Cluster Team.
3	Future raw water demand	3	Future raw water demand based on registered volumes for irrigation and domestic and industrial water users. Actual raw water volumes could not be obtained.
4	Asset details	4	Required asset information that was not in the Asset Register was derived (see Section 4.2).
5	Financial information	4	Required financial information that could not be found was derived (refer to Sections 5 and 6).
Average Data Confidence		**4**	**Minor inaccuracies, with 21 – 30% margin of error.**

1.4 Purpose of this Asset Management Plan

The main purpose of this 10-year AMP is to enable the Cluster to effectively and efficiently manage its immovable assets, thereby enabling it to maximise its service delivery potential and benefits (delivering the desired levels of service to its clients), and to minimise related risks and costs over its immovable assets' entire life cycle. To this end, this AMP aims at achieving the following:

- Describing the service offered by the Cluster.
- Articulating the intended 'levels of service' relevant to this Cluster, and the performance measures and targets against which actual performance needs to be assessed.
- Analysing the Cluster's immovable assets and proposing appropriate asset life cycle activities/works aimed at making sure the Cluster's immovable assets meet: the levels of service (for supply of raw water) agreed with its clients; as well as the projected future raw water demand for the Cluster.
- Proposing a financial plan for the Cluster for the next 10 years.
- Identifying areas of improvement with regards to the DWS Asset Management practices, and providing appropriate recommendations thereof.
- Enabling the Cluster to make optimized asset creation, operation, maintenance, renewal, upgrade and disposal decisions; and
- Complying with the provisions of the GIAMA.

1.5 Legislative Framework, Policies, Strategies and Standards

This AMP has been developed in line with the laws of the Republic of South Africa, relevant DWS policies, strategies and guides, as well as relevant international standards. The legislative framework includes, but is not limited to:

- Constitution of the Republic of South Africa (Act No. 108 of 1997).
- National Water Act (No. 36 of 1998).
- Government Immovable Asset Management Act (GIAMA) No. 19 of 2007.
- Public Finance Management Act (PFMA) No. 1 of 1999.

The relevant DWS policies and strategies include:

- Immovable Asset Management Policy (2015).
- Disposal Policy for Immovable Assets (2015).
- Valuation Guide (2008).

The relevant international standards include:

- Generally Recognized Accounting Practice for Property, Plant and Equipment (GRAP 17).
- International Standard for Asset Management Systems (ISO 55000).
- International Infrastructure Management Manual.

1.6 Strategic Context

This AMP is aligned with the DWS's Strategic Plan, ensuring that the NWRI's immovable assets are managed in a manner that fully supports the DWS's vision of delivering "equitable and sustainable water and sanitation that support socio-economic growth and development of the well-being of current and future generations". This AMP flows from and supports the DWS's Asset Management Policy, High-level Strategic Goals, Mission and Vision (refer to Appendix B).

1.7 Cluster Description and Location

The Southern Cluster is part of NWRI Operations and encompasses the Eastern Cape, Western Cape Province, and some parts of the Northern Cape Province, as shown in Figure 1.1. It constitutes two area offices Eastern Cape (Port Elizabeth) and Western Cape (Bellville), and has 111 government water schemes, of which 66 are active and 45 are inactive, as shown in Table 1.3.

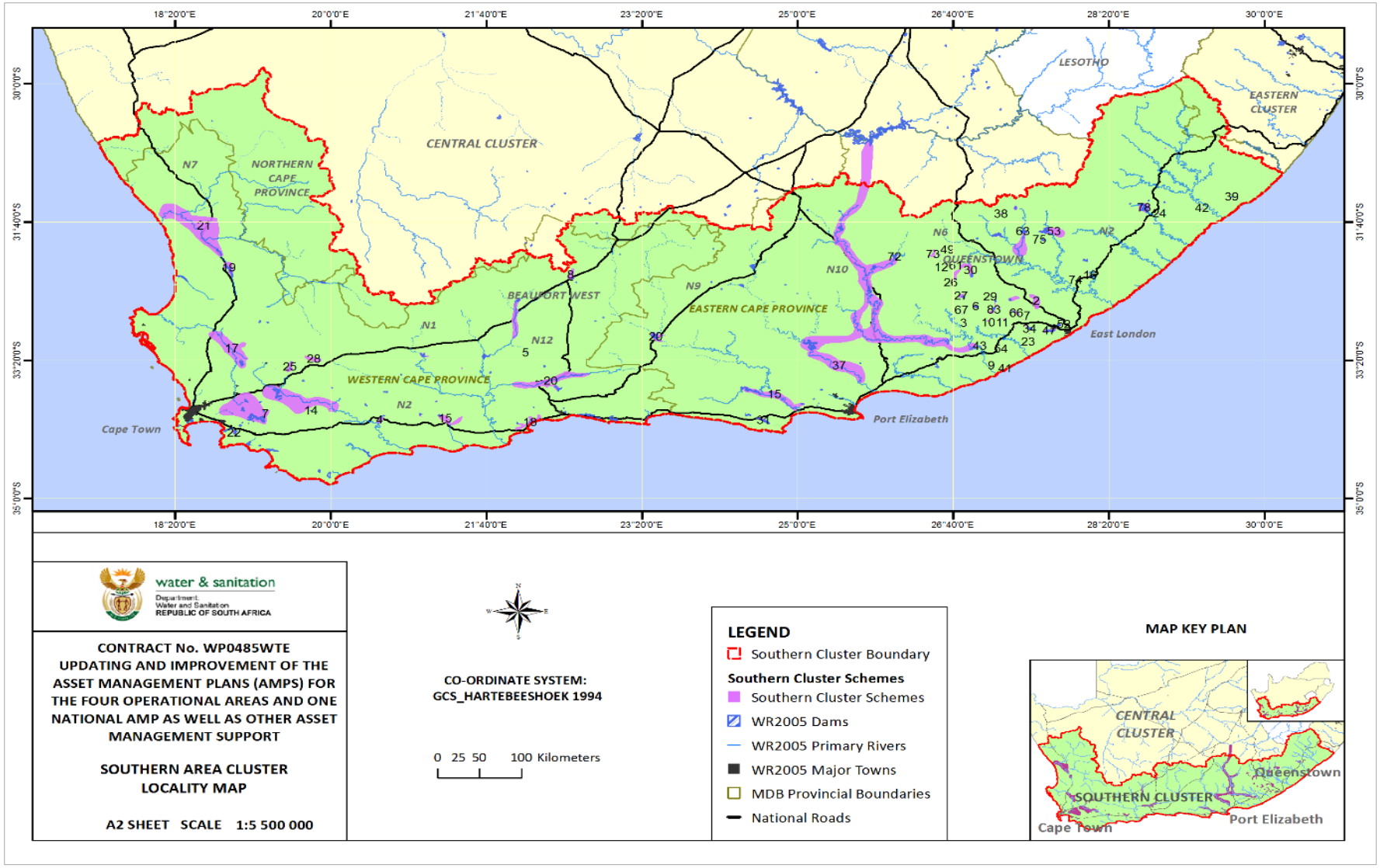


Figure 1.1: Locality map for the Southern Operations Cluster

Table 1.3: Southern Operations Schemes List

No.	Scheme Name	Operational Status	No.	Scheme Name	Operational Status
	Eastern Cape:				
1	Amabele GWS (Amatola)	Inactive	62	Mankazana GWS (Amatola)	Inactive
2	Amatola (Wriggleswade Dam)	Active	63	Masela 1	Inactive
3	Balura GWS (Amatola)	Inactive	64	Masela 2	Inactive
4	Groot River (Beervlei Dam)	Active	65	Mdantsane 1	Inactive
5	Bekruipkop - Ciskei	Inactive	66	Mdantsane 2	Inactive
7	Binfield Park Dam	Active	67	Mhlahlane (Mabaleni Dam)	Active
8	Blue Crane Dam	Inactive	68	Midfort	Inactive
13	Bushmanskrantz Dam	Active	70	Mount Coke	Inactive
14	Gxulu (Corana Dam)	Active	71	Msengeni	Inactive
16	Dabi Dam	Active	72	Umtata Dam	Active
17	Debe Dam	Active	73	Nahoon River (Nahoon Dam)	Active
18	Dimbaza - Ciskei	Inactive	74	Ncora (Ncora Dam)	Active
20	Donnybrook 1	Inactive	75	Tyhefu (Ndlambe Dam)	Inactive
21	Donnybrook 2	Inactive	76	Ngwekazi	Inactive
22	Doorn River (Doorn River Dam)	Active	77	Noncampa	Inactive
27	Gamtoos River (Kouga and Loerie Dams)	Active	78	Nqadu - TS*	Active
28	Gcuwa Weir	Active	79	Nqwelo GWS (Amatola)	Inactive
29	Geluk GS	Active	80	Nzikizini GWS (Amatola)	Inactive
30	Glenbrok	Inactive	84	Orange - Fish GWS	Active
31	Lower Fish Scheme	Active	85	Outspan Dam	Inactive
33	Gwaba	Inactive	86	Oxkraal - Ciskei	Inactive
34	Gxethu GWS (Amatola)	Inactive	88	Pleasant View Dam	Inactive
36	Jan Tshatshu - Ciskei	Inactive	89	Qamata (Lubisi Dam)	Active
37	Kamastone	Inactive	90	Qibira	Inactive
38	Kat River (Kat River Dam)	Active	91	Redhill	Inactive
40	Keiskammahoek (Cata Dam)	Active	93	Rooikrantz Dam	Active
41	Keiskammahoek (Mnyameni Dam)	Active	94	Roxeni GWS (Amatola)	Inactive
43	Klipplaat River (Waterdown Dam)	Active	95	Rura GWS (Amatola)	Inactive
46	Kromme River (Impofu Dam)	Active	97	Sheshegu Dam	Inactive
47	Kubusi River (Gubu Dam)	Active	98	Shiloh - CS*	Inactive
48	Kuzitungu	Inactive	99	Sinqumeni GWS (Amatola)	Inactive
49	Kwabhaca (Ntenetyane Dam)	Active	100	Tarka River (Kommandodrift Dam)	Active
50	Laing Dam	Active	101	Tendergate - CS*	Inactive
51	Lanti	Active	103	Toleni (Toleni Dam)	Active
53	Libode (Mhlanga Dam)	Active	104	Tsojana Dam	Active
55	Lower Sundays Scheme	Active	105	Tyutyu	Inactive
56	Macubeni Dam	Active	107	Woburn 2	Inactive
57	Magwa - TS*	Inactive	108	Woburn 3	Inactive
58	Maipase - Ciskei	Inactive	109	Xilinxa Dam	Active
59	Maitland - Ciskei	Inactive	110	Xonxa Dam	Active
60	Majola - TS*	Inactive	111	Zanyokwe (Sandile Dam)	Active
61	Maluti (Belfort Dam)	Active			

No.	Scheme Name	Operational Status	No.	Scheme Name	Operational Status
	Western Cape:				
9	Brand River GWS (Miertjieskraal Dam)	Active	45	KorenteVette River GWS (Korente-Vette Dam)	Active
10	Breede River GWS (Brandvlei&Kwaggaskloof Dams)	Active	52	Leeu River GWS (LeeuGamka Dam)	Active
11	Buffels River GWS (Floriskraal Dam)	Active	54	Lower Berg River GWS (Voelvlei&Misverstand Dams)	Active
12	Buffelsjags River GWS (Buffelsjags Dam)	Active	69	Mosselbay GWS (Wolwedans dam)	Active
15	Cordiers River GWS (Oukloof Dam)	Active	81	Olifants River (Stompdrift&Kamanassie Dams) (Oudtshoorn)	Active
23	Duivenhoks River GWS (Duivenhoks Dam)	Active	83	Olifants River GWS (Clanwilliam dam)	Active
24	Elands River GWS (Elandskloof Dam)	Active	82	Olifants River Van Rhynsdorp GWS (Bulshoek Dam)	Active
25	Gamka River GWS (Beaufort West Dam)	Active	87	Palmiet River GWS (Rockview&Kogelberg Dams)	Active
26	Gamka River GWS (Gamkapoort Dam)	Active	6	Riversonderend - Berg River GWS	Active
32	Goukou River GWS	Active	92	Roodefontein Dam	Active
35	Hartenbos River GWS (Hartbeeskuil Dam)	Active	96	Sandrift River GWS (RoodeElsberg&Lakenvallei Dams)	Active
39	Keisies River GWS (Pietersfontein Dam)	Active	102	Tierkloof Dam	Active
42	Kingna River GWS (Poortjieskloof Dam)	Active	106	Valsch River GWS (Ben Etive Dam)	Active
44	Konings River GWS (Klipberg Dam)	Active	19	Verkeerdevlei Dam	Inactive

1.8 Service Description and Assets Summary

The primary service offered by the Cluster is the delivery of bulk raw water to its domestic and industrial (D&I), and irrigation water users (customers). Total raw water registered volume for the Cluster is 4 169.137 Mm^3 per annum, of which 24.39% is for domestic and industrial and 75.61% is for irrigation use as shown in Table 1.4.

Table 1.4: Raw water allocations per water user category

Water User Category	Total Registered Volume (Mm^3 pa)	% of Total Registered Volume
Domestic & Industrial	1 016.936	24.39
Irrigation	3 152.201	75.61
Total	**4 169.137**	**100.00**

The key stakeholders for the Cluster are shown in Appendix C. Table 1.5 shows the principal customers (in terms of registered raw water volumes) for the Cluster. Appendix D, Table D.1 shows registered raw water volumes per water use category.

Table 1.5: Principal water users for the Cluster

Principal Customer Name	Water User Category	Registered Water Volume (Mm^3 pa)
Great Fish River Water Users Association	Irrigation	426.262
City of Cape Town Metropolitan Municipality	Domestic & Industrial	317.700
Sentraal-Breërivier WGV	Irrigation	172.896
Lower Sundays River Water User Association	Irrigation	145.445
Nelson Mandela Bay Municipality	Domestic & Industrial	132.444
Total		**1 194.747**
% of Total Cluster Registered Volume		*29%*

Table 1.6 summarizes the immovable assets for Cluster as they appear in the Asset Register (refer to Appendix A) used in the development of this AMP. The Cluster's immovable asset components have a total DRC and CRC of about R50.845 billion and about R55.630 billion, respectively. They can be grouped into two:

- infrastructure asset components (with total DRC and CRC of about R46.683 billion and about R51.468 billion, respectively), and
- land (with a total of R4.162 billion for both DRC and CRC).

For infrastructure assets, dams-related asset components have the highest CRC of about R28.250 billion, followed by tunnels, canals, measuring facilities, pipelines and pump stations related asset components with CRC of about: R10.015 billion, R7.632 billion, R2.704 billion, R1.436 billion, and R0.656 billion, respectively. A similar pattern is evident for DRC.

Table 1.6: Summary of the Cluster's immovable assets

Asset Facility Category	No. of Asset Components	CRC (R Million)	DRC (R Million)
Borehole	2	3.06	2.75
Buildings	807	518.32	433.48
Canals	1506	7 631.99	6 357.46
Dams	2735	28 249.81	26 349.91
Measuring facilities	1035	2 703.65	2 418.09
Pipelines	219	1 436.48	1 280.16
Power supply	9	2.14	1.75
Pump stations	426	656.41	547.24
Reservoirs	24	135.7	122.1
Roads	94	101.83	91.04
Telemetry	11	6.40	5.43
Tunnels	105	10 015.30	9 067.87

Asset Facility Category	No. of Asset Components	CRC (R Million)	DRC (R Million)
Water Treatment	11	7.31	5.91
Sub-total Infrastructure	**6984**	**51 468.40**	**46 683.21**
Land - owned land	133	3 602.40	3 602.40
Land - servitudes	1196	559.22	559.22
Sub-total Land	**1329**	**4 161.62**	**4 161.62**
TOTAL	**8313**	**55 630.01**	**50 844.82**

To be noted is that the Asset Register (see Appendix A) used in the development of this AMP did not have sizes (e.g. lengths of canals, roads, etc.) on most of the asset components. Hence, asset sizes are not shown in Table 1.6.

1.9 Summary

This AMP is for the Southern Operations Cluster which is part of the DWS's NWRI operations. Key data sources used in the development of this AMP include: the NWRI's immovable asset register; asset hierarchy; the 2016 Condition Assessment Audit of Irrigation Scheme Infrastructure - Scheme Reports for Southern Cluster operations; the Cluster's financial information (costs and revenue); face-to-face interviews conducted with the relevant Cluster personnel; as well as other relevant NWRI documentation.

The main purpose of this AMP is to enable the Cluster to effectively and efficiently manage its infrastructure assets, thereby enabling it to maximise its service delivery potential and benefits (delivering the desired level of service to its clients), and to minimise related risks and costs over its infrastructure assets' entire life cycle. This AMP is prepared in accordance with the provisions of the GIAMA, and is also aligned to: other relevant South African legislation; international standards; as well as the DWS's strategic plan.

The primary service offered by the Cluster is the delivery of bulk raw water to its domestic and industrial (D&I), and irrigation water users (customers). Total raw water registered volume for the Cluster is 4 169.137 Mm^3 per annum, of which 24.39% is for domestic and industrial and 75.61% is for irrigation use.

The Cluster's immovable assets can be grouped into two: infrastructure assets (with total DRC and CRC of about R46.683 billion and about R51.468 billion, respectively), and land (with a total of about R4.162 billion for both DRC and CRC).

The next section highlights the levels of service expected from the Cluster, as well as the associated performance measures and targets for the Scheme.

2. LEVELS OF SERVICE, PERFORMANCE MEASURES & TARGETS

2.1 Overview

This section presents the levels of service, as well as the associated performance measures and targets, for the Southern Operations Cluster. Understanding the levels of service for the Cluster assists in monitoring and managing the Cluster's infrastructure assets so as to ensure effective service delivery to its water users and, thus, leading to customer satisfaction.

2.2 Levels of Service, and Associated Performance Measures and Targets

In this AMP, 'levels of service' refers to the quality and quantity of the Cluster's service delivery, against which the Cluster's performance may be measured. As indicated in the preceding section, the key service delivered by the Cluster is the supply of raw water to its customers (irrigation, and domestic and industrial water users). The total raw water registered volume for this Cluster is 4 169.137 Mm^3. Appendix D, Table D.1, shows the registered raw water volumes per water use category.

There are three key levels of service applicable to the Cluster's raw water supply service, namely:

- Volume of raw water supplied;
- Quality of raw water supplied; and
- Assurance level of raw water supply.

The above-listed levels of service are evident in the: raw water supply agreements with water users; and the DWS's Raw Water Pricing Strategy. The DWS's Catchment Management Area (CMA) is responsible for raw water registration/licensing. Two of the levels of service (volume of raw water supplied; and assurance level of raw water supply) fall under the direct responsibility of the Cluster (which is part of NWRI Operations); whilst the 'quality of raw water supplied' level of service falls under the direct responsibility of the CMA. As this AMP focuses on NWRI, the 'quality of raw water supplied' level of service is not covered in subsequent text.

Table 2.1 presents the performance measures and targets (associated with each of the two levels of service for which the Cluster, as part of NWRI, is responsible), current performance, as well as the desired future performance targets.

Table 2.1: Levels of service, and associated performance measures and targets

Level of Service	Performance Measure	Performance Target (2015/16)	Current Performance (2015/16)	Desired Performance Targets (2016/17 – 2025/26)
Volume of raw water supplied	Number of agreements with water users in place	All water users have valid agreements in place (100%).	Could not be ascertained for some of the schemes.	All water users have valid agreements in place (100%).
	Volume of raw water supplied	Registered raw water volumes per annum: ▪ 1 016.936 Mm^3 for domestic and industrial water users; ▪ 3 152.201 Mm^3 for irrigation water users; ▪ 4 169.137 Mm^3 Total.	Actual raw water volumes supplied to irrigation water users could not be obtained.	Be able to meet the growth in demand (refer to Section 3).
	Asset Maintenance	No deferred maintenance.	There is some deferred maintenance (refer to Section 5.5).	No deferred maintenance.
	Water conveyance efficiency	Percentage of unaccounted for raw water during delivery: < 3% for pipes; <20% for canals.	Could not be ascertained for some of the schemes.	Percentage of unaccounted for raw water during delivery: < 3% for pipes; <20% for canals.
Assurance level of raw water supply	Water supply assurance	▪ 97% for domestic and industrial water users; ▪ 91% for irrigation water users.	Could not be ascertained for some of the schemes.	▪ 97% for domestic and industrial water users; ▪ 91% for irrigation water users.

2.3 Summary

There are three key desired levels of service applicable to the Cluster's raw water supply service: volume of raw water supplied; quality of raw water supplied; and assurance level of raw water supply. Volume of raw water supplied and assurance level of raw water supply fall under the direct responsibility of the Cluster operations; whilst quality of raw water supplied falls under the direct responsibility of the CMA. The Cluster is expected to supply an annual total of: 1 016.936 Mm^3 of raw water to D&I water users for which it assures 97% non-interruption; and 3 152.201 Mm^3 to irrigation water users for which it assures 91%.

In order to ensure that the Cluster provides the levels of service agreed with the water users, a number of asset life cycle management activities need to be executed, as outlined in Sections 4 and 5 of this AMP. The following section indicates the future raw water demand projections for this Cluster.

3. FUTURE RAW WATER DEMAND

3.1 Overview

This section highlights the Southern Operations Cluster's projected raw water demand levels based on the past trend.

3.2 Raw Water Demand Projection

Insight of the Cluster's future raw water demand helps in optimised planning for future new and upgrade capital needs (capital acquisitions), as contemplated in Sections 5 and 6 of the GIAMA. Figure 3.1 shows projected raw water demand for the Cluster, based on the registered volumes for both domestic and industrial (D&I) and irrigation (IRR), and actual raw water volumes for D&I (where available). Refer to Appendix D, Table D.2, for the data used to generate the graph in Figure 3.1. Ideally, the Cluster's future raw water demand determined by the DWS's Planning Office needs to take precedence; this will be addressed in the next update of this AMP.

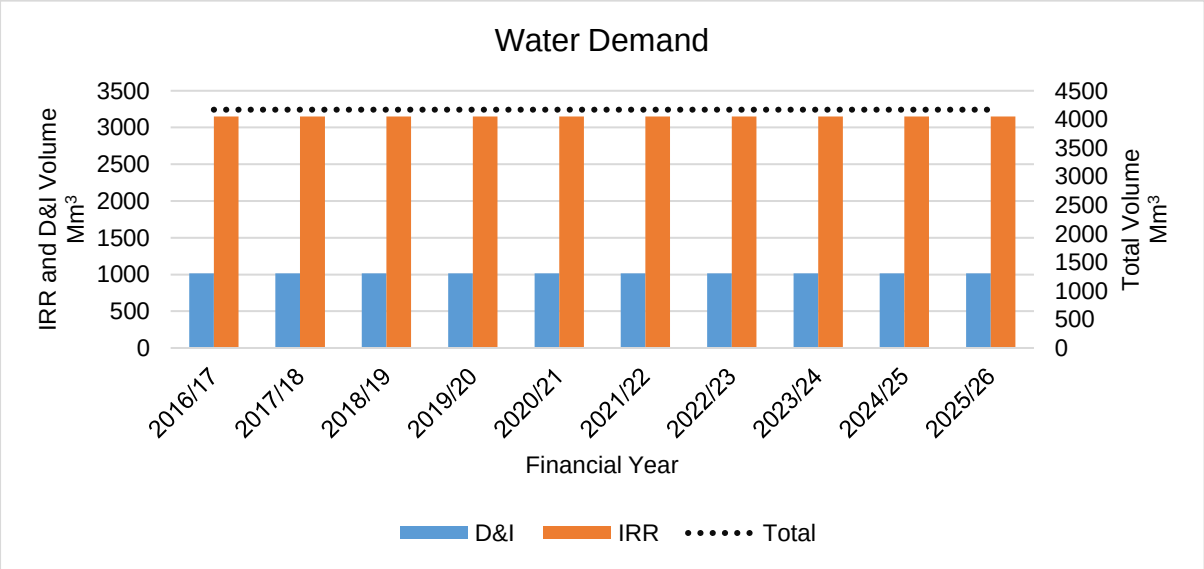


Figure 3.1: Projected raw water demand

3.3 Assumptions Made in Projecting Water Demand.

The main assumption made here is that there will be no major changes on the economic, political, demographic, settlement, irrigation, and domestic and industrial fronts affecting the Cluster. It is however important to note that in the event that there is a significant unforeseen change in any of these fronts, the projected raw water demand is bound to change. This calls for forward-looking planning where the Cluster needs to always keep track of changes

unfolding in these fronts, watching for changes that could significantly shift the current raw water demand, and consequently requiring upgrades or new capital or disposals of the Cluster's assets.

3.4 Sensitivity Analysis

Figure 3.2 shows possible scenarios from a sensitivity analysis; refer to Appendix D, Table D.3, for the data used to generate the graph.

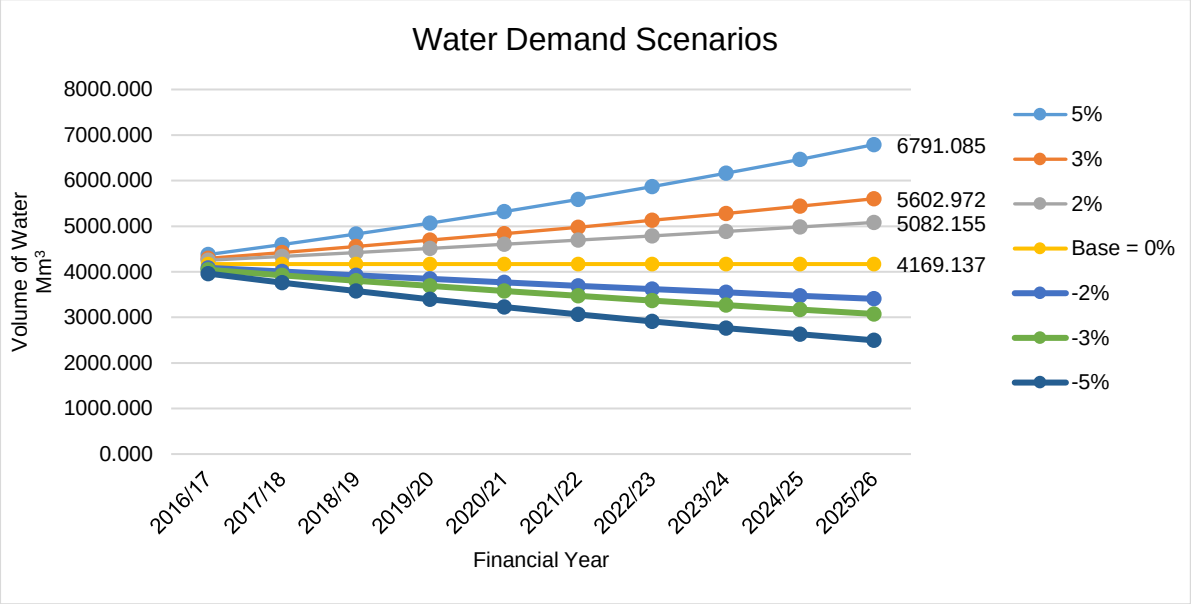


Figure 3.2: Future raw water demand sensitivity analysis

Ideally, the sensitivity graph in Figure 3.2 needs to be compared to the yields of the dams in the Cluster to ascertain whether or not the Cluster will be able to meet its projected raw water demand without the need for additional assets (new and/or upgrades). The next update of this AMP is expected to incorporate the dam yields.

3.5 Summary

The Southern Operations Cluster's future raw water demand for the next 10 years is projected to be around 4 169.137 Mm^3. The main assumption made here is that there will be no major changes on the economic, political, demographic, settlement, irrigation, and domestic and industrial fronts affecting the Cluster. Ideally, the Cluster's future raw water demand determined by the DWS's Planning Office takes precedence. The next update of this AMP is expected to make use of such data.

In order for the Cluster to meet the future raw water demand projected in this section, the following Sections 4 and 5 highlight the accordingly required asset life cycle works and associated financial plan, respectively.

4. ASSET DETAILS, RISK AND LIFE CYCLE WORKS

4.1 Overview

This section begins with an analysis of the immovable asset details (e.g. extent, value, condition, criticality, utilisation, etc.) for the Southern Operations Cluster. It then proceeds to discuss the associated risks, the works and strategies recommended for the Cluster to effectively and efficiently manage its assets throughout their life cycles in order to meet the levels of service agreed with its water users (see Section 2) and the projected future raw water demand (see Section 3).

4.2 Asset Information

The following subsections highlight the details (extent, value, condition, criticality and utilization) of the Cluster's immovable assets, based on the DWS's Immovable Asset Register for the 2015/16 financial year (refer to Appendix A).

The DWS Immovable Asset Management Policy (Section 6) and GRAP 17 (Section 11) prescribe the minimum asset register information, including: detail asset description (e.g. sizes, material of construction, etc.), EUL, RUL, impairments, and disposal (date, proceeds, and depreciation up to date of disposal). Where such information was incomplete in the asset register used in this AMP, the DWS Infrastructure Asset Hierarchy (latest version updated in 2013/14), the DWS's Immovable Asset Management Policy, Valuation Guide and the 2010 AMPs formed the basis for addressing the shortcoming. For instance:

- EULs were assigned based on the DWS Infrastructure Asset Hierarchy.
- RULs were determined using the age-based approach (and moderated by the condition-based approach).
- CRCs were determined by adjusting the provided acquisition costs with PPI and an uncertainty factor, and moderated using the CRCs reported in the 2010 AMPs, owing to the insufficient data on asset component sizes and material of construction.

4.2.1 Asset Extent and Values

Table 4.1 shows the extent (number of asset components), acquisition cost, CRC, DRC and asset carrying values for the Cluster's assets, split between scheme-specific and non-scheme specific.

Table 4.1: Asset extent, acquisition costs, CRC and values (scheme- and non-scheme-specific)

Description	No. of Asset Components	Acquisition Cost (R Million)	Asset Carrying Value (R Million)	CRC (R Million)	DRC (R Million)	DRC / CRC (%)
Scheme-Specific Infrastructure	6 024	18 160.02	13 578.96	49 744.47	45 163.41	90.79
Scheme-Specific Land	1 026	1 475.10	4 053.23	4 053.23	4 053.23	100.00
Sub-Total Scheme-Specific	**7 050**	**19 635.12**	**17 632.2**	**53797.7**	**49 216.65**	**91.48**
Non-Scheme-Specific Infrastructure	960	623.28	419.14	1 723.93	1 723.93	88.16
Non-Scheme-Specific Land	303	39.18	108.38	108.38	108.38	100.00
Sub-Total Non-Scheme-Specific	**1 263**	**662.46**	**527.52**	**1 832.31**	**1 628.17**	**88.86**
Total	**8 313**	**20 297.58**	**18 159.72**	**55 630.01**	**50 844.82**	**91.40**

Table 4.2 shows the extent (number of asset components), acquisition cost, CRC, DRC and asset carrying values for the Cluster's assets per asset facility category.

Table 4.2: Asset extent, acquisition costs, CRC and values (per facility category)

Asset Facility Category	No. of Asset Components	Acquisition Cost (R Million)	Asset Carrying Value (R Million)	CRC (R Million)	DRC (R Million)	DRC / CRC (%)
Borehole	2	1.11	0.79	3.06	2.75	89.84
Buildings	807	188.97	104.13	518.32	433.48	83.63
Canals	1 506	2 767.47	1 492.94	7 631.99	6 357.46	83.30
Dams	2 735	10 329.63	8 429.73	28 249.81	26 349.91	93.27
Measuring facilities	1 035	980.24	694.67	2 703.65	2 418.09	89.44
Pipelines	219	540.24	383.91	1 436.48	1 280.16	89.12
Power supply	9	0.77	0.38	2.14	1.75	81.64
Pump stations	426	255.92	146.75	656.41	547.24	83.37
Reservoirs	24	49.06	35.50	135.7	122.1	90.01
Roads	94	43.27	32.48	101.83	91.04	89.41
Telemetry	11	2.97	2.00	6.40	5.43	84.82
Tunnels	105	3 621.01	2 673.58	10 015.30	9 067.87	90.54
Water Treatment	11	2.64	1.24	7.31	5.91	80.81
Sub-total Infrastructure	**6 984**	**18 783.30**	**13 998.11**	**51 468.40**	**46 683.21**	**90.70**
Land - owned land	133	1 311.60	3 602.40	3 602.40	3 602.40	100.00
Land - servitudes	1 196	202.68	559.22	559.22	559.22	100.00
Sub-total Land	**1 329**	**1 514.28**	**4 161.62**	**4 161.62**	**4 161.62**	**100.00**
TOTAL	**8 313**	**20 297.58**	**18 159.72**	**55 630.01**	**50 844.82**	**91.40**

As shown in Table 4.1, the Cluster has an immovable asset base consisting of: *infrastructure*

assets (with a total of 6 984 asset components) and *land* (with a total of 1 329 asset components). The Cluster's immovable asset components have a total DRC and CRC of about R50.844 billion and about R55.630 billion, respectively. They can be grouped into two: infrastructure assets with a total DRC and CRC of about R46.683 billion and about R51.468 billion, respectively; and land with a total of about R4.162 billion for both DRC and CRC. The DRC/CRC ratio for infrastructure assets is about 91%, indicating that about 9% of the infrastructure asset base has been consumed so far.

For infrastructure assets, dams-related asset components have the highest CRC of about R28.250 billion, followed by tunnels, canals, measuring facilities, pipelines and pump stations related asset components with CRC of about: R10.015 billion, R7.632 billion, R2.704 billion, R1.436 billion, and R0.656 billion, respectively. A similar pattern is evident for DRC.

Figure 4.1 shows the proportional distribution of the Cluster's asset components per asset facility category. The majority of the Cluster's asset components are dams, canals, land, measuring facilities and buildings related asset components (about 33%, 18%, 16%, 12% and 10%, respectively).

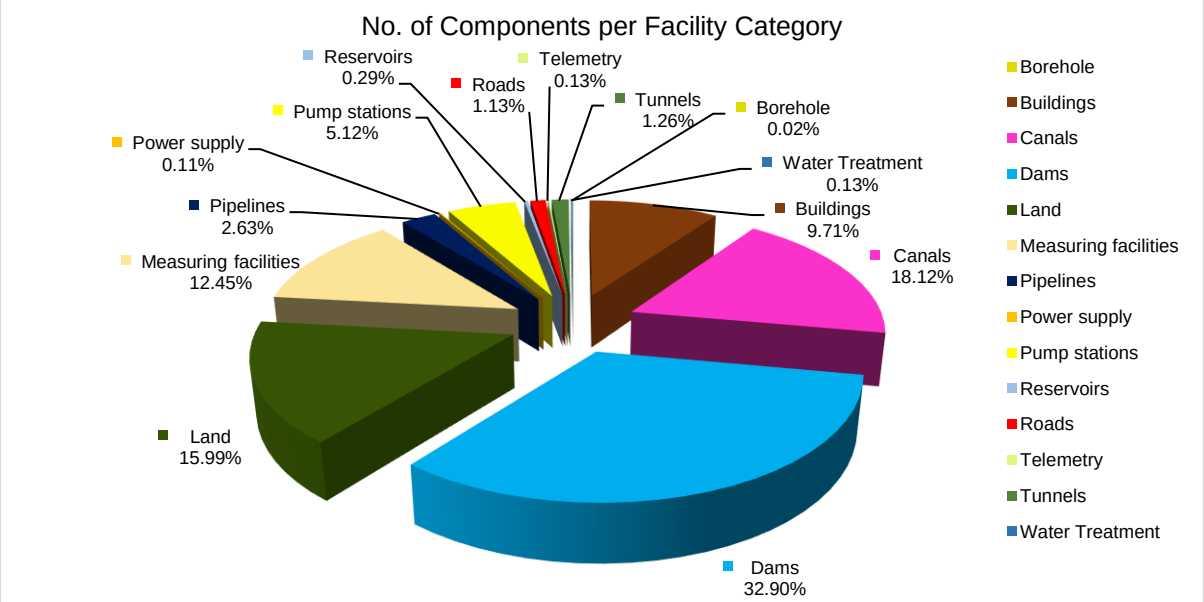


Figure 4.1: Proportion of asset components per asset facility category

Figures 4.2 and 4.3 show the associated proportions of the DRC and CRC per asset facility category, respectively.

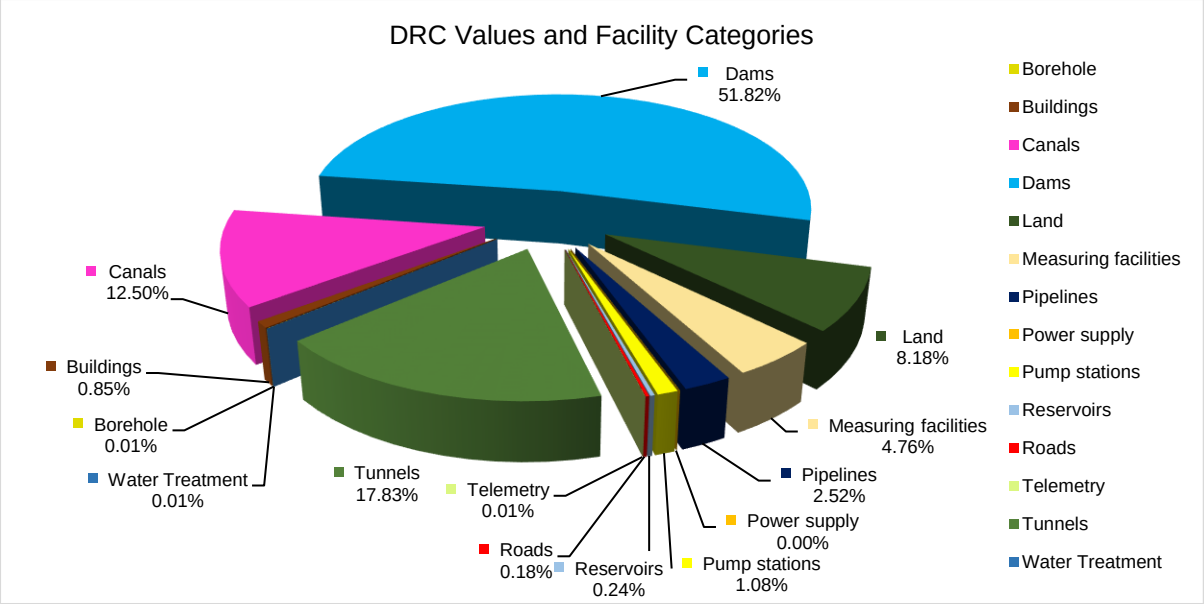


Figure 4.2: DRC per asset facility category

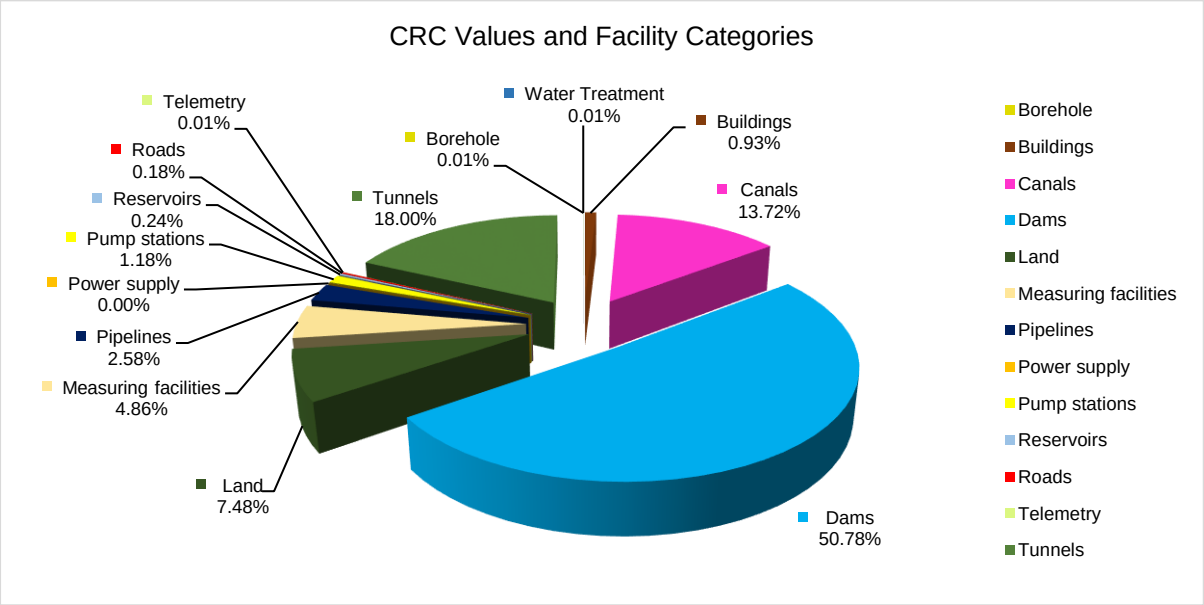


Figure 4.3: CRC per asset facility category

4.2.2 Asset Condition and RUL/EUL Ratio

Table 4.2 shows the asset condition grading criteria as well as the link between the condition grading and the RUL/EUL ratio range.

Table 4.3: Linking asset condition grades to RUL/EUL ratio range

Condition Grade	Description	Detailed Description	Indicative RUL/EUL
5	Very good	Sound structure, well maintained. Only normal maintenance required.	71 - 100%
4	Good	Serves needs but minor deterioration (< 5%). Minor maintenance required.	46 - 70%
3	Fair	Marginal, clearly evident deterioration (10-20%). Significant maintenance required.	26 - 45%
2	Poor	Significant deterioration of structure and/or appearance. Significant impairment of functionality (20-40%). Significant renewal/upgrade required.	11 - 25%
1	Very poor	Unsound, failed, needs reconstruction/ replacement (> 50% needs replacement).	0 - 10%
0	Not Working	Unsound, failed, needs reconstruction/ replacement (100% needs replacement).	0%

Source: Adapted from DWS Immovable Asset Management Policy (2015)

Asset Condition

Table 4.4 and Figure 4.4 show the proportions of the Cluster's infrastructure asset components per condition grading and per asset facility category. Appendix E, Table E.1, an expanded version of Table 4.4, shows the number of asset components in each condition grading.

- About 73% of the Cluster's infrastructure asset components are in fair, good and very good conditions. These include all: boreholes, water treatment and reservoirs related asset components; and also, the majority of tunnels (about 99%), pump stations (about 92%), telemetry (about 91%), canals (about 83%) and power supply (about 78%) related asset components. In addition to these, there are about 75%, 73%, 61%, and 44% of buildings, dams, pipelines, and measuring facilities related asset components, respectively, which also fall under the fair, good and very good conditions. All these asset components require appropriate maintenance to prevent them from deteriorating to poor and very poor condition.
- On the other hand, about 27% of the Cluster's infrastructure asset components have deteriorated to poor and very poor conditions. These are: measuring facilities (about 56%), pipelines (about 39%), dams (about 27%), buildings (25%), power supply (about 22%), canals (17%), roads (about 14%), telemetry (about 9%) and pump stations (about 8%). These assets require immediate renewal to ensure they continue delivering the required service.

Table 4.4: Asset component condition grading proportions per asset facility category

Asset Facility Category	Condition Grading					Total
	1-Very Poor	2-Poor	3-Fair	4-Good	5-Very Good	
Borehole	-	-	-	100.00%	-	**100.00%**
Buildings	4.09%	20.57%	46.47%	27.76%	1.12%	**100.00%**
Canals	4.12%	12.95%	55.58%	26.56%	0.80%	**100.00%**
Dams	2.41%	24.31%	36.38%	33.56%	3.33%	**100.00%**
Measuring facilities	1.84%	54.11%	25.12%	16.62%	2.32%	**100.00%**
Pipelines	5.94%	32.88%	42.01%	5.02%	14.16%	**100.00%**
Power supply	-	22.22%	66.67%	11.11%	-	**100.00%**
Pump stations	6.34%	1.88%	11.74%	38.73%	41.31%	**100.00%**
Reservoirs	-	-	83.33%	16.67%	-	**100.00%**
Roads	2.13%	11.70%	27.66%	40.43%	18.09%	**100.00%**
Telemetry	9.09%	-	18.18%	72.73%	-	**100.00%**
Tunnels	-	0.95%	39.05%	46.67%	13.33%	**100.00%**
Water Treatment	-	-	63.64%	36.36%	-	**100.00%**
All Cluster asset components	*3.19%*	*24.05%*	*38.82%*	*28.58%*	*5.36%*	***100.00%***

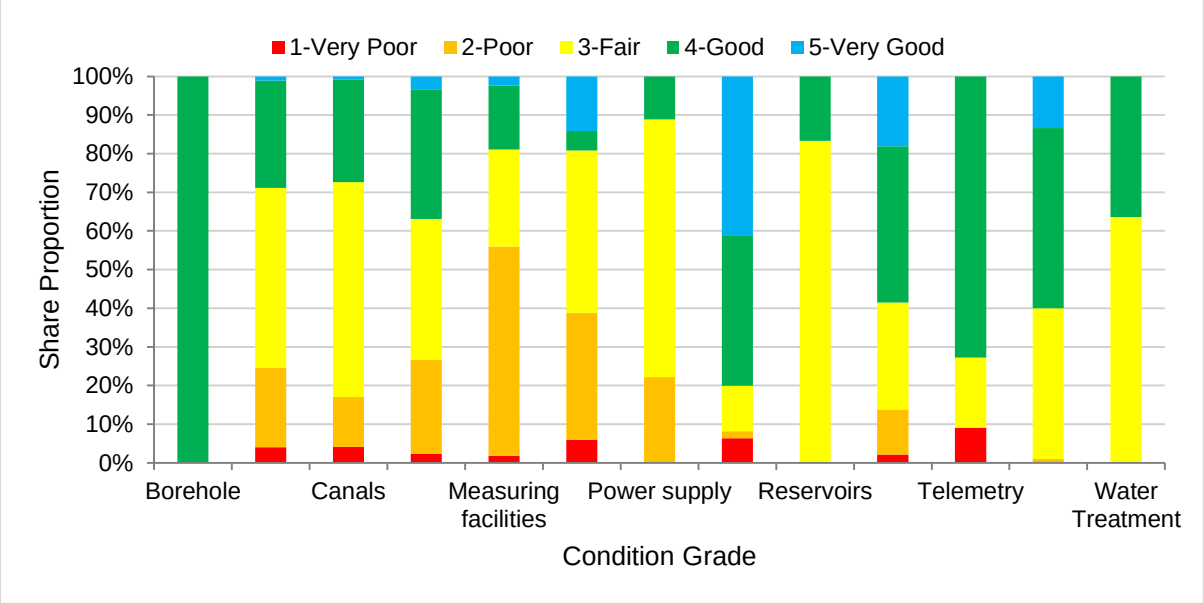
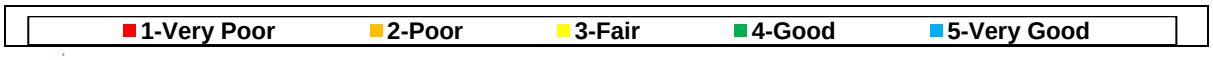
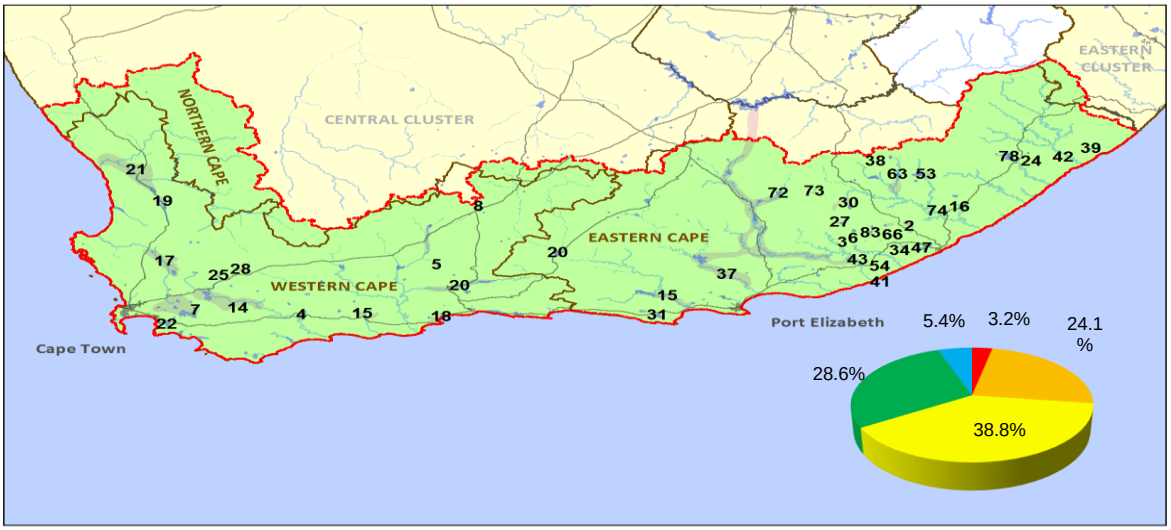


Figure 4.4: Asset component condition grading proportions per asset facility category

Figure 4.5 presents the overall condition gradings of the Cluster's asset components indicating that, as also shown in Table 4.4: about 73% of the Cluster's infrastructure asset components are in fair, good and good conditions; while about 27% are in poor and very poor conditions.





No	Scheme Name	No	Scheme Name	No	Scheme Name
	Eastern Cape:				
1	Amabele GWS (Amatola)	46	Kromme River (Impofu Dam)	77	Noncampa
2	Amatola (Wriggleswade Dam)	47	Kubusi River (Gubu Dam)	78	Nqadu - TS*
3	Balura GWS (Amatola)	48	Kuzitungu	79	Nqwelo GWS (Amatola)
4	Groot River (Beervlei Dam)	49	Kwabhaca (Ntenetyane Dam)	80	Nzikizini GWS (Amatola)
5	Bekruipkop - Ciskei	50	Laing Dam	84	Orange - Fish GWS
7	Binfield Park Dam	51	Lanti	85	Outspan Dam
8	Blue Crane Dam	53	Libode (Mhlanga Dam)	86	Oxkraal - Ciskei
13	Bushmanskrantz Dam	55	Lower Sundays Scheme	88	Pleasant View Dam
14	Gxulu (Corana Dam)	56	Macubeni Dam	89	Qamata (Lubisi Dam)
16	Dabi Dam	57	Magwa - TS*	90	Qibira
17	Debe Dam	58	Maipase - Ciskei	91	Redhill
18	Dimbaza - Ciskei	59	Maitland - Ciskei	93	Rooikrantz Dam
20	Donnybrook 1	60	Majola - TS*	94	Roxeni GWS (Amatola)
21	Donnybrook 2	61	Maluti (Belfort Dam)	95	Rura GWS (Amatola)
22	Doorn River (Doorn River Dam)	62	Mankazana GWS (Amatola)	97	Sheshegu Dam
27	Gamtoos River (Kouga and Loerie Dams)	63	Masela 1	98	Shiloh - CS*
28	Gcuwa Weir	64	Masela 2	99	Sinqumeni GWS (Amatola)
29	Geluk GS	65	Mdantsane 1	100	Tarka River (Kommandodrift Dam)
30	Glenbrok	66	Mdantsane 2	101	Tendergate - CS*
31	Lower Fish Scheme	67	Mhlahlane (Mabaleni Dam)	103	Toleni (Toleni Dam)
33	Gwaba	68	Midfort	104	Tsojana Dam
34	Gxethu GWS (Amatola)	70	Mount Coke	105	Tyutyu
36	Jan Tshatshu - Ciskei	71	Msengeni	107	Woburn 2
37	Kamastone	72	Umtata Dam	108	Woburn 3
38	Kat River (Kat River Dam)	73	Nahoon River (Nahoon Dam)	109	Xilinxa Dam
40	Keiskammahoek (Cata Dam)	74	Ncora (Ncora Dam)	110	Xonxa Dam
41	Keiskammahoek (Mnyameni Dam)	75	Tyhefu (Ndlambe Dam)	111	Zanyokwe (Sandile Dam)
43	Klipplaat River (Waterdown Dam)	76	Ngwekazi		
	Western Cape:				
9	Brand River GWS (Miertjieskraal Dam)	35	Hartenbos River GWS (Hartbeeskuil Dam)	82	Olifants River Van Rhynsdorp GWS (Bulshoek Dam)
10	Breede River GWS (Brandvlei & Kwaggaskloof Dams)	39	Keisies River GWS (Pietersfontein Dam)	87	Palmiet River GWS (Rockview&Kogelberg Dams)
11	Buffels River GWS (Floriskraal Dam)	42	Kingna River GWS (Poortjieskloof Dam)	6	Riversonderend - Berg River GWS
12	Buffelsjags River GWS (Buffelsjags Dam)	44	Konings River GWS (Klipberg Dam)	92	Roodefontein Dam
15	Cordiers River GWS (Oukloof Dam)	45	KorenteVette River GWS (Korente-Vette Dam)	96	Sandrift River GWS (RoodeElsberg&Lakenvallei Dams)
23	Duivenhoks River GWS (Duivenhoks Dam)	52	Leeu River GWS (LeeuGamka Dam)	102	Tierkloof Dam
24	Elands River GWS (Elandskloof Dam)	54	Lower Berg River GWS (Voelvlei&Misverstand Dams)	106	Valsch River GWS (Ben Etive Dam)
25	Gamka River GWS (Beaufort West Dam)	69	Mosselbay GWS (Wolwedans dam)	19	Verkeerdevlei Dam
26	Gamka River GWS (Gamkapoort Dam)	81	Olifants River (Stompdrift & Kamanassie Dams)		
32	Goukou River GWS	83	Olifants River GWS (Clanwilliam dam)		

Figure 4.5: Asset condition grading proportions for the Cluster

Table 4.5 and Figure 4.6 present the CRCs of the Cluster's infrastructure asset components

per condition grading and per asset facility category. Asset components that are in fair, good and very good conditions (representing about 73% of all the Cluster's infrastructure asset components, as shown in Table 4.4 and Figures 4.4 and 4.5) have a total CRC of about R48.350 billion; the main contributions coming from:

- dams-related asset components (representing about 73% of all dams-related asset components, as shown in Table 4.4 and Figure 4.4) with a total CRC of about R26.996 billion;
- Tunnels-related asset components (representing about 99% of all tunnels-related asset components, as shown in Table 4.4 and Figure 4.4) with a total CRC of about R10 billion; and
- canals-related asset components (representing about 83% of all canals-related asset components, as shown in Table 4.4 and Figure 4.4) with a total CRC of about R6.5 billion.

On the other hand, asset components that are in poor and very poor condition (representing about 27% of all the Cluster's infrastructure asset components, as shown in Table 4.3 and Figure 4.4) have a total CRC of about R3.118 billion; the main contribution coming from:

- dams-related asset components (representing about 17% of all dams-related asset components, as shown in Table 4.4 and Figure 4.4) with a total CRC of about R1.254 billion; and,
- canals-related asset components (representing about 17% of all canals-related asset components, as shown in Table 4.4 and Figure 4.4) with a total CRC of about R1.128 billion.

Table 4.5: CRC per condition grading and per asset facility category

Asset Facility Category	Condition Grading vs CRC (R Million)					Total	*% of Total CRC*
	1-Very Poor	2-Poor	3-Fair	4-Good	5-Very Good		
Borehole				3.06		**3.06**	*0.01*
Buildings	18.02	72.39	208.81	194.63	24.48	**518.32**	*1.01*
Canals	322.14	805.94	3 780.00	2 421.93	301.98	**7 631.99**	*14.83*
Dams	245.78	1 008.03	4 117.28	19 285.82	3 592.90	**28 249.81**	*54.89*
Measuring facilities	70.61	418.45	953.63	757.53	503.43	**2 703.65**	*5.25*
Pipelines	33.20	77.08	405.11	427.69	493.41	**1 436.48**	*2.79*
Power supply		0.14	1.77	0.23		**2.14**	*0.00*
Pump stations	29.80	4.25	18.23	171.85	432.28	**656.41**	*1.28*
Reservoirs			127.15	8.54		**135.69**	*0.26*
Roads	0.79	9.34	10.25	40.60	40.86	**101.83**	*0.20*
Telemetry	0.23		0.46	5.72		**6.40**	*0.01*
Tunnels		2.20	2 847.60	6 736.36	429.14	**10 015.30**	*19.46*
Water Treatment			4.84	2.47		**7.31**	*0.01*

Asset Facility Category	Condition Grading vs CRC (R Million)					Total	% of Total CRC
	1-Very Poor	2-Poor	3-Fair	4-Good	5-Very Good		
Total	**720.56**	**2 397.81**	**12 475.11**	**30 056.43**	**5 818.48**	**51 468.40**	***100.00***
% of Total CRC	*1.40*	*4.66*	*24.24*	*58.40*	*11.30*	*100.00*	

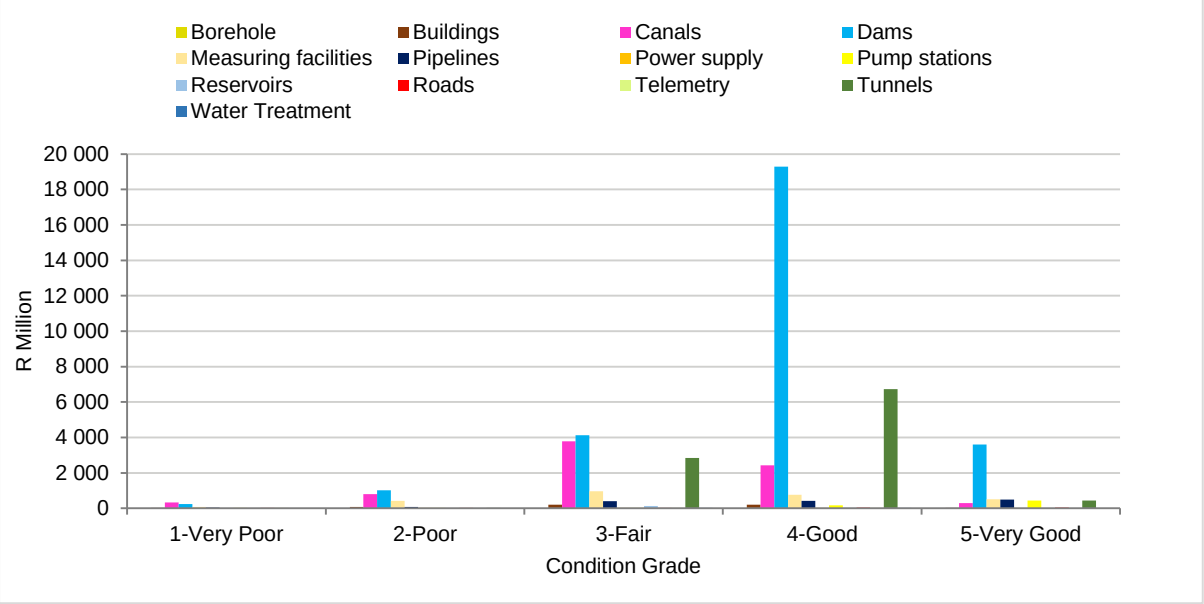


Figure 4.6: CRC per condition grading and per asset facility category

Asset RUL/EUL ratio

Table 4.6 and Figure 4.7 show the proportions of the Cluster's infrastructure asset components per RUL/EUL ratio and per asset facility category. Appendix E, Table E.2, an expanded version of Table 4.6, shows the number of asset components in each RUL/EUL ratio range.

- About 73% of the Cluster's infrastructure asset components have RUL/EUL ratios in the 26% to 100% range. These include all: boreholes, water treatment and reservoirs related asset components; and also, the majority of tunnels (about 99%), pump stations (about 92%), telemetry (about 91%), canals (about 83%) and power supply (about 78%) related asset components. In addition to these, there are about 75%, 73%, 61%, and 44% of buildings, dams, pipelines, and measuring facilities, respectively, fall under the same RUL/EUL ratio ranges. These asset components require appropriate maintenance to ensure they continue to meet the required service.
- On the other hand, about 27% of the Cluster's infrastructure asset components have RUL/EUL ratios of 25% and below. These are: measuring facilities (about 56%), pipelines (about 39%), dams (about 27%), buildings (25%), power supply (about 22%), canals (17%), roads (about 14%), telemetry (about 9%) and pump stations (about 8%). The RUL/EUL ratios of 25% and below mean that these asset components are nearing the end of their EULs; calling for immediate asset renewal to extend their useful lives.

Table 4.6: Asset component RUL/EUL ratio proportions per asset facility category

Asset Facility Category	RUL/EUL Ratio					Total
	0-10%	11-25%	26-45%	46-70%	71-100%	
Borehole	-	-	-	100.00%	-	**100.00%**
Buildings	4.09%	20.57%	46.47%	27.76%	1.12%	**100.00%**
Canals	4.12%	12.95%	55.58%	26.56%	0.80%	**100.00%**
Dams	2.41%	24.31%	36.38%	33.56%	3.33%	**100.00%**
Measuring facilities	1.84%	54.11%	25.12%	16.62%	2.32%	**100.00%**
Pipelines	5.94%	32.88%	42.01%	5.02%	14.16%	**100.00%**
Power supply	-	22.22%	66.67%	11.11%	-	**100.00%**
Pump stations	6.34%	1.88%	11.74%	38.73%	41.31%	**100.00%**
Reservoirs	-	-	83.33%	16.67%	-	**100.00%**
Roads	2.13%	11.70%	27.66%	40.43%	18.09%	**100.00%**
Telemetry	9.09%	-	18.18%	72.73%	-	**100.00%**
Tunnels	-	0.95%	39.05%	46.67%	13.33%	**100.00%**
Water Treatment	-	-	63.64%	36.36%	-	**100.00%**
All Cluster asset components	*3.19%*	*24.05%*	*38.82%*	*28.58%*	*5.36%*	***100.00%***

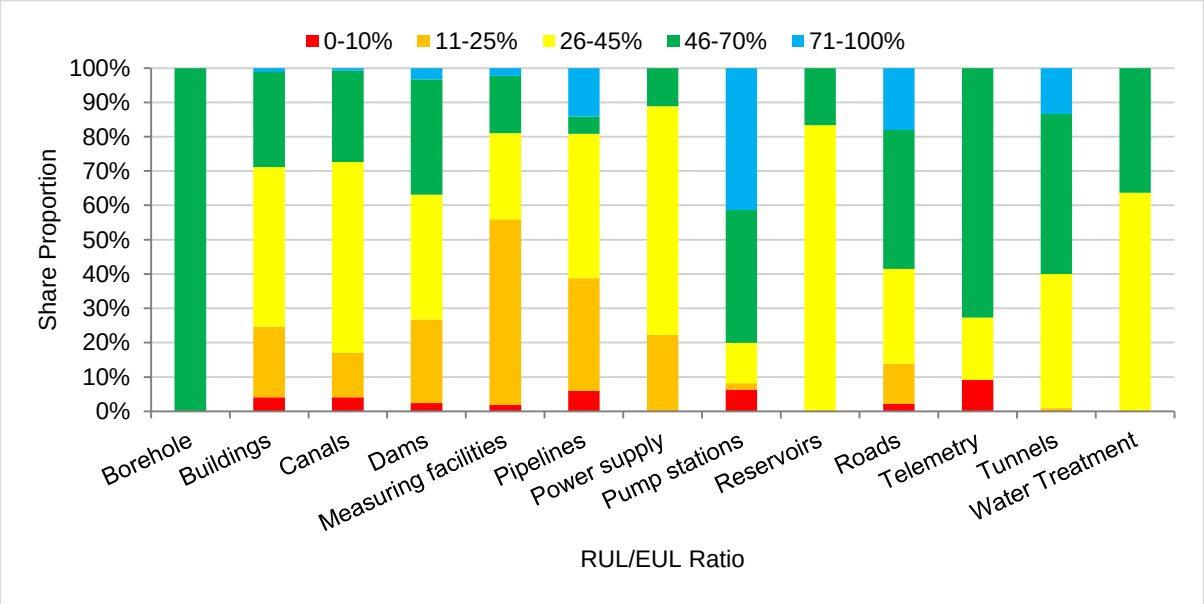


Figure 4.7: Asset component RUL/EUL ratio proportions per asset facility category

Table 4.7 and Figure 4.8 present the CRCs of the Cluster's asset components per RUL/EUL ratio range and per asset facility category. Asset components with RUL/EUL ratios in the ranges 26% to 100% (representing about 73% of all the Cluster's asset components, as shown in Table 4.6 and Figure 4.7) have a total CRC of about R48.350 billion; the main contributions coming from:

- dams-related asset components (representing about 73% of all dams-related asset

components, as shown in Table 4.6 and Figure 4.7) with a total CRC of about R26.996 billion;

- tunnels-related asset components (representing about 96% of all canals-related asset components, as shown in Table 4.6 and Figure 4.7) with a total CRC of about R10 billion; and
- Canals-related asset components (as shown in Table 4.6 and Figure 4.7) with a total CRC of about R6.5 billion.

On the other hand, asset components with RUL/EUL ratios of 25% and below (representing about 27% of all the Cluster's asset components, as shown in Table 4.6 and Figure 4.7) have a total CRC of about R3.118 billion; the main contribution coming from:

- dams-related asset components (representing about 27% of all dams-related asset components, as shown in Table 4.6 and Figure 4.7) with a total CRC of about R1.254 billion; and,
- canals-related asset components (representing about 17% of all canals-related asset components, as shown in Table 4.6 and Figure 4.7) with a total CRC of about R1.128 billion.

Table 4.7: CRC per RUL/EUL ratio and per asset facility category

Asset Facility Category	**RUL/EUL ratio vs CRC (R Million)**					**Total**	*% of Total CRC*
	0-10%	**11-25%**	**26-45%**	**46-70%**	**71-100%**		
Borehole				3.06		**3.06**	*0.01*
Buildings	18.02	72.39	208.81	194.63	24.48	**518.32**	*1.01*
Canals	322.14	805.94	3 780.00	2 421.93	301.98	**7 631.99**	*14.8*
Dams	245.78	1 008.03	4 117.28	19 285.82	3 592.90	**28 249.81**	*54.89*
Measuring facilities	70.61	418.45	953.63	757.53	503.43	**2 703.65**	*5.25*
Pipelines	33.20	77.08	405.11	427.69	493.41	**1 436.48**	*2.79*
Power supply		0.14	1.77	0.23		**2.14**	*0.00*
Pump stations	29.80	4.25	18.23	171.85	432.28	**656.41**	*1.28*
Reservoirs			127.15	8.54		**135.69**	*0.26*
Roads	0.79	9.34	10.25	40.60	40.86	**101.83**	*0.20*
Telemetry	0.23		0.46	5.72		**6.40**	*0.01*
Tunnels		2.20	2 847.60	6 736.36	429.14	**10 015.30**	*19.46*
Water Treatment			4.84	2.47		**7.31**	*0.01*
Total	**720.56**	**2 397.81**	**12 475.11**	**30 056.43**	**5 818.48**	**51 468.40**	***100.00***
% of Total CRC	*1.40*	*4.66*	*24.24*	*58.40*	*11.30*	***100.00***	

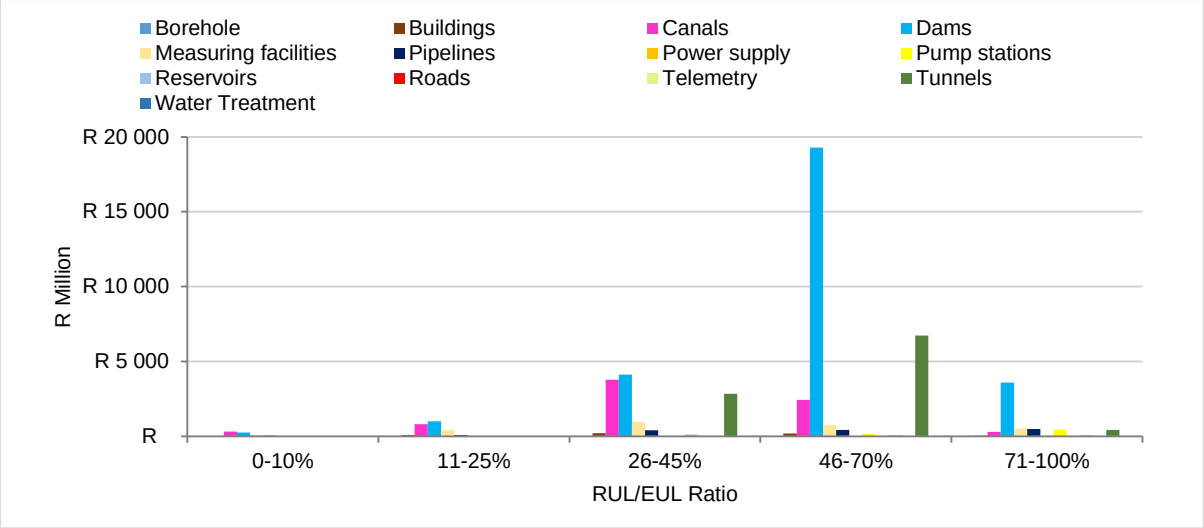


Figure 4.8: CRC per RUL/EUL ratio and per asset facility category

4.2.3 Asset Criticality

In this AMP, asset components are graded in terms of criticality according to the criteria listed in Table 4.8.

Table 4.8: Asset criticality grading criteria

Grade	Criticality Description	Consequence of Failure (Impact)	Qualitative Description
1	Very Low	Insignificant	Is readily absorbed under normal operating conditions.
2	Low	Minor	Can be managed under normal operating conditions.
3	Moderate	Moderate	Can be managed but requires additional resources and management effort.
4	High	Major	Will have a prolonged impact and extensive consequences.
5	Very High	Catastrophic	Irreversible and extensive impacts, or will significantly undermine business objectives.

Table 4.9 and Figure 4.9 show the proportions of the Cluster's infrastructure asset components per criticality grade and per asset facility category. Appendix E, Table E.3, an expanded version of Table 4.9, shows the number of asset components in each criticality grade. For this Cluster:

- About 81% of the Cluster's infrastructure asset components are in the moderate, high and very high criticality grades. These include: all borehole and tunnels related asset components and about 97% and 94% of canals and pump station related asset components. In the event of failure, these asset components will cause a moderate to catastrophic impact on the Cluster's ability to meet the required levels of service. Thus, these assets require appropriate maintenance and renewal to ensure they continue

delivering the required service.

- On the other hand, about 19% of the Cluster's infrastructure asset components are in the low and very low criticality grades. These include all: all water treatment related asset components as well as 94% and 66% of roads and power supply related asset components. In the event of failure, these asset components, and those others which fall under the low and very low criticality grades as presented in Table 4.9, will cause a minor to insignificant impact on the Cluster's ability to meet the required levels of service.

Table 4.9: Asset component Criticality grading proportions per asset facility category

Asset Facility Category	Criticality Grading					Total
	1-Very Low	2-Low	3-Moderate	4-High	5-Very High	
Borehole	-	-	100.00%	-	-	**100.00%**
Buildings	10.04%	17.84%	65.68%	6.44%	-	**100.00%**
Canals	1.66%	1.13%	96.61%	0.60%	-	**100.00%**
Dams	1.28%	11.52%	22.41%	55.43%	9.36%	**100.00%**
Measuring facilities	11.88%	29.57%	50.63%	7.92%	-	**100.00%**
Pipelines	0.91%	51.14%	17.35%	25.11%	5.48%	**100.00%**
Power supply	-	66.67%	33.33%	-	-	**100.00%**
Pump stations	-	5.63%	43.66%	41.31%	9.39%	**100.00%**
Reservoirs	-	50.00%	41.67%	-	8.33%	**100.00%**
Roads	86.17%	7.45%	2.13%	4.26%	-	**100.00%**
Telemetry	-	54.55%	-	45.45%	-	**100.00%**
Tunnels	-	-	0.95%	53.33%	45.71%	**100.00%**
Water Treatment	9.09%	90.91%	-	-	-	**100.00%**
All Cluster asset components	*4.98%*	*13.73%*	*48.17%*	*27.99%*	*5.13%*	***100.00%***

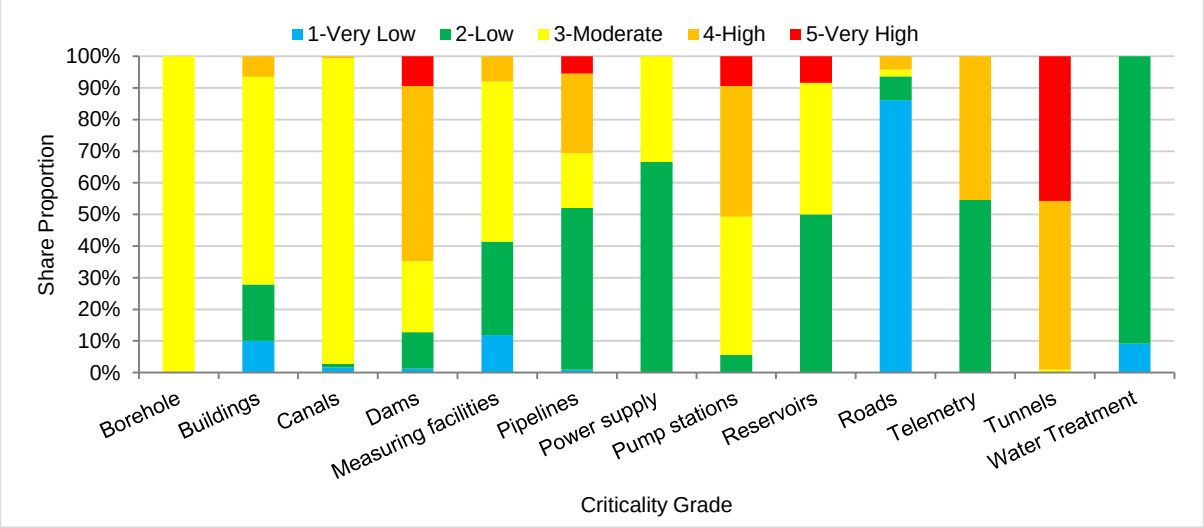
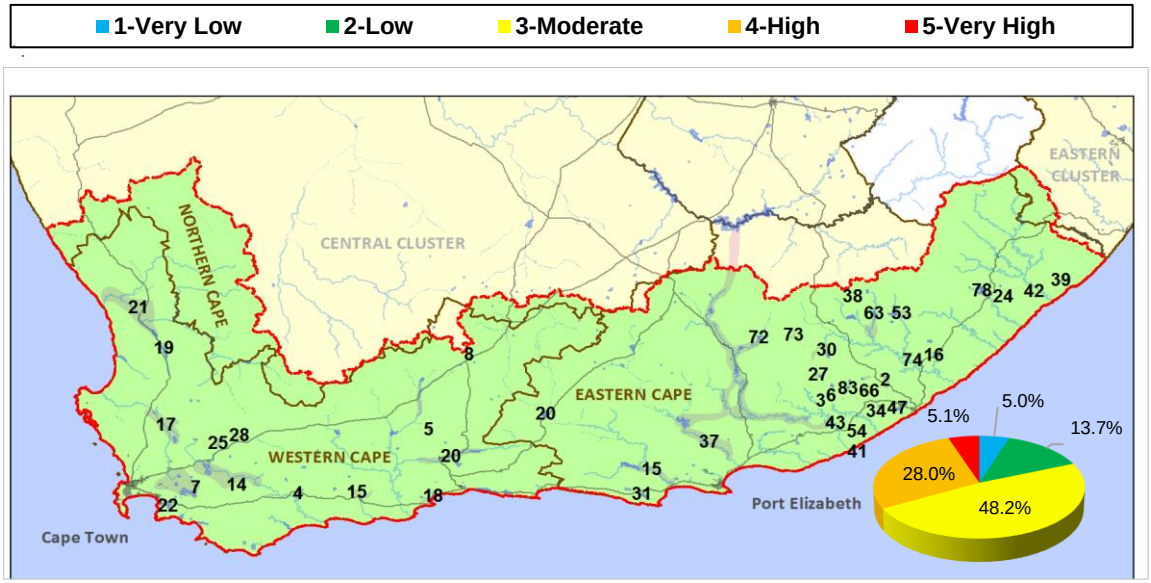


Figure 4.9: Asset component Criticality grading proportions per asset facility category

Figure 4.10 presents the overall criticality gradings of the Cluster's infrastructure asset components indicating that, as also shown in Table 4.9: about 81% of the Cluster's

infrastructure asset components are in moderate, high and very high criticality grades; while about 19% are in the low and very low criticality grades.



No	Scheme Name	No	Scheme Name	No	Scheme Name
	Eastern Cape:				
1	Amabele GWS (Amatola)	46	Kromme River (Impofu Dam)	77	Noncampa
2	Amatola (Wriggleswade Dam)	47	Kubusi River (Gubu Dam)	78	Nqadu - TS*
3	Balura GWS (Amatola)	48	Kuzitungu	79	Nqwelo GWS (Amatola)
4	Groot River (Beervlei Dam)	49	Kwabhaca (Ntenetyane Dam)	80	Nzikizini GWS (Amatola)
5	Bekruipkop - Ciskei	50	Laing Dam	84	Orange - Fish GWS
7	Binfield Park Dam	51	Lanti	85	Outspan Dam
8	Blue Crane Dam	53	Libode (Mhlanga Dam)	86	Oxkraal - Ciskei
13	Bushmanskrantz Dam	55	Lower Sundays Scheme	88	Pleasant View Dam
14	Gxulu (Corana Dam)	56	Macubeni Dam	89	Qamata (Lubisi Dam)
16	Dabi Dam	57	Magwa - TS*	90	Qibira
17	Debe Dam	58	Maipase - Ciskei	91	Redhill
18	Dimbaza - Ciskei	59	Maitland - Ciskei	93	Rooikrantz Dam
20	Donnybrook 1	60	Majola - TS*	94	Roxeni GWS (Amatola)
21	Donnybrook 2	61	Maluti (Belfort Dam)	95	Rura GWS (Amatola)
22	Doorn River (Doorn River Dam)	62	Mankazana GWS (Amatola)	97	Sheshegu Dam
27	Gamtoos River (Kouga and Loerie Dams)	63	Masela 1	98	Shiloh - CS*
28	Gcuwa Weir	64	Masela 2	99	Sinqumeni GWS (Amatola)
29	Geluk GS	65	Mdantsane 1	100	Tarka River (Kommandodrift Dam)
30	Glenbrok	66	Mdantsane 2	101	Tendergate - CS*
31	Lower Fish Scheme	67	Mhlahlane (Mabaleni Dam)	103	Toleni (Toleni Dam)
33	Gwaba	68	Midfort	104	Tsojana Dam
34	Gxethu GWS (Amatola)	70	Mount Coke	105	Tyutyu
36	Jan Tshatshu - Ciskei	71	Msengeni	107	Woburn 2
37	Kamastone	72	Umtata Dam	108	Woburn 3
38	Kat River (Kat River Dam)	73	Nahoon River (Nahoon Dam)	109	Xilinxa Dam
40	Keiskammahoek (Cata Dam)	74	Ncora (Ncora Dam)	110	Xonxa Dam
41	Keiskammahoek (Mnyameni Dam)	75	Tyhefu (Ndlambe Dam)	111	Zanyokwe (Sandile Dam)
43	Klipplaat River (Waterdown Dam)	76	Ngwekazi		
	Western Cape:				
9	Brand River GWS (Miertjieskraal Dam)	35	Hartenbos River GWS (Hartbeeskuil Dam)	82	Olifants River Van Rhynsdorp GWS (Bulshoek Dam)
10	Breede River GWS (Brandvlei & Kwaggaskloof Dams)	39	Keisies River GWS (Pietersfontein Dam)	87	Palmiet River GWS (Rockview&Kogelberg Dams)
11	Buffels River GWS (Floriskraal Dam)	42	Kingna River GWS (Poortjieskloof Dam)	6	Riversonderend - Berg River GWS
12	Buffelsjags River GWS (Buffelsjags Dam)	44	Konings River GWS (Klipberg Dam)	92	Roodefontein Dam
15	Cordiers River GWS (Oukloof Dam)	45	KorenteVette River GWS (Korente-Vette Dam)	96	Sandrift River GWS (RoodeElsberg&Lakenvallei Dams)
23	Duivenhoks River GWS (Duivenhoks Dam)	52	Leeu River GWS (LeeuGamka Dam)	102	Tierkloof Dam
24	Elands River GWS (Elandskloof Dam)	54	Lower Berg River GWS (Voelvlei&Misverstand Dams)	106	Valsch River GWS (Ben Etive Dam)

25	Gamka River GWS (Beaufort West Dam)	69	Mosselbay GWS (Wolwedans dam)	19	Verkeerdevlei Dam
26	Gamka River GWS (Gamkapoort Dam)	81	Olifants River (Stompdrift & Kamanassie Dams)		
32	Goukou River GWS	83	Olifants River GWS (Clanwilliam dam)		

Figure 4.10: Asset criticality grading proportions for the Cluster

Table 4.10 and Figure 4.11 show the CRCs of the Cluster's asset components per criticality grading and per asset facility category. Asset components that are of moderate, high and very high criticality (representing about 81% of all the Cluster's asset components, as shown in Table 4.9 and Figures 4.9 and 4.10) have a total CRC of about R43.636 billion, with main contributions coming from:

- dams related assets (representing about 87% of all dams related asset components, as shown in Table 4.9 and Figure 4.9) with a total CRC of R22 673 billion;
- All tunnels related assets (as shown in Table 4.9 and Figure 4.9) with a total CRC of R10. 015 billion; and
- canals related assets (representing about 97% of all canals related asset components, as shown in Table 4.9 and Figure 4.9), with a total CRC of R7.47 billion.

On the other hand, asset components that are of low and very low criticality (representing about 19% of all the Cluster's asset components, as shown in Table 4.9 and Figure 4.9) have a total CRC of about R7.832 billion, with the main contributions coming from:

- dams related assets (representing about 13% of all dams related asset components, as shown in Table 4.9 and Figure 4.9) with a total CRC of R5.577 billion;
- measuring facilities assets (representing about 41% of all measuring facilities related asset components, as shown in Table 4.9 and Figure 4.9) with a total CRC of R1.741 billion;

Table 4.10: CRC per Criticality grading and per asset facility category

Asset Facility Category	Criticality Grading vs CRC (R Million)					Total	*% of Total CRC*
	1-Very Low	2-Low	3-Moderate	4-High	5-Very High		
Borehole			3.06			**3.06**	*0.01*
Buildings	42.51	148.74	276.33	50.73		**518.32**	*1.01*
Canals	32.09	129.61	7 293.98	176.31		**7 631.99**	*14.83*
Dams	77.25	5 499.32	3 339.87	13 807.08	5 526.29	**28 249.81**	*54.89*
Measuring facilities	288.32	1 453.55	313.49	648.29		**2 703.65**	*5.25*
Pipelines	2.25	45.08	663.85	120.86	604.45	**1 436.48**	*2.79*
Power supply		1.44	0.70			**2.14**	*0.00*
Pump stations		30.64	251.41	273.83	100.53	**656.41**	*1.28*
Reservoirs		6.30	15.36		114.03	**135.69**	*0.26*
Roads	43.73	22.85	13.42	21.83		**101.83**	*0.20*
Telemetry		1.37		5.04		**6.40**	*0.01*
Tunnels			0.54	1 742.67	8 272.09	**10 015.30**	*19.46*

Asset Facility Category	Criticality Grading vs CRC (R Million)					Total	% of Total CRC
	1-Very Low	2-Low	3-Moderate	4-High	5-Very High		
Water Treatment	0.38	6.93				**7.31**	*0.01*
Total	**486.53**	**7 345.83**	**12 172.01**	**16 846.64**	**14 617.39**	**51 468.40**	***100.00***
% of Total CRC	*0.95*	*14.27*	*23.65*	*32.73*	*28.40*	***100.00***	

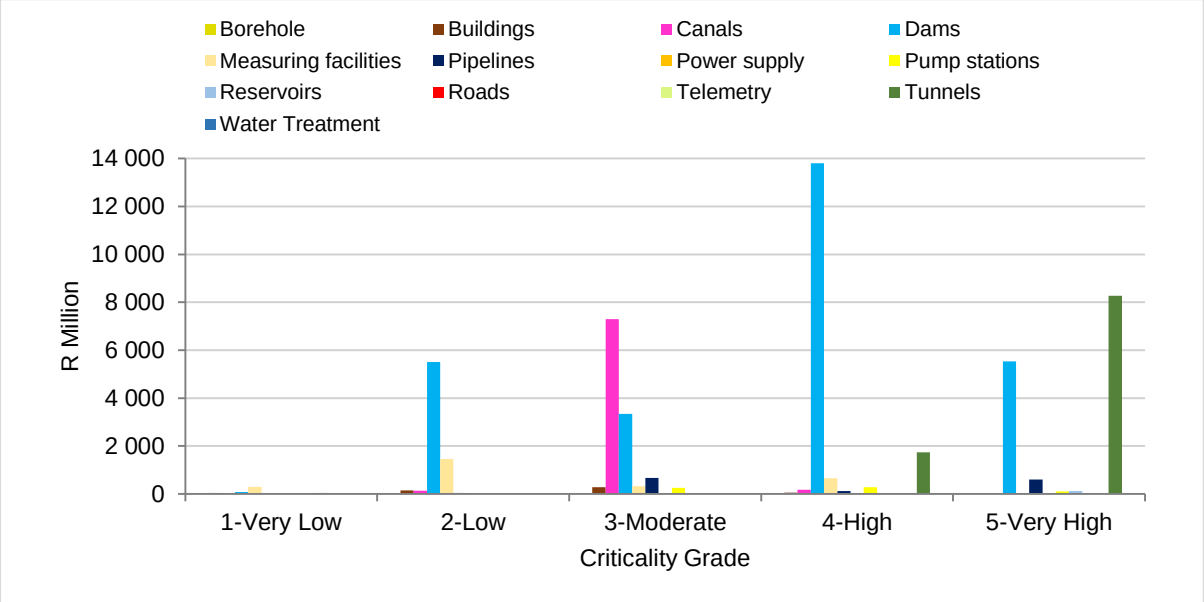


Figure 4.11: CRC per Criticality grading and per asset facility category

4.2.4 Asset Utilization

Assets are graded in terms of utilisation according to the criteria listed in Table 4.11.

Table 4.11: Asset utilisation grading criteria

Grade	Utilisation Description
0	Not in use
1	Strategic redundancy
2	Under-utilised
3	Moderate use
4	Approaching design capacity
5	Exceeding capacity/stressed

Table 4.12 and Figure 4.12 show the proportions of the Cluster's infrastructure asset components per utilisation grade and per asset facility category. Appendix E, Table E.4, an expanded version of Table 4.12, shows the number of asset components in each utilisation grade. For this Cluster:

- About 3.8% of the Cluster's infrastructure asset components are under-utilised. These

include: about 82% of roads and about 33% of reservoirs related asset components. The reasons for the under-utilisation need to be assessed and consideration made for decommissioning and disposal, where necessary.

- About 81% of the Cluster's infrastructure asset components are 'approaching design capacity' in utilisation; which means that these asset components require continual monitoring and planning to avoid exceeding design capacity.
- About 0.4% of the Cluster's infrastructure asset components are exceeding design capacity. These include: about 6% of pipelines; and 0.07% of pump stations related asset components. These asset components need to be upgraded immediately to avoid stress related failures, and to ensure the Scheme meets the required level of service.

Table 4.12: Asset component Utilisation grading proportions per asset facility category

Asset Facility Category	Utilization Grading					Total
	1-Strategic redundancy	2-Under-utilised	3-Moderate use	4-Approaching design capacity	5-Exceeding capacity / stressed	
Borehole	-	-	50.00%	50.00%	-	**100.00%**
Buildings	-	4.21%	14.37%	81.41%	-	**100.00%**
Canals	-	1.00%	12.82%	86.19%	-	**100.00%**
Dams	0.26%	4.53%	11.63%	83.51%	0.07%	**100.00%**
Measuring facilities	-	0.68%	9.76%	89.57%	-	**100.00%**
Pipelines	-	-	35.62%	64.38%	-	**100.00%**
Power supply	-	-	11.11%	88.89%	-	**100.00%**
Pump stations	-	0.70%	34.74%	58.22%	6.34%	**100.00%**
Reservoirs	-	33.33%	4.17%	62.50%	-	**100.00%**
Roads	-	81.91%	13.83%	4.26%	-	**100.00%**
Telemetry	-	-	36.36%	63.64%	-	**100.00%**
Tunnels	-	-	41.90%	58.10%	-	**100.00%**
Water Treatment	-	-	18.18%	81.82%	-	**100.00%**
All Cluster asset components	*0.10%*	*3.84%*	*14.60%*	*81.04%*	*0.42%*	*100.00%*

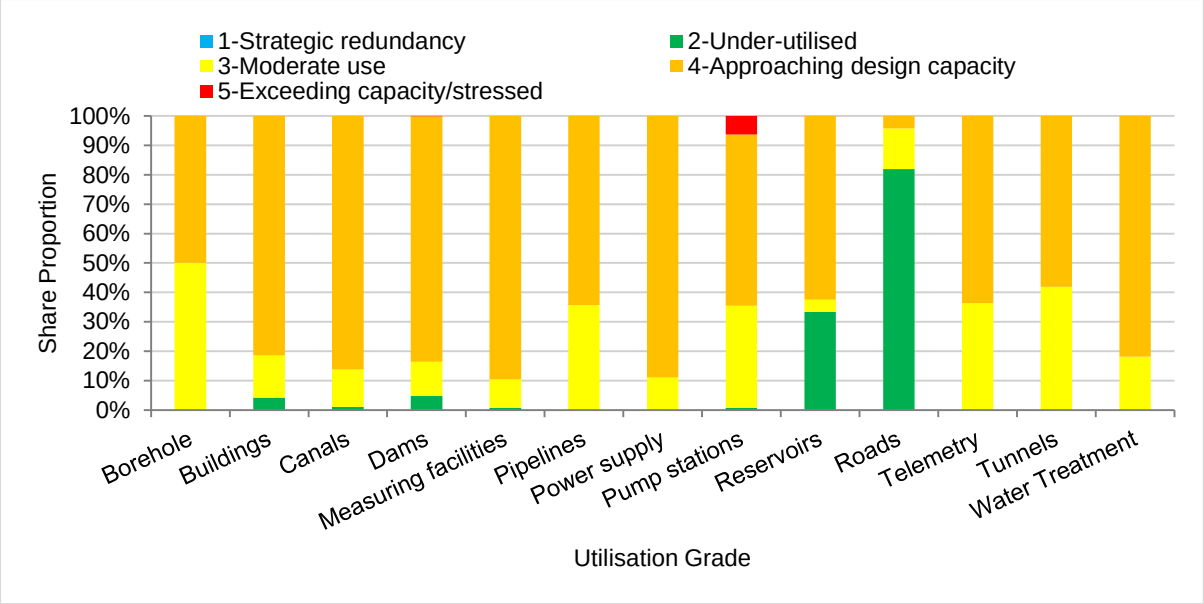
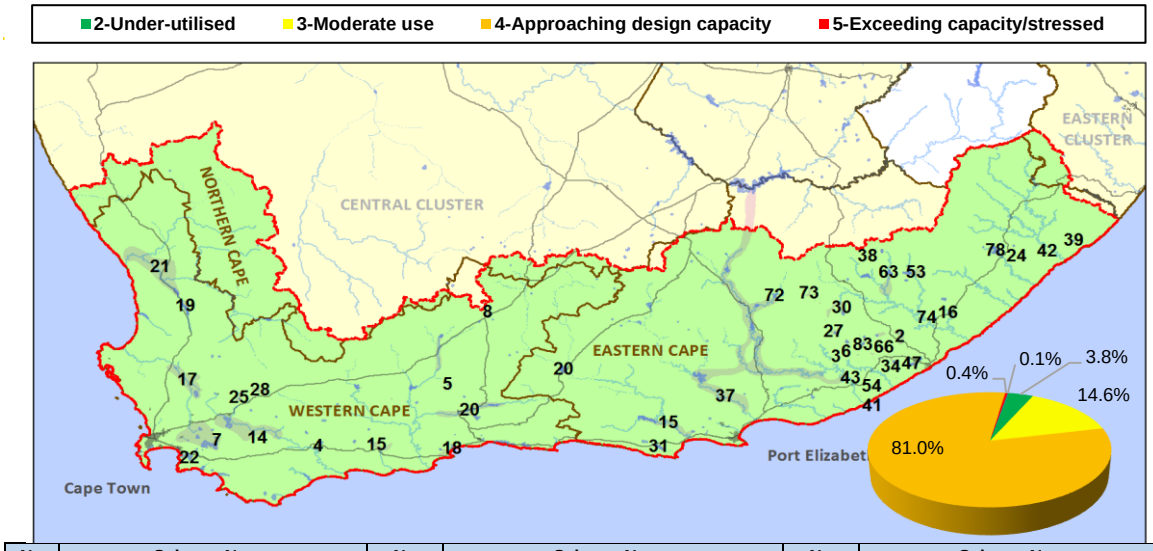


Figure 4.12: Asset component Utilisation grading proportions per asset facility category

Figure 4.10 presents the overall utilisation gradings of the Cluster's asset components, in line with Table 4.9.



No	Scheme Name	No	Scheme Name	No	Scheme Name
	Eastern Cape:				
1	Amabele GWS (Amatola)	46	Kromme River (Impofu Dam)	77	Noncampa
2	Amatola (Wriggleswade Dam)	47	Kubusi River (Gubu Dam)	78	Nqadu - TS*
3	Balura GWS (Amatola)	48	Kuzitungu	79	Nqwelo GWS (Amatola)
4	Groot River (Beervlei Dam)	49	Kwabhaca (Ntenetyane Dam)	80	Nzikizini GWS (Amatola)
5	Bekruipkop - Ciskei	50	Laing Dam	84	Orange - Fish GWS
7	Binfield Park Dam	51	Lanti	85	Outspan Dam
8	Blue Crane Dam	53	Libode (Mhlanga Dam)	86	Oxkraal - Ciskei
13	Bushmanskrantz Dam	55	Lower Sundays Scheme	88	Pleasant View Dam
14	Gxulu (Corana Dam)	56	Macubeni Dam	89	Qamata (Lubisi Dam)
16	Dabi Dam	57	Magwa - TS*	90	Qibira
17	Debe Dam	58	Maipase - Ciskei	91	Redhill
18	Dimbaza - Ciskei	59	Maitland - Ciskei	93	Rooikrantz Dam
20	Donnybrook 1	60	Majola - TS*	94	Roxeni GWS (Amatola)
21	Donnybrook 2	61	Maluti (Belfort Dam)	95	Rura GWS (Amatola)
22	Doorn River (Doorn River Dam)	62	Mankazana GWS (Amatola)	97	Sheshegu Dam
27	Gamtoos River (Kouga and Loerie Dams)	63	Masela 1	98	Shiloh - CS*
28	Gcuwa Weir	64	Masela 2	99	Sinqumeni GWS (Amatola)
29	Geluk GS	65	Mdantsane 1	100	Tarka River (Kommandodrift Dam)
30	Glenbrok	66	Mdantsane 2	101	Tendergate - CS*
31	Lower Fish Scheme	67	Mhlahlane (Mabaleni Dam)	103	Toleni (Toleni Dam)
33	Gwaba	68	Midfort	104	Tsojana Dam
34	Gxethu GWS (Amatola)	70	Mount Coke	105	Tyutyu
36	Jan Tshatshu - Ciskei	71	Msengeni	107	Woburn 2
37	Kamastone	72	Umtata Dam	108	Woburn 3
38	Kat River (Kat River Dam)	73	Nahoon River (Nahoon Dam)	109	Xilinxa Dam
40	Keiskammahoek (Cata Dam)	74	Ncora (Ncora Dam)	110	Xonxa Dam
41	Keiskammahoek (Mnyameni Dam)	75	Tyhefu (Ndlambe Dam)	111	Zanyokwe (Sandile Dam)
43	Klipplaat River (Waterdown Dam)	76	Ngwekazi		
	Western Cape:				
9	Brand River GWS (Miertjieskraal Dam)	35	Hartenbos River GWS (Hartbeeskuil Dam)	82	Olifants River Van Rhynsdorp GWS (Bulshoek Dam)
10	Breede River GWS (Brandvlei & Kwaggaskloof Dams)	39	Keisies River GWS (Pietersfontein Dam)	87	Palmiet River GWS (Rockview&Kogelberg Dams)
11	Buffels River GWS (Floriskraal Dam)	42	Kingna River GWS (Poortjieskloof Dam)	6	Riversonderend - Berg River GWS
12	Buffelsjags River GWS (Buffelsjags Dam)	44	Konings River GWS (Klipberg Dam)	92	Roodefontein Dam
15	Cordiers River GWS (Oukloof Dam)	45	KorenteVette River GWS (Korente-Vette Dam)	96	Sandrift River GWS (RoodeElsberg&Lakenvallei Dams)
23	Duivenhoks River GWS (Duivenhoks Dam)	52	Leeu River GWS (LeeuGamka Dam)	102	Tierkloof Dam
24	Elands River GWS (Elandskloof Dam)	54	Lower Berg River GWS (Voelvlei&Misverstand Dams)	106	Valsch River GWS (Ben Etive Dam)
25	Gamka River GWS (Beaufort West Dam)	69	Mosselbay GWS (Wolwedans dam)	19	Verkeerdevlei Dam
26	Gamka River GWS (Gamkapoort Dam)	81	Olifants River (Stompdrift & Kamanassie Dams)		
32	Goukou River GWS	83	Olifants River GWS (Clanwilliam dam)		

Figure 4.13: Asset utilisation grading proportions for the Cluster

Table 4.13 and Figure 4.14 show the CRCs of the Cluster's infrastructure asset components per utilisation grading and per asset facility category.

Under-utilised asset components (representing about 3.8% of all the Cluster's infrastructure asset components, as shown in Table 4.12 and Figure 4.12) have a total CRC of R0.784 billion, with the main contribution coming from:

- Dams related assets components (representing about 5% of all dams-related asset components, as shown in Table 4.12 and Figure 4.12), with a total CRC of about R0.615 billion.

Asset components that are approaching design capacity (representing 81% of all the Cluster's asset components) have a total CRC of about R35.288 billion, with the main contributions coming from:

- dams related assets (representing about 83% of all dams-related asset components, as shown in Table 4.12 and Figure 4.12), with a total CRC of R21.270 billion;
- canal related assets (representing about 86% of all canals-related asset components, as shown in Table 4.12 and Figure 4.12), with a total CRC of R7.080 billion; and
- tunnels related assets (representing about 58% of all pipelines-related asset components, as shown in Table 4.12 and Figure 4.12), with a total CRC of R3.816 billion.

Asset components that are stressed (exceeding design capacity on utilisation) (representing 0.4% of all the Cluster's infrastructure asset components, as shown in Table 4.12 and Figure 4.12) have a total CRC of about R0.008 billion, with the contributions coming from:

- pump stations related assets (representing 35% of all pump stations-related asset components, as shown in Table 4.12 and Figure 4.12), with a total CRC of R0.00817 billion; and
- dams related assets (representing about 4% of all dams-related asset components, as shown in Table 4.12 and Figure 4.12), with a total CRC of R0.005 billion.

Table 4.13: CRC per Utilization grading and per asset facility category

Asset Facility Category	Utilisation Grading vs CRC (R Million)					Total	*% of Total CRC*
	1-Strategic redundancy	2-Under-utilised	3-Moderate use	4-Approaching design capacity	5-Exceeding capacity / stressed		
Borehole			1.75	1.31		**3.06**	*0.01*
Buildings		11.12	125.48	381.72		**518.32**	*1.01*
Canals		75.84	476.01	7 080.14		**7 631.99**	*14.83*
Dams	4.48	615.09	6 359.49	21 270.69	0.05	**28 249.81**	*54.89*
Measuring facilities		16.66	558.99	2 128.00		**2 703.65**	*5.25*
Pipelines			1 195.73	240.76		**1 436.48**	*2.79*
Power supply			0.56	1.58		**2.14**	*0.00*
Pump stations		0.98	410.24	237.02	8.17	**656.41**	*1.28*
Reservoirs		22.72	0.12	112.84		**135.69**	*0.26*
Roads		42.14	48.99	10.71		**101.83**	*0.20*
Telemetry			4.05	2.35		**6.40**	*0.01*
Tunnels			6 199.63	3 815.67		**10 015.30**	*19.46*
Water Treatment			1.57	5.74		**7.31**	*0.01*
Total	**4.48**	**784.56**	**15 382.59**	**35 288.54**	**8.23**	51 468.40	***100.00***
% of Total CRC	*0.01*	*1.52*	*29.89*	*68.56*	*0.02*	***100.00***	

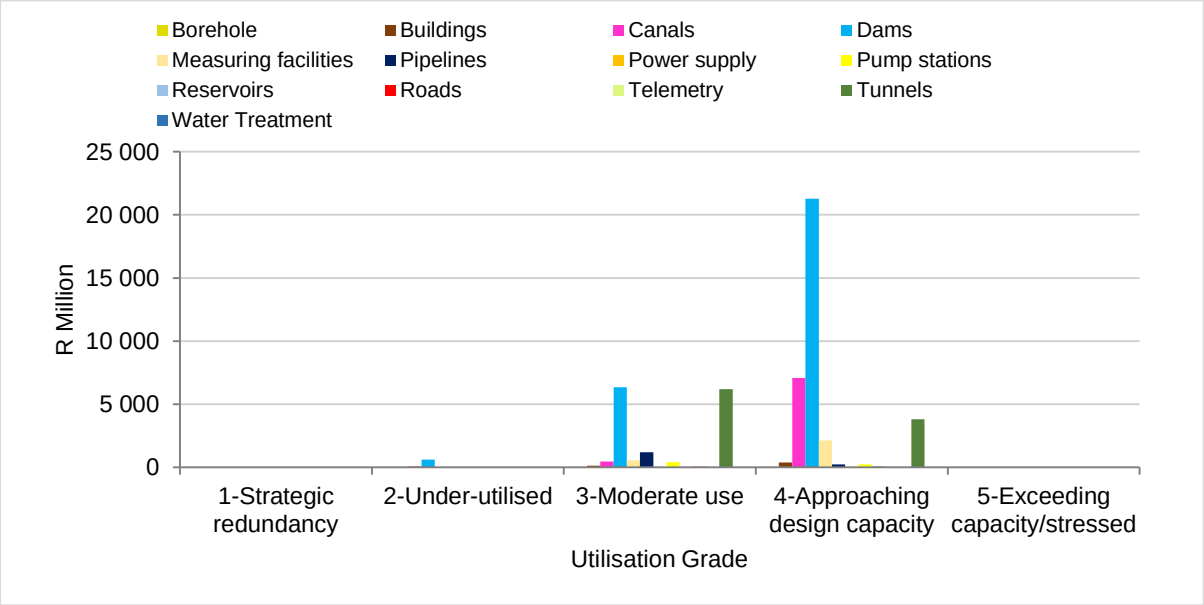


Figure 4.14: CRC per Utilization grading and per asset facility category

4.3 Risk Management

4.3.1 Risk Management Process

In this AMP, 'risk' refers to the possibility that an undesired outcome disrupts the service offered by the Cluster, resulting in the Cluster failing to meet its set levels of service. Risk management is, thus, an indispensable part of infrastructure Asset Management Planning and Implementation. Typically, the risk management process includes the following key steps:

- Identification of risk events and their impacts;
- Analysing the risks (identification of the risk drivers; determining their likelihoods; and calculating their expected losses);
- Prioritizing the risks, so that one can take appropriate action starting with the most devastating risks;
- Resolving the risks through taking some actions, e.g. avoiding, transferring or mitigating the risk; or redundancy measures; and
- Continual monitoring of risk resolution action plans, termination of successful action plans, identification of new risks that, and initiation of new risk resolution action plans.

Risk (expected loss) is calculated by determining the product of the likelihood of the risk and the total amount of loss (impact) when the risk occurs:

Expected Loss (Risk) = Risk Likelihood x Total Loss (Impact)

As indicated in Section 4.2.3 of this AMP, impact is related to criticality. For this Cluster, however, risk likelihood was not captured in the Asset Register (see Appendix A) used in the development of this AMP. Hence, an in-depth risk analysis could not be conducted. It is, thus, recommended that the DWS captures risk likelihood in its infrastructure asset register so that the next update of this AMP can address this short-coming.

4.3.2 The Scheme's Risks and Resolution Actions

Whilst cognisant of the presence of non-asset related risks (such as understaffing, vandalism, theft, etc.), this Cluster AMP focuses mainly on infrastructure asset-related risks. Table 4.13 shows some of the Cluster's key asset-related risks and associated risk resolution actions (aimed at reducing the risk likelihood) recommended in this AMP:

Table 4.14: The Cluster's asset risks and recommended resolution actions

No.	Asset Risk	Status for the Cluster	Recommended Risk Resolution Action
1	*Condition risk:* Failure by the asset to deliver the required service due to deteriorated physical condition.	About 27% of the Cluster's infrastructure asset components (with a total CRC of about R3.118 billion) have deteriorated to poor and very poor conditions. Refer to Section 4.2.2.	Implement renewal of the asset components to ensure they continue delivering the required service. Refer to Section 4.4.2 for the recommended renewal strategies per asset component.

No.	Asset Risk	Status for the Cluster	Recommended Risk Resolution Action
		About 73% of the Cluster's asset components (with a total CRC of about R48.350 billion) are in fair, good and very good conditions. Refer to Section 4.2.2.	Conduct appropriate maintenance to prevent the asset components from deteriorating to poor and very poor condition. Refer to Section 4.4.1 for the recommended maintenance strategies per asset component.
2	*Capacity risk:* Failure by the asset to deliver the required service as a result of it exceeding its design capacity/stressed.	About 0.4% of the Cluster's asset components (with a total CRC of about R0.008 billion) are stressed (exceeding design capacity on utilisation). About 81% of the Cluster's asset components (with a total CRC of about R35.288 billion) are approaching design capacity in utilisation. Refer to Section 4.2.4.	Consider and implement appropriate upgrades and/or new capital investments to avoid stress related failures, and to ensure the Cluster meets the required levels of service. Refer to Section 4.4.3.
3	*Not in use / under-utilisation risk:* Misallocation of resources (e.g. financial, human resources, material, etc.).	About 4% of the Cluster's asset components (with a total CRC of R0.784 billion) are under-utilised. Refer to Section 4.2.4.	Assess the reasons for non/under-utilisation and consider asset decommissioning and disposal of.

For generic risks typically associated with the different asset facility categories, refer to Appendix F.

4.4 Asset Life Cycle Works and Strategies

The key stages of an asset life cycle include: planning, design, procurement, construction, commissioning, operation, maintenance, renewal, upgrading and disposal. Thus, asset life cycle management involves decision making, planning and control over acquisition, operation, maintenance, renewal, upgrading, safeguarding and disposal of an asset to maximise its service delivery potential and benefits, and to minimise its related risks and costs over its entire life cycle (i.e. "cradle to the grave").

In order for the Cluster to meet the levels of service agreed with its water users (see Section 2) and the projected future raw water demand (see Sections 3), the Cluster needs to accordingly carry out the following asset life cycle management activities and works:

- Operations and Maintenance;
- Renewals;

- Upgrades and new capital investments; and
- Disposals.

The associated expenditure requirements for each of the abovementioned activities are outlined in the Section 5 of this AMP.

Noteworthy is that the quality and usefulness of an AMP is highly dependent on the completeness and accuracy of the asset register used in the development of the AMP. Accordingly, the abovementioned asset life cycle management activities and works recommended for the Cluster in this AMP are highly dependent on the asset component condition, criticality and utilisation gradings captured in the asset register used in the development of this AMP. As such, execution of the abovementioned asset life cycle management activities and works recommended for the Cluster (as detailed in the following subsections) need to be adapted in line with the realities on the ground. Refer to Section 6 regarding some recommendations on how to improve on the current NWRI immovable asset register.

Asset component maintenance and renewals works in this AMP have been prioritised using the criteria shown in Table 4.15. For example, renewal works priorities were set as follows: VH-NW (top priority); VH-VP; VH-P; H-NW; H-VP; H-P; M-NW; M-VP; and M-P, making sure that the asset components have not been marked for disposal.

Table 4.15: Asset criticality versus condition grading

Criticality Grade	**Condition Grade**					
	For Maintenance			**For Renewals**		
	5 Very Good (VG)	4 Good (G)	3 Fair (F)	2 Poor (P)	1 Very Poor (VP)	0 Not Working (NW)
1 Very Low (VL)	VL-VG	VL-G	VL-F	VL-P	VL-VP	VL-NW
2 Low (L)	L-VG	L-G	L-F	L-P	L-VP	L-NW
3 Moderate (M)	M-VG	M-G	M-F	M-P	M-VP	M-NW
4 High (H)	H-VG	H-G	H-F	H-P	H-VP	H-NW
5 Very High (VH)	VH-VG	VH-G	VH-F	VH-P	VH-VP	VH-NW

4.4.1 Operations and Maintenance (O&M)

Operations

Operations includes activities associated with the delivery of service (raw water supply) to the customers (water users) through the utilisation of the Cluster's immovable assets, which consume resources such as manpower, energy, chemicals and materials. Operations require two key resources: direct and indirect manpower and utilities (e.g. electricity, fuel and chemicals).

Operation of the Cluster's immovable assets needs to be done in line with the relevant O&M Manuals and Operating Rules.

Maintenance

Maintenance entails all actions necessary for retaining an asset as near as possible to its desired functional condition with normal wear and tear (achieving its expected useful life), but excluding renewal. Maintenance requires three key resources: direct and indirect labour/manpower; plant (movable assets, such as vehicles) and materials.

For those schemes that are not being operated and maintained by the DWS, it is crucial that the DWS makes regular inspections to be sure that the Scheme's assets are adequately maintained and renewed.

Asset maintenance works for Cluster's infrastructure assets are prioritized in the scheme AMPs according to asset component criticality and condition grading, as indicated in Table 4.15. The Cluster has about 73% of its infrastructure asset components in fair, good and very good conditions, as shown in Table 4.4 and Figures 4.5. These asset components require appropriate significant/improved maintenance to preventative and normal maintenance to prevent them from deteriorating to poor and very poor condition.

Figure 4.15 shows the proportions of these infrastructure asset components (in fair, good and very good conditions) per criticality-condition grading for the Cluster. Appendix E, Table E.5A shows the data table used to generate Figure 4.15.

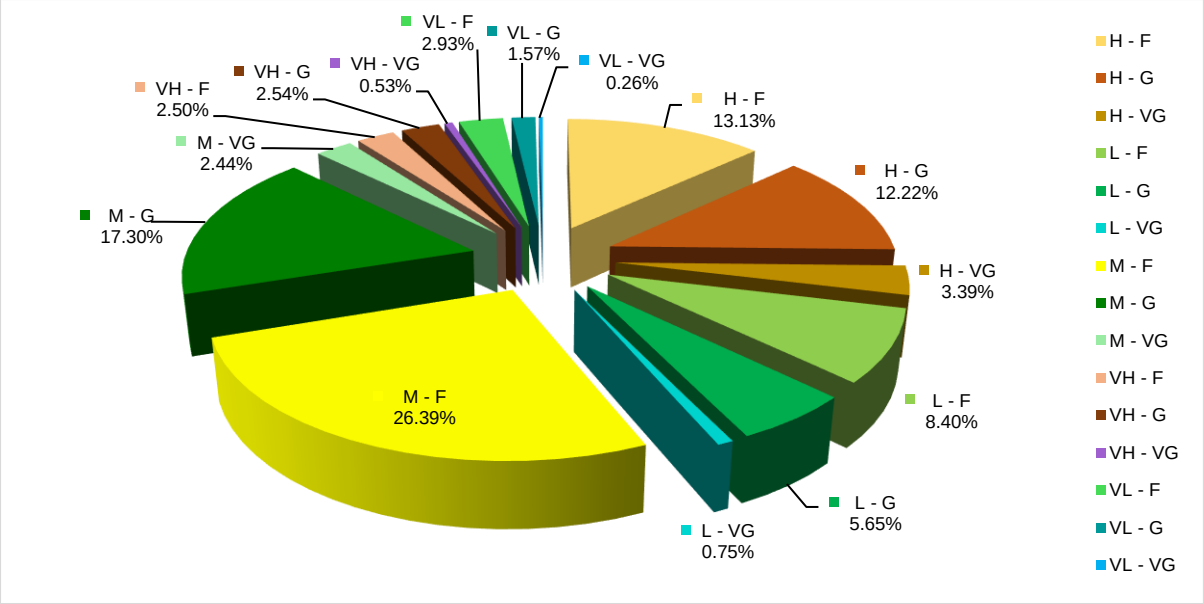


Figure 4.15: Asset component proportions per Criticality-Condition grading (maintenance)

The approximately 73% of the Cluster's infrastructure asset components (see Table 4.4 and Figures 4.5 and 4.15) that are in fair, good and very good conditions have a total CRC of about R48.350 billion, as shown in Table 4.5 and Figure 4.16 (which shows the split of the total CRC per criticality-condition grading). Appendix E, Table E.5B shows the data table used to generate Figure 4.16.

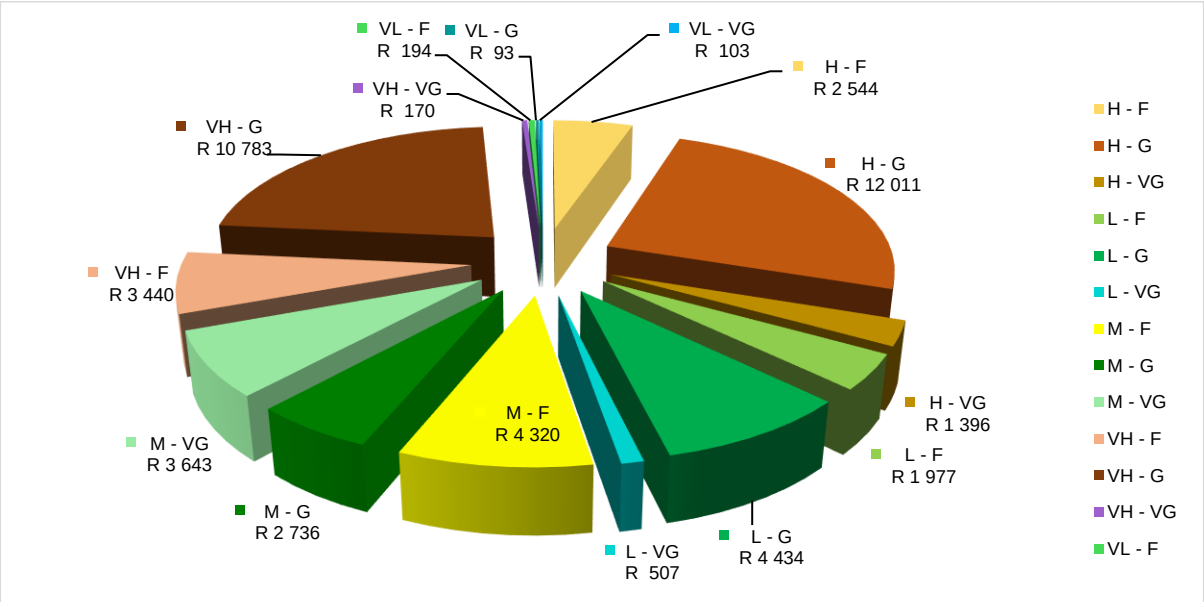


Figure 4.16: CRC (R million) per asset component criticality-condition grading (maintenance)

Appendix I, Table I.1 shows the maintenance strategies per asset component condition grading used in this AMP as well as in the individual scheme AMPs. For instance, asset components that are in very good condition require preventative and normal maintenance,

whilst those that are in fair condition require significant/improved maintenance.

Table 4.16 summarises the Cluster's required maintenance works (number of infrastructure asset components per maintenance strategy and per asset facility category) for the first projected financial year.

Table 4.16: Maintenance works (asset components per maintenance strategy per asset facility category)

Asset Facility Category	Maintenance Strategy (No. of Asset Components)			Total
	Significant / improved	Target condition	Preventative and Normal	
Borehole		2		**2**
Buildings	375	224	9	**608**
Canals	837	400	12	**1 249**
Dams	995	918	91	**2 004**
Measuring facilities	260	172	24	**456**
Pipelines	92	11	31	**134**
Power supply	6	1		**7**
Pump stations	50	165	176	**391**
Reservoirs	20	4		**24**
Roads	26	38	17	**81**
Telemetry	2	8		**10**
Tunnels	41	49	14	**104**
Water Treatment	7	4		**11**
Total	**2 711**	**1 996**	**374**	**5 081**

Appendix I, Tables I.2 and I.3 show a split of the required maintenance works for the Cluster (shown in Table 4.16) between scheme specific and non-scheme specific asset components, respectively.

Appendix I, Table I.2 of the individual scheme AMPs present a prioritised list of all the infrastructure asset components requiring maintenance (the order of which would need to be followed when executing the works) and maintenance strategies assigned to them. The identified maintenance strategies for the Cluster's infrastructure asset components need to be implemented in line with the DWS Maintenance Policy, the DWS Maintenance Strategy, as well as the Operating and Maintenance Manual for the individual schemes.

Section 5.4.1 of this AMP shows the associated projected O&M costs for this Cluster.

4.4.2 Renewals

Asset renewals entails works to refurbish (electrical or mechanical), rehabilitate (civil) or replace an existing asset with another asset of equivalent capacity or performance capability.

The Cluster has about 27% of its infrastructure asset components in poor and very poor conditions, as shown in Table 4.4 and Figures 4.5. These asset components need to be renewed, failure of which poses a high risk to the delivery of services to its customers as well as its environment.

Figure 4.17 shows the proportions of these infrastructure asset components (in poor and very poor conditions) per criticality-condition grading for the Cluster. Appendix E, Table E.6A shows the data table used to generate Figure 4.17.

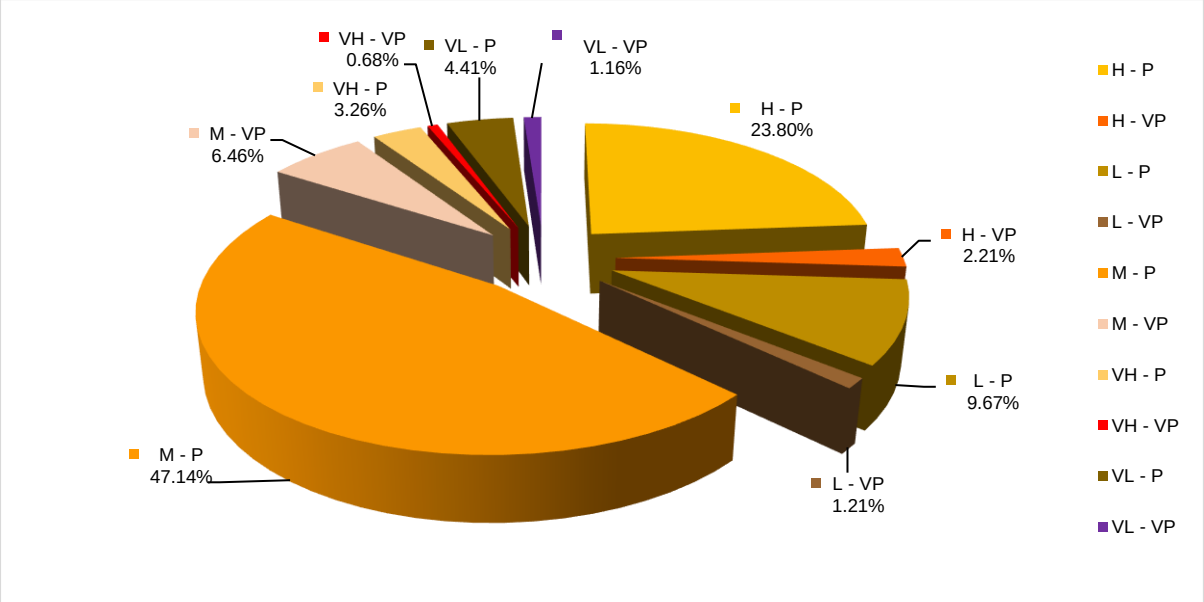


Figure 4.17: Asset component proportions per Criticality-Condition grading (renewals)

The approximately 27% of the Cluster's infrastructure asset components (see Table 4.4 and Figures 4.5 and 4.17) that are in poor and very poor conditions have a total CRC of about R3.118 billion, as shown in Table 4.5 and Figure 4.18 (which shows the split of the total CRC per criticality-condition grading). Appendix E, Table E.6B shows the data table used to generate Figure 4.18.

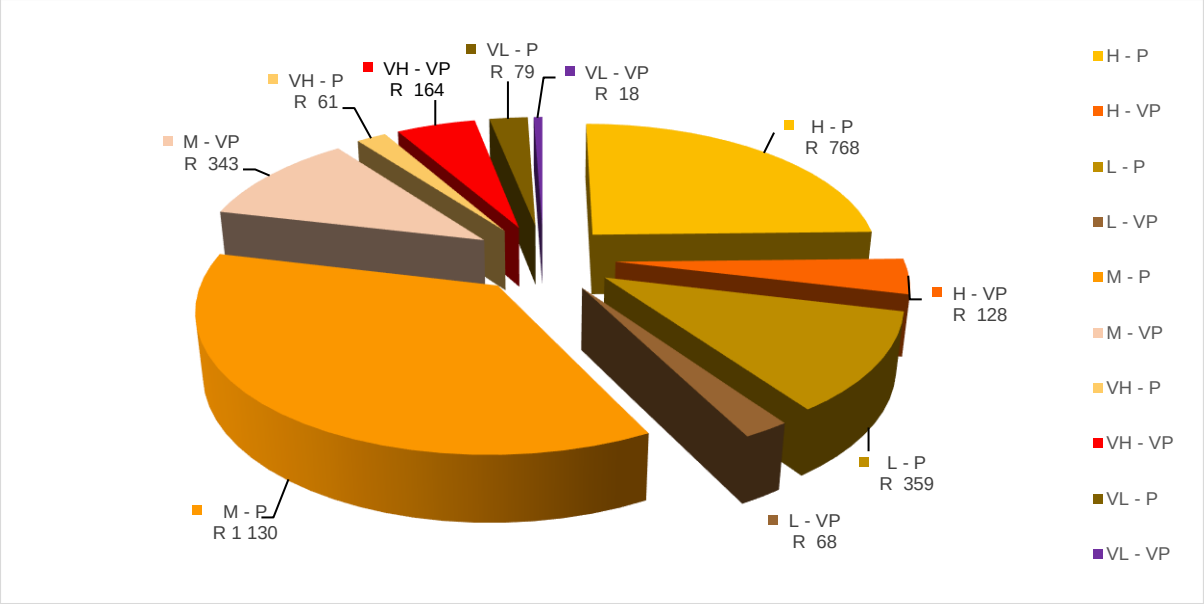


Figure 4.18: CRC (R million) per asset component criticality-condition grading (renewals)

Appendix J, Table J.1 summarises the renewal strategies per asset condition grading used in this AMP as well as in the individual scheme AMPs. Table 4.17 summarises the Cluster's required asset renewals works for the first projected financial year; it shows the number of asset components per renewals strategy per asset facility category.

Table 4.17: Renewals works (asset components per renewals strategy per asset facility category)

Asset Facility Category	Renewal strategy (No. of Asset Components)		Total
	Stop operating immediately and renew the asset component	Significantly renew the asset component	
Borehole	-	-	-
Buildings	29	158	187
Canals	59	192	251
Dams	32	610	642
Measuring facilities	12	552	564
Pipelines	13	72	85
Power supply	0	2	2
Pump stations	27	8	35
Reservoirs	-	-	-
Roads	1	11	12
Telemetry	1	-	1
Tunnels	-	1	1
Water Treatment	-	-	-
Total	**174**	**1 606**	**1 780**

Appendix J, Tables J.2 and J.3 show the required renewals works for the Cluster for the first projected year (shown in Table 4.17) split between scheme-specific and non-scheme-specific asset components, respectively.

Appendix J, Table J.4 present a prioritised list (the order of which would need to be followed when executing the works) of all the Cluster's asset components that are in poor and very poor conditions, per scheme and per asset facility category, and the associated renewal strategies assigned to them. To be noted is that such renewal works priorities are based solely on criticality and condition grading (as indicated in the Asset Register – see Appendix A) of the asset components. Before any renewal work can commence, it is imperative that a further analysis is conducted to ascertain the feasibility of the renewal work and any impact the renewal work might have on other asset components. For example, renewal work on canal excavation is likely to affect the associated canal lining.

Table 4.18 summarises the Cluster's required asset renewals works (total number of asset components requiring renewal per asset facility category) for each of the projected ten years.

Table 4.18: Renewals works (asset components per asset facility category)

Asset Facility Category	Renewal (No. of Asset Components) per Projected Financial Year									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Borehole	-	-	-	-	-	-	-	-	-	-
Buildings	187	-	-	367	-	4	-	-	-	-
Canals	251	-	213	355	-	70	52	56	157	13
Dams	642	-	59	316	115	346	-	8	268	74
Measuring facilities	564	33	-	-	15	223	24	33	-	-
Power Supply	2	-	3	-	-	-	-	4	-	-
Pump stations	35	-	14	18	9	26	3	16	17	9
Reservoirs	-	-	-	2	-	-	-	18	-	-
Roads and bridge	12	-	-	-	-	25	-	-	-	1
Steel Pipelines	85	-	48	16	9	-	19	-	2	16
Telemetry	1	-	-	-	-	-	-	2	4	-
Tunnels	1	-	-	8	-	-	-	17	-	-
Water Treatment	-	-	-	-	1	6	-	-	-	-
Total	**1 780**	**33**	**337**	**1 082**	**149**	**700**	**98**	**154**	**448**	**113**

Section 5.4.2 of this AMP shows the associated projected asset renewal costs for this Cluster.

4.4.3 Upgrades and New Capital

The Cluster's future raw water demand projection as well as asset utilisation grading determine the need for either increasing or decreasing the Cluster's asset extent, functional performance or capacity (done through asset upgrades or new capital developments).

An analysis of the asset utilisation grading (obtained from the Asset Register – see Appendix A and Section 4.2.4) per asset component revealed that about 0.4% of the Cluster's infrastructure asset components (with a total CRC of about R8.23 million) are stressed

(exceeding design capacity on utilisation). These are: dams and pump stations related asset components, as shown in Table 4.19. These asset components need to be upgraded to avoid stress related failures, and to ensure the Cluster meets the required level of service. However, before such upgrade works are executed, it is imperative that the utilisation gradings (captured in the Asset Register) of the affected asset components are first verified to confirm the necessity of the upgrades.

Table 4.19: Utilisation-based upgrade works (asset components exceeding capacity in utilisation)

Asset Facility Category	No. of Assets Exceeding capacity / stressed	CRC (Million)
Borehole		
Buildings		
Canals		
Dams	2	0.05
Measuring facilities		
Pipelines		
Power supply		
Pump stations	27	8.17
Reservoirs		
Roads		
Telemetry		
Tunnels		
Water Treatment		
Total	**29**	**8.23**

Appendix K, Table K.2 shows the required utilisation-based upgrade works for the Cluster (shown in Table 4.19) split between scheme-specific and non-scheme-specific infrastructure asset components.

Appendix K, Table K.3 shows a list of all the Cluster's infrastructure asset components per scheme and per asset facility category that are exceeding their design capacities (stressed), and, thus, require upgrading.

The 2016 reports on the Condition Assessment Audit for the irrigation infrastructure of 11 schemes [Buffeljags River GWS (Buffeljags Dam), Gamtoos River GWS (Kouga and Loerie Dams), Goukou River GWS, Korente Vette River GWS (Korente Vette Dam), Lanti, Lower Berg GWS (Voelvlei), Lower Sundays, Lower Fish, Ncora (Ncora Dam), Olifants River (Stompdrift & Kamanassie), and Olifants River Van Rhynsdorp (Bulshoek Dam)] in the Cluster identified some canal-related upgrade works with a total acquisition cost of about R1.835 billion; these have been considered in this AMP. For a summary of the required upgrades and new capitals works for the Cluster, refer to Appendix K, Table K.4.

Section 5.4.3 of this AMP shows the associated upgrades and new capital costs for the Cluster.

4.4.4 Impairments and disposals

Impairments

Asset impairment is the loss of future economic benefits or service potential of an asset over and above the systematic recognition of the loss of the asset's future economic benefits or service potential through depreciation. As a result, the carrying value of assets needs to be reduced where there is evidence that the value has become over-stated due to unexpected events or circumstances (depreciation caters for normal consumption of the assets, through normal wear and tear).

Impairment causes an acceleration of one or more of the following failure modes: condition, functional performance, utilisation, or obsolescence. As such, an asset may be impaired based on: condition (e.g. vandalism, theft, poor maintenance, etc.), functional performance (e.g. siltation of dams), utilisation (under-utilisation), or obsolescence (e.g. spare parts no longer available).

For the Cluster, some asset components (mainly dams related) were impaired as per the DWS Annual Review of Impairment and Useful Life - NWRIB Immoveable Assets 31 March 2016 report. Furthermore, the Cluster has some infrastructure asset components with zero asset carrying values (according to the Asset Register), which implies that they are either fully depreciated or fully impaired. In this AMP, these infrastructure asset components with zero asset carrying values are being treated as impairments. Altogether, the Cluster's impaired asset components (mainly dams, measuring facilities, buildings, and canals related) have a total CRC of about R1.4 billion, and are summarised per asset facility category in Table 4.20. The DWS needs to take further steps on these asset components to determine appropriate disposal plans for them.

Table 4.20: Impaired asset components per asset facility category

Asset Facility Category	No. of impaired asset components	CRC (R million)
Buildings	20	11.86
Borehole	-	-
Canals	11	285.18
Dams	208	1 016.00
Power Supply	-	-
Pump stations	1	2.59
Reservoirs	-	-

Asset Facility Category	No. of impaired asset components	CRC (R million)
WR: Roads and bridge	1	0.68
WR: Steel Pipelines	-	-
WR: Telemetry	-	-
WR: Tunnels	-	-
WR: Water Treatment	-	-
Measuring facilities	20	65.08
Total	**261**	**1 381.39**

Appendix L, Table L.1 shows a split of the impaired asset components for the Cluster (shown in Table 4.20) between scheme-specific and non-scheme-specific infrastructure asset components.

Appendix L, Table L.2 presents a list of all the Cluster's infrastructure asset components, per scheme and per asset facility category, that have zero asset carrying values, and are here considered to be impaired.

Disposals

Asset disposal entails termination of the DWS's control over the asset; and needs to be done in line with the DWS Disposal Strategy for Immovable Assets.

An analysis of the asset utilisation grading (obtained from the Asset Register – see Appendix A and Section 4.2.4) per asset component revealed that about 4% of the Cluster's infrastructure asset components (with a total CRC of about R785 million) are under-utilised. These are mainly dams, roads, buildings and canals related asset components, as shown in Table 4.21. Indeed, 45 out 111 schemes in the Cluster are currently inactive (refer to Table 1.3) and, thus, under-utilised. It is, thus, recommended that the DWS strongly assess the reasons for the under-utilisation and consideration be made for decommissioning and disposal, where necessary. Possible disposal of the Scheme's assets could be by transferring to the local community through the local municipality.

Table 4.21: Asset components that are under-utilised

Asset Facility Category	No. of Asset Components Under-Utilised	CRC (R million)
Buildings	34	11.12
WS: borehole		-
WR: Canals	15	75.84
WR: Dams	124	615.09
WR: Power Supply		-
WR: Pump stations	3	0.98

Asset Facility Category	No. of Asset Components Under-Utilised	CRC (R million)
WR: Reservoirs	8	22.72
WR: Roads and bridge	77	42.14
WR: Steel Pipelines		-
WR: Telemetry		0
WR: Tunnels		0
WR: Water Treatment		-
WS: Measuring facili	7	16.66
Total	**268**	**784.56**

Appendix L, Table L.3 shows the under-utilised asset components for the Cluster (shown in Table 4.21) split between scheme-specific and non-scheme-specific asset components.

Appendix L, Table L.4 presents a list of all the Cluster's asset components, per scheme and per asset facility category, that are under-utilised.

Based on previous assessments and the Asset Register (refer to Appendix A) used in the development of this AMP, the Cluster does not have any assets that are not in use and/or identified for disposal in the foreseeable future.

4.5 Summary

The Southern Operations Cluster has an immovable asset base consisting of: infrastructure assets (with a total of 6 984 asset components) and land (with a total of 1 329 asset components). The majority of the Cluster's asset components are dams, canals and land related asset components (about 33%, 18% and 16%, respectively).

The Cluster's immovable asset components have a total DRC and CRC of about R50.844 billion and about R55.630 billion, respectively. They can be grouped into two: infrastructure assets with a total DRC and CRC of about R46.683 billion and about R51.468 billion, respectively; and land with a total of about R4.162 billion for both DRC and CRC. The DRC/CRC ratio for infrastructure assets is about 91%, indicating that about 9% of the infrastructure asset base has been consumed so far.

For infrastructure assets, dams-related asset components have the highest CRC of about R28.250 billion, followed by tunnels, canals, measuring facilities, pipelines and pump stations related asset components with CRC of about: R10.015 billion, R7.632 billion, R2.704 billion, R1.436 billion, and R0.656 billion, respectively. A similar pattern is evident for DRC.

Key asset-related risks for the Cluster include: condition risk (failure by the asset to deliver the required service due to deteriorated physical condition); capacity risk (failure by the asset to deliver the required service as a result of it exceeding its design capacity/stressed); and not in use / under-utilisation risk (resulting in misallocation of resources, e.g. financial, human resources, material, etc.). To minimise these risks, and in order for the Cluster to meet its set levels of service and the projected future raw water demand, the following asset life cycle management activities are recommended for the Cluster in this AMP: appropriate and adequate maintenance and renewals (condition risk); upgrades and new capital investments (capacity risk); and disposals (not in use / under-utilisation risk).

The Cluster has about 73% of its infrastructure asset components (with a total CRC of about R48.350 billion) in fair, good and very good conditions; and about 27% (with a total CRC of about R3.118 billion) in poor and very poor conditions. Appropriate maintenance and renewal strategies, respectively, recommended and prioritised based on criticality and condition for these asset components in the individual scheme AMPs, have been summarised per asset facility category in this AMP.

Upgrade works are recommended for the Cluster's infrastructure asset components, about 0.4% and with a total CRC of about R8.3 million, which are stressed (exceeding design capacity on utilisation). These are mainly: dams and pump stations related asset components. Such upgrade works are aimed at avoiding stress related failures, and to ensure the Cluster meets the required level of service. However, before such upgrade works are executed, it is imperative that the utilisation gradings (captured in the Asset Register) of the affected asset components are first verified to confirm the necessity of the upgrades.

Furthermore, the 2016 reports on the Condition Assessment Audit for the Cluster's irrigation infrastructure (for 11 schemes) identified some canal-related upgrade works with a total acquisition cost of about R1.835 billion; these have been considered in this AMP.

The Cluster has some impaired asset components (mainly dams, measuring facilities, buildings, and canals related) with a total CRC of about R1.4 billion. The DWS needs to take further steps on these asset components to determine appropriate disposal plans for them.

Furthermore, about 4% of the Cluster's infrastructure asset components (with a total CRC of about R785 million) are under-utilised. These asset components, which are mainly dams, roads, buildings and canals related asset components, could be candidates for disposal. The reasons for the under-utilisation need to be assessed and consideration made for

decommissioning and disposal, where necessary.

Based on previous assessments and the Asset Register used in the development of this AMP, the Cluster does not have any assets that are not in use and/or identified for disposal in the foreseeable future.

Non-operational schemes???

Noteworthy is that the quality and usefulness of an AMP is highly dependent on the completeness and accuracy of the asset register used in the development of the AMP. Accordingly, the abovementioned asset life cycle management activities recommended for the Cluster in this AMP are highly dependent on the asset component condition, criticality and utilisation gradings captured in the asset register used in the development of this AMP. As such, execution of the abovementioned asset life cycle management activities and works recommended for the Cluster need to be adapted in line with the realities on the ground. Refer to Section 6 regarding some recommendations on how to improve on the current NWRI immovable asset register.

The next section presents a ten-year financial plan associated with the asset life cycle management activities discussed above.

5. ASSET LIFE CYCLE FINANCIAL PLAN

5.1 Overview

This section presents the Southern Cluster's ten-year projected optimal financial requirements that are necessary to fund the asset life cycle works identified in Section 4, and it answers the questions of 'when' and 'for how much' of those works. Asset life cycle works costs are discussed per asset facility category; a further zoom in is made on optimum revenue requirement, past and future potential renewal backlog, as well as infrastructure asset movement o0ver the ten-year period, all in alignment to Section 4.4.

5.2 Financial Projection Assumptions

Key assumptions underpinning financial projections in this AMP are:

- Growth Factors: Expenditure and/or Revenue were grown by:
  - *Inflation rate* of 6.8% in 2016/17, 6.2% in 2017/18, 5.9% in 2018/19, and 5.6% in 2019/20 as provided for in the South African National Treasury 2016/17 MTEF Technical Guidelines on budgeting. Thereafter, a four-year moving average rate was used; and
  - A *progressive factor* averaging 0.9% in 2016/17, 1.7% in 2017/18 and 2.4% in 2018/19 as projected in the 2016/17 South African National Treasury Budget Review. Thereafter, a three-year moving average rate was used.
- Growth Factor for PPE related values.
  - Average PPI of about 7.1% was used to adjust for PPE related monetary values.
- New capital costs are a function of growth in water demand beyond the existing raw water yield of the Cluster.
- Upgrade costs are a function of either growth in water demand beyond the existing raw water yield of the Cluster or of asset utilisation, or both.
- Renewal Capital Expenditure are a function of accumulated depreciation from the last date of renewal and a price adjustment equivalent to: the engineering professional fees; construction preliminary and generals (P&Gs); construction contingency reserves as well as the projected PPI in the particular year renewal work will be carried out.
- Once renewal work is determined, there will be at least one-year provision for planning and resource mobilization.
- Straight line depreciation method was used for the projections.
- The modelled optimal O&M costs per asset facility category, in this AMP, are proportions of the CRCs derived for the year 2015/16; where the following sources formed the basis for the splitting ratios:
  - Guidelines for Infrastructure Asset Management in Local Government 2006– 2009

(Department of Provincial and Local Government, 2006).

- Maintenance Accounting Framework for immovable assets under the custodianship of National and Provincial Department of Works (Department of Public Works, 2015).
- Monitoring and Evaluation Protocol for immovable assets under the custodianship of National and Provincial Department of Works (Department of Public Works, 2015).
- Operations and maintenance costs of rural water supply schemes in South Africa (Gibson, 2010).

Owing to the base on which the costs are estimated (CRCs, which also relied on cost of acquisition in the Asset register, which on its own is estimates, and owing to limited information on asset components to allow for market consultation, the reported figures are presumed to be on the conservative side.

5.3 Optimal Total Cost Requirement

5.3.1 Identified Optimal Total Cost Requirement

Table 5.1 presents the Cluster's modelled identified optimal total cost requirement, in light of asset life cycle works discussed in Section 4.4, per cost component (i.e., O&M (inclusive of direct and indirect labour costs); renewal works; upgrades and new capital; as well as asset disposal) for the 10-year period, where incurred. These costs are made up from scheme and non-scheme specific asset components. Non-scheme specific asset components are found under these categories: Hydrometry Western Cape, Mechanical Support, Mzimvubu Tsitsikama and Operations Breede/Gourtz.

- The Cluster's projected modelled identified optimal annual total cost requirements for the first three years (2016/17, 2017/18 and 2018/19) are about: R587.464 million; R1.447 billion; and R738.284 million, respectively.

  The projected sharp increase in total optimal cost in 2017/18 is attributed to a high renewal capital cost requirement of about R819.735 million and upgrade/new capital cost of R4.103 million.
- Table 5.2 and Figure 5.1 show the optimal annual total cost requirement per asset facility category; where dams, canals and measuring facilities related asset components are the main cost drivers.
- The cost requirement, per cost component, and per facility category (shown in Tables 5.1 and 5.2) are separated between scheme and non-scheme specific, and are also given per scheme, refer to Appendix H, Tables H.1A to H.7.

Table 5.1: Optimal total cost requirement per cost component

Cost component	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
O&M	587.464	623.142	661.141	699.194	743.221	788.230	835.930	886.420	940.590	997.634
Renewal	-	819.735	3.859	78.481	580.707	43.015	780.952	161.027	302.813	156.800
Upgrade & New	-	4.103	73.284	31.772	106.570	123.001	470.455	422.415	526.487	80.587
Disposal	-	-	-	-	-	-	-	-	-	-
Total	**587.464**	**1 446.981**	**738.284**	**809.448**	**1 430.498**	**954.246**	**2 087.338**	**1 469.862**	**1 769.890**	**1 235.020**

Table 5.2: Optimal total cost requirement per asset facility category

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	29.026	64.599	32.666	34.547	119.873	38.946	41.957	43.797	46.474	49.292
WR: Canals	139.688	524.357	230.491	248.312	639.778	310.428	1 016.392	706.687	760.717	400.269
WR: Dams	247.666	474.497	278.727	314.765	397.231	344.109	497.509	373.701	397.957	489.243
WR: Power Supply	0.143	0.230	0.161	0.752	0.181	0.192	0.204	0.216	0.488	0.243
WR: Pump stations	19.167	40.419	21.571	25.979	24.938	26.987	35.585	29.580	39.961	34.606
WR: Reservoirs	1.086	1.151	1.222	1.292	1.391	1.456	1.545	1.638	36.375	1.843
WR: Roads and bridge	3.035	5.983	3.416	3.613	3.840	4.073	8.425	4.580	4.860	5.155
WR: Steel Pipelines	15.801	64.749	17.783	23.261	57.659	47.586	22.484	99.789	25.300	27.965
WR: Telemetry	0.351	0.467	0.395	0.418	0.444	0.471	0.499	0.530	0.775	3.089
WR: Tunnels	50.445	54.302	56.772	60.040	82.616	67.685	71.781	76.117	317.895	85.666
WR: Water Treatment	0.251	0.266	0.282	0.298	0.317	0.820	2.047	0.378	0.401	0.425
WS: borehol	0.214	0.227	0.241	0.255	0.271	0.287	0.304	0.323	0.343	0.363
WS: Measuring facili	80.591	215.734	94.557	95.918	101.958	111.206	388.605	132.527	138.344	136.860
Total	**587.464**	**1 446.981**	**738.284**	**809.448**	**1 430.498**	**954.246**	**2 087.338**	**1 469.862**	**1 769.890**	**1 235.020**

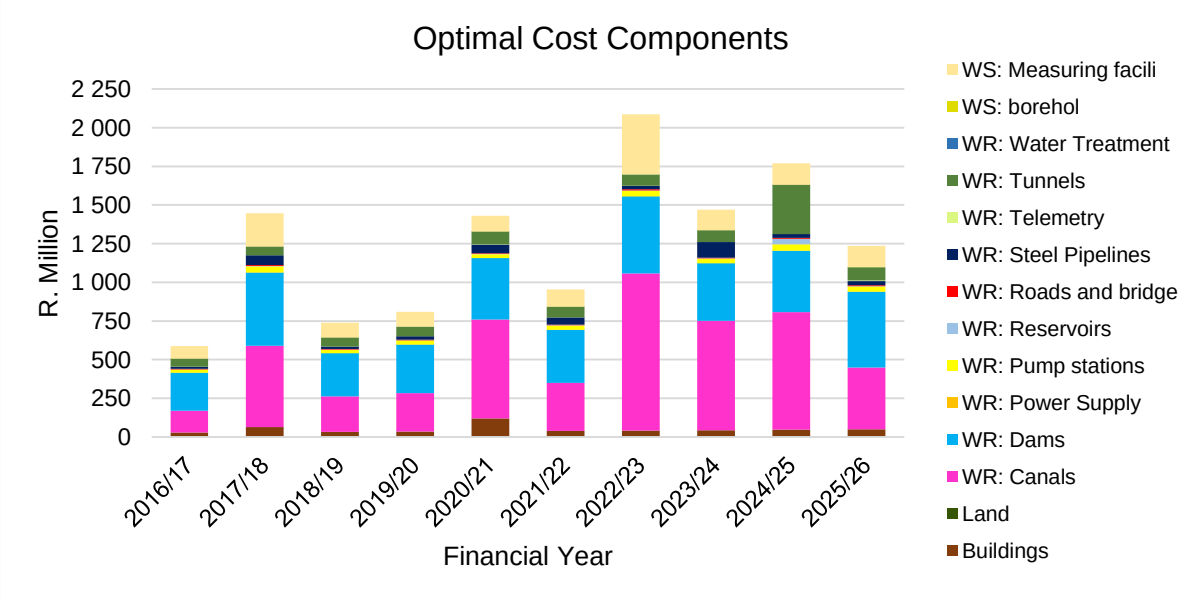


Figure 5.1: Optimal total cost requirement per asset facility category

The significant increases in the modelled identified optimal total cost requirement for the

financial years 2017/18 and 2022/23, evident in Figure 5.1, (emanating mainly from the modelled identified optimal renewal and upgrades and new capital cost requirements), compounded by the current economic and financial constraints facing the country, present some implementation challenges for the Cluster's modelled identified optimal total cost requirement. As such, for practical implementation purposes, the identified optimal cost requirements for the Cluster are adjusted as indicated in the following subsection.

5.3.2 Implementation Plan for Identified Optimal Cost requirements

Table 5.3 presents the Cluster's modelled adjusted optimal total cost requirement per cost component (i.e. O&M (inclusive of direct and indirect labour costs); renewal works; upgrades and new capital; as well as asset disposal) for the projected 10-year period, where incurred.

- The Cluster's projected modelled adjusted optimal total cost requirement for the first three years (2016/17, 2017/18 and 2018/19) are about: R587.464 million; R746.718 million; and R814.825 million, respectively, as presented in Table 5.3.
- Table 5.4 and Figure 5.2 show the projected modelled adjusted optimal total cost requirement per asset facility category; where dams, canals and measuring facilities related asset components are the main cost drivers.
- The cost requirement, per cost component, and per facility category (shown in Tables 5.3 and 5.4) are separated between scheme and non-scheme specific, and are also given per scheme, as shown in Appendix H, Tables H.1B to H.5.

Table 5.3: Modelled adjusted optimal total cost requirement per cost component

Cost Component	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
O&M	587.464	623.142	661.141	699.194	743.221	788.230	835.930	886.420	940.590	997.634
Renewal	-	122.961	141.983	145.264	218.992	255.967	386.704	414.988	532.614	602.736
Upgrade & New	-	0.615	11.700	18.622	35.167	66.834	161.983	282.765	495.503	603.496
Disposal	-	-	-	-	-	-	-	-	-	-
Total	**587.464**	**746.718**	**814.825**	**863.080**	**997.380**	**1 111.031**	**1 384.617**	**1 584.173**	**1 968.707**	**2 203.865**

Table 5.4: Modelled adjusted optimal total cost requirement per asset facility category

Asset Facility Category	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	29.026	35.861	38.498	40.024	54.000	61.654	62.636	60.176	61.724	61.757
WR: Canals	139.688	204.600	233.092	252.697	327.674	389.835	552.350	693.205	932.886	1 068.307
WR: Dams	247.666	294.476	315.261	332.079	359.766	383.647	426.790	444.719	469.613	512.753
WR: Power Supply	0.143	0.164	0.174	0.271	0.301	0.317	0.312	0.294	0.378	0.418
WR: Pump stations	19.167	23.344	25.036	26.541	27.801	29.251	31.933	33.377	38.030	41.660
WR: Reservoirs	1.086	1.151	1.222	1.292	1.376	1.460	1.549	1.641	12.132	17.778
WR: Roads and bridge	3.035	3.635	3.893	4.061	4.233	4.417	5.415	5.833	6.220	6.405

Asset Facility Category	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
WR: Steel Pipelines	15.801	23.959	26.061	27.249	33.297	41.712	42.440	58.517	66.660	67.589
WR: Telemetry	0.351	0.386	0.411	0.433	0.458	0.483	0.508	0.536	0.631	1.695
WR: Tunnels	50.445	53.628	56.909	60.168	66.752	71.966	75.892	79.321	154.911	197.217
WR: Water Treatment	0.251	0.266	0.282	0.298	0.317	0.433	0.810	0.920	0.996	0.976
WS: borehol	0.214	0.227	0.241	0.255	0.271	0.287	0.304	0.323	0.343	0.363
WS: Measuring facili	80.591	105.022	113.745	117.713	121.135	125.570	183.674	205.313	224.182	226.947
Total	**587.46**	**746.72**	**814.82**	**863.08**	**997.38**	**1 111.03**	**1 384.61**	**1 584.17**	**1 968.71**	**2 203.86**

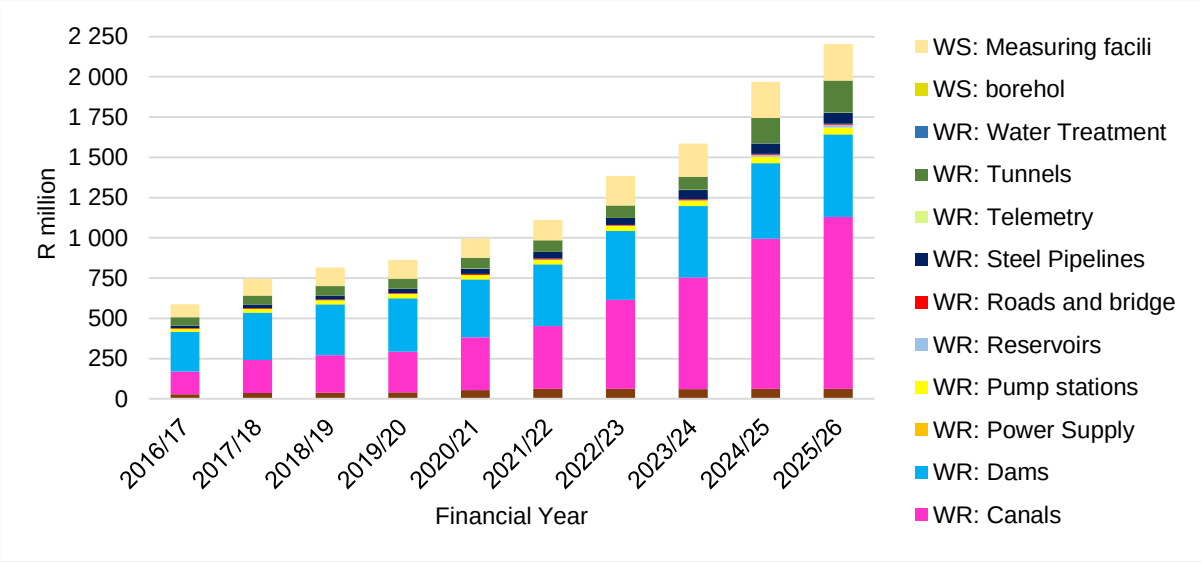


Figure 5.2: Modelled adjusted optimal total cost requirement per asset facility category

5.4 Costs Breakdown

5.4.1 Operations and Maintenance (O&M)

Optimally funding asset maintenance ensures that an asset will retain, or be restored to, a state in which it can perform its function. Table 5.5 and Figure 5.3 show the Cluster's optimal O&M cost requirements, in light of works discussed in Section 4.4.1, per asset facility category:

- The Cluster's projected optimal annual O&M cost requirement for the first three years (2016/17, 2017/18 and 2018/19) are: R587.464 million; R623.142 million; and R661.141 million, respectively. Dams and canals related asset components are the main cost drivers in this Cluster.
- O&M costs were further modelled to stand separately between operations (O) and maintenance (M) costs (per asset facility category), and were further separated between scheme and non-scheme specific, and are also given per scheme, refer to Appendix I, Table I.4 to I.6.

Table 5.5: Optimal O&M cost per asset facility category

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	29.026	30.789	32.666	34.547	36.722	38.946	41.303	43.797	46.474	49.292
WR: Canals	139.688	148.172	157.207	166.256	176.724	187.427	198.769	210.775	223.655	237.219
WR: Dams	247.666	262.707	278.727	294.770	313.331	332.306	352.415	373.701	396.538	420.587
WR: Power Supply	0.143	0.152	0.161	0.171	0.181	0.192	0.204	0.216	0.230	0.243
WR: Pump stations	19.167	20.331	21.571	22.812	24.249	25.717	27.273	28.921	30.688	32.549
WR: Reservoirs	1.086	1.151	1.222	1.292	1.373	1.456	1.545	1.638	1.738	1.843
WR: Roads and bridge	3.035	3.220	3.416	3.613	3.840	4.073	4.319	4.580	4.860	5.155
WR: Steel Pipelines	15.801	16.761	17.783	18.807	19.991	21.201	22.484	23.842	25.300	26.834
WR: Telemetry	0.351	0.372	0.395	0.418	0.444	0.471	0.499	0.530	0.562	0.596
WR: Tunnels	50.445	53.509	56.772	60.040	63.820	67.685	71.781	76.117	80.768	85.666
WR: Water Treatment	0.251	0.266	0.282	0.298	0.317	0.336	0.356	0.378	0.401	0.425
WS: borehol	0.214	0.227	0.241	0.255	0.271	0.287	0.304	0.323	0.343	0.363
WS: Measuring facili	80.591	85.485	90.698	95.918	101.958	108.133	114.676	121.603	129.034	136.860
Total	**587.464**	**623.142**	**661.141**	**699.194**	**743.221**	**788.230**	**835.930**	**886.420**	**940.590**	**997.634**

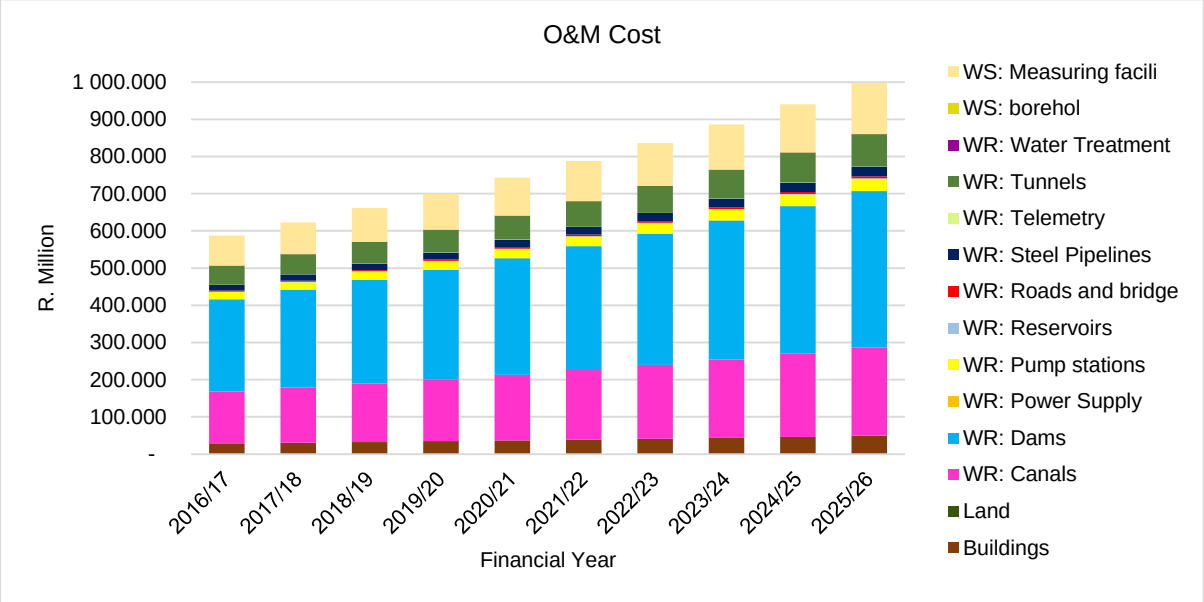


Figure 5.3: Modelled optimal O&M cost per asset facility category

5.4.2 Renewals

Renewal works on existing assets are meant to enable the Cluster to retain the service potential or the life of the asset to that which it had originally. Hence, the necessity of optimally funding such renewals, where identified.

Table 5.6 and Figure 5.4 show the Cluster's modelled optimal annual renewal cost requirements, in light of the works discussed in Section 4.4.2:

- Optimal annual renewal cost requirements for the Cluster for the first three years (2016/17, 2017/18 and 2018/19) amount to about: R122.961 million and R141.983

million to be incurred only in 2017/18 and 2018/19, respectively. Canals, dams and measuring facilities related asset components are the main cost drivers.

- The projected renewals cost for 2017/18 is attributed to condition backlog from the past years. It is crucial that these renewals be given high priority in the year indicated to minimise asset component condition risk and, consequently, deteriorating service delivery.

A provision of at least one year for planning and resources mobilization is made from the time renewal work is identified and associated cost budgets determined to the time the renewals are done (as shown in Table 5.6 and Figure 5.4). For example, renewals for 2017/18 were actually identified in 2016/17. For the list of asset component identified for renewal and associated component renewal budgets, refer to relevant Scheme AMPs.

The cost requirement per facility category (shown in Table 5.6) are separated between scheme and non-scheme specific, and are also given per scheme, refer to Appendix J, Tables J.5 to J.7.

Table 5.6: Modelled optimal renewal cost per asset facility category

Asset Facility Category	Financial Year (Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
Buildings	-	5.072	5.832	5.477	17.278	22.708	21.333	16.379	15.250	12.465
WR: Canals	-	56.428	64.892	68.485	116.366	136.085	192.007	199.941	213.967	227.775
WR: Dams	-	31.766	36.531	37.307	46.433	51.339	74.374	71.017	73.074	92.165
WR: Power Supply	-	0.012	0.013	0.100	0.120	0.125	0.108	0.078	0.148	0.175
WR: Pump stations	-	2.400	2.760	3.067	2.971	3.026	4.253	4.181	7.104	8.929
WR: Reservoirs	-	-	-	-	0.003	0.004	0.004	0.003	10.394	15.935
WR: Roads and bridge	-	0.415	0.477	0.448	0.393	0.344	1.096	1.253	1.360	1.250
WR: Steel Pipelines	-	7.198	8.278	8.442	13.306	20.511	19.956	34.675	41.360	40.755
WR: Telemetry	-	0.014	0.016	0.015	0.014	0.012	0.009	0.006	0.069	1.099
WR: Tunnels	-	0.119	0.137	0.128	2.932	4.281	4.111	3.204	74.143	111.551
WR: Water Treatment	-	-	-	-	-	0.097	0.454	0.542	0.595	0.551
WS: Measuring facili	-	19.537	23.047	21.795	19.177	17.437	68.998	83.710	95.148	90.087
Total	**-**	**122.961**	**141.983**	**145.264**	**218.992**	**255.967**	**386.704**	**414.988**	**532.614**	**602.736**

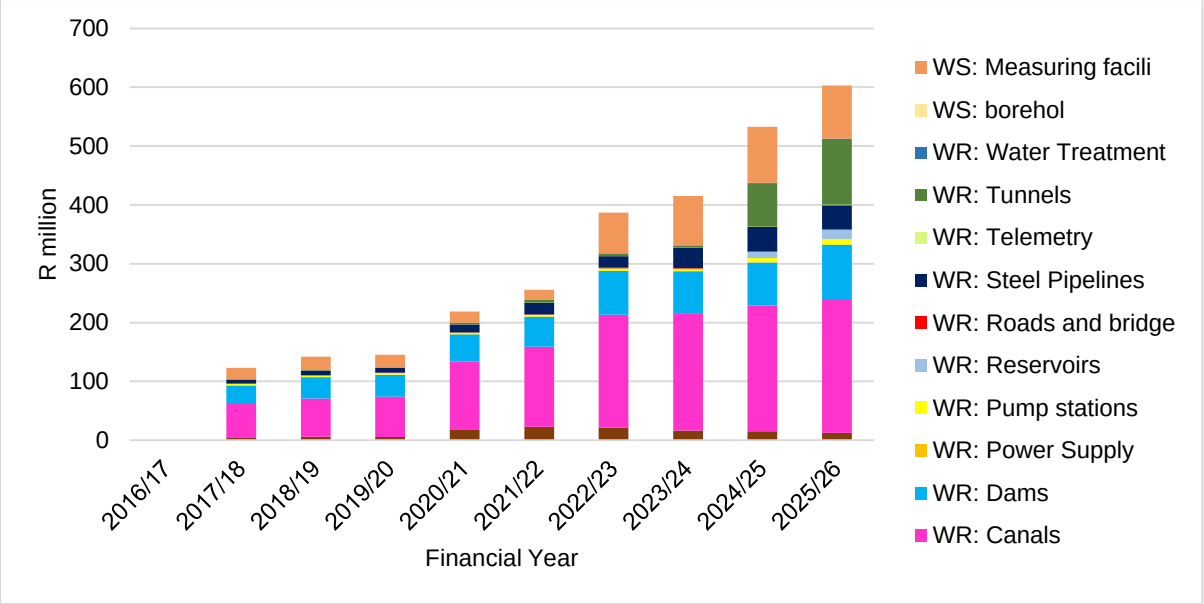


Figure 5.4: Modelled optimal renewal cost per asset facility category

5.4.3 Upgrades and New Capital

As indicated in section 4.4.3. Table 5.7 and Figure 5.5 show the upgrades new capital costs requirements for the Cluster.

- Optimal annual upgrades and new capital cost requirements for the Cluster for the first three years (2016/17, 2017/18 and 2018/19) amount to about: R0, R0.615 million and R11.700 million, respectively. Canals related asset components are the main cost drivers.
- There is a significant increase in the upgrades and new capital cost requirement from 2022/23 and 2025/26, mainly for canals-related asset components; traced from the 2016 reports on the Condition Assessment Audit for the Cluster's irrigation infrastructure.

The cost requirement per facility category (shown in Table 5.7) are separated between scheme and non-scheme specific, and are also given per scheme, refer to Appendix K, Tables K.4 to K.5.

Table 5.7: Modelled optimal upgrades and new capital cost per asset facility category

Asset Facility Category	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
WR: Canals	-	-	10.993	17.957	34.584	66.323	161.574	282.489	495.264	603.313
WR: Dams	-	0.002	0.003	0.003	0.002	0.002	0.002	0.001	0.001	0.001
WR: Pump stations	-	0.613	0.705	0.662	0.581	0.508	0.407	0.275	0.238	0.182
Total	**-**	**0.615**	**11.700**	**18.622**	**35.167**	**66.834**	**161.983**	**282.765**	**495.503**	**603.496**

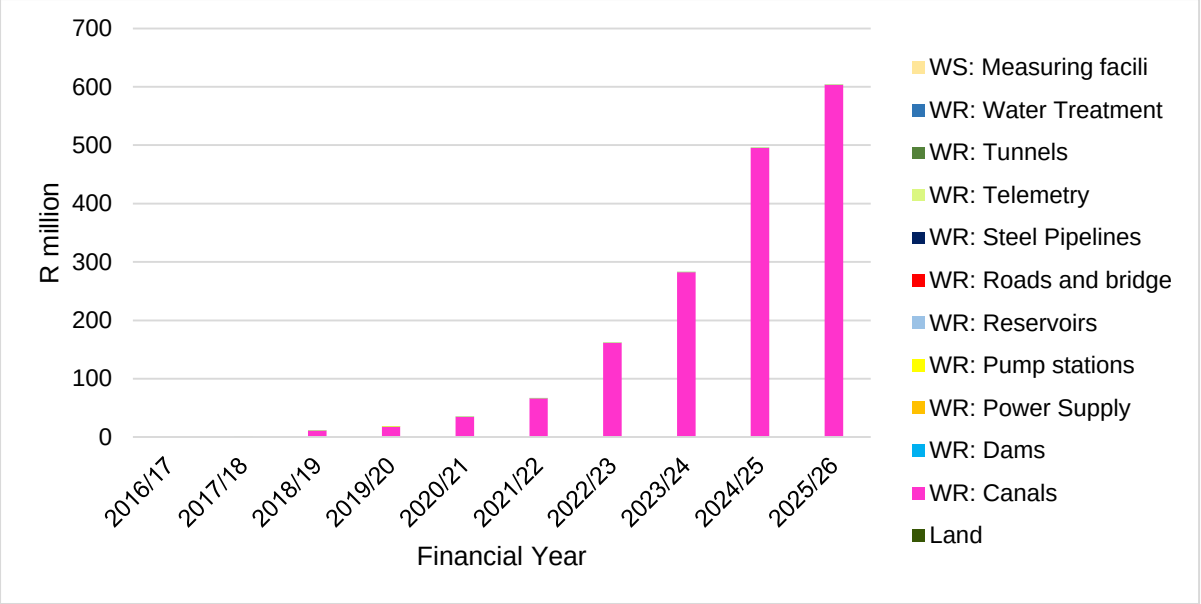


Figure 5.5: Modelled optimal upgrade and new capital cost per asset facility category

5.4.4 Impairments and Disposals

As indicated in Section 4.4.4, the Cluster has some asset components classified as:

- impaired (those with zero asset carrying values), with a total CRC of about R1.381 billion, which could be candidates for disposal. For a summary of these asset components, per facility category and the respective CRCs, and also a list of them, refer to Appendix L, Tables L.1 and L.2, respectively.
- under-utilised', with a total CRC of about R784.56 million, which could also be candidates for disposal. For a summary of these asset components, per facility category and the respective CRCs, and also a list of them, refer to Appendix L, Tables L.3 and L.4, respectively.

5.5 Backlog (Deferred Maintenance and Deferred Renewals)

'Backlog' (or Deferred Maintenance and Deferred Renewals) is "The value of maintenance and renewal work that has not been done when it should have been – in order to meet the prescribed levels of service". If maintenance and renewal work is not carried out at the optimum time in the asset lifecycle:

- the assets will deteriorate further;
- the maintenance or renewal work that will have to be done later may be more extensive and expensive (in real terms) than it would have been if it had been carried out at the optimum time;

- the asset may not be able to continue to perform to its original design capacity or performance standard, or to deliver the specified levels of service, and, if the work continues not being done, may ultimately be unable to provide the required service altogether.

Figure 5.6 depicts the projected potential renewal backlog for the Cluster. This backlog is a direct mirror image of the projected renewals because a delay or part spending of the renewal budget would lead to renewal backlog on those particular assets.

- The amount (R819.735 million) recorded for 2016/17 in Figure 5.6 is backlog on maintenance and/or renewals that were supposed to have been done in the previous year(s), because if maintenance and renewals were optimally done, no asset component in the current year could be in poor or very poor condition.
- It is imperative that this backlog be cleared in the year indicated, otherwise the works may be spread over a maximum of three years.

The backlog per facility category (shown in Figure 5.6) are separated between scheme and non-scheme specific, and are also given per scheme, refer to Appendix J, Tables J.5 and J.7.

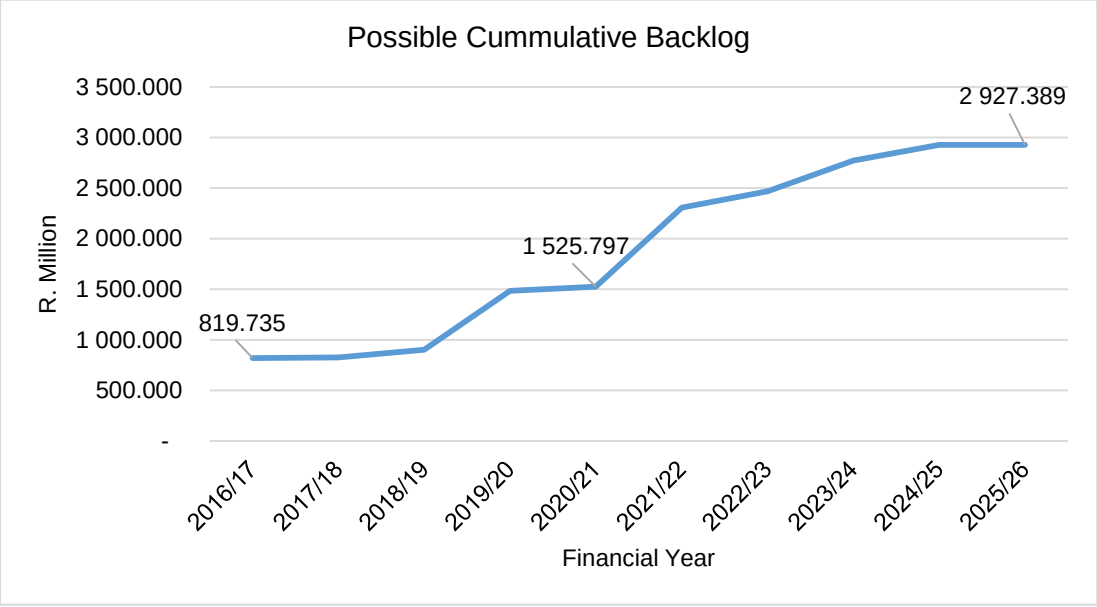


Figure 5.6: Possible cumulative backlog

5.6 Funding Requirements

Table 5.8 and Figure 5.7 present the modelled optimal revenue requirements necessary to sustain the Cluster. For the Cluster to be able to cover all its cost requirements, its revenue needs to be at least equivalent to the modelled revenue.

The Cluster's projected optimal annual revenue requirements for the first three years (2016/17, 2017/18 and 2018/19) amount to about: R587 million, R747 million and R815 million, respectively. Over the projected 10-year period, the revenue which needs to be generated by the Cluster to fund the required immovable asset life cycle works varies between about R 587 million and about R2.204 billion. In the event that such revenue cannot be generated through user charges (an indication that the Cluster is not financially self-sustainable), external funding would need to be considered. Such funding can be in the form of fiscal support, cross subsidisation or debt raised through such institutions as TCTA.

Table 5.8: Modelled optimal revenue requirement

	Financial Year (Amounts in Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
Modelled Optimal Revenue Requirement	587.464	746.718	814.825	863.080	997.380	1 111.031	1 384.617	1 584.173	1 968.707	2 203.865

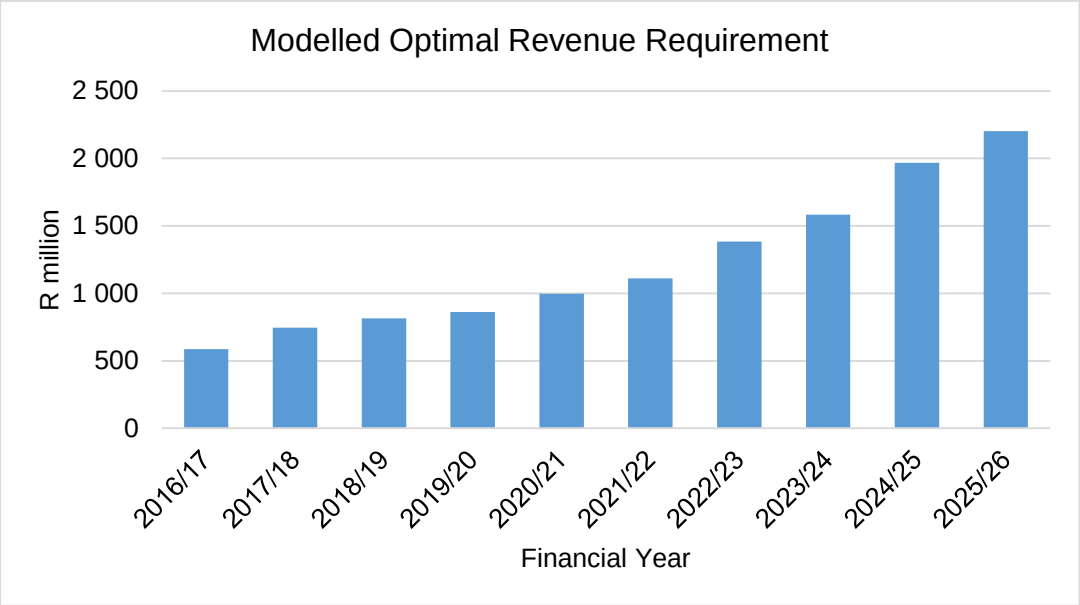


Figure 5.7: Modelled optimal revenue requirement

5.7 Infrastructure Assets Movement

Tables 5.9 to 5.11 and Figures 5.8 to 5.10 present the Cluster's projected annual infrastructure asset movement, but excluding land. The asset carrying value for land at this Cluster is about R4.162 billion. The asset movement position per facility category (shown in Tables 5.7 to 5.9) are separated between scheme and non-scheme specific, and are also given per scheme, refer to Appendix M, Tables M.1 to M.3.

Table 5.9: Accumulated acquisition cost per asset facility category

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
Buildings	188.975	222.784	222.784	222.784	305.935	305.935	306.590	306.590	306.590	306.590
WR: Canals	2 767.467	3 143.652	3 216.935	3 298.991	3 762.045	3 885.047	4 702.669	5 198.582	5 735.643	5 898.693
WR: Dams	10 329.631	10 541.420	10 541.420	10 561.416	10 645.317	10 657.120	10 802.213	10 802.213	10 803.632	10 872.289
WR: Power Supply	0.773	0.851	0.851	1.432	1.432	1.432	1.432	1.432	1.690	1.690
WR: Pump stations	255.920	276.009	276.009	279.176	279.865	281.135	289.447	290.106	299.380	301.437
WR: Reservoirs	49.058	49.058	49.058	49.058	49.076	49.076	49.076	49.076	83.713	83.713
WR: Roads and bridge	43.271	46.034	46.034	46.034	46.034	46.034	50.140	50.140	50.140	50.140
WR: Steel Pipelines	540.236	588.224	588.224	592.678	630.346	656.730	656.730	732.677	732.677	733.808
WR: Telemetry	2.971	3.066	3.066	3.066	3.066	3.066	3.066	3.066	3.279	5.771
WR: Tunnels	3 621.010	3 621.803	3 621.803	3 621.803	3 640.599	3 640.599	3 640.599	3 640.599	3 877.726	3 877.726
WR: Water Treatment	2.643	2.643	2.643	2.643	2.643	3.127	4.817	4.817	4.817	4.817
WS: borehol	1.105	1.105	1.105	1.105	1.105	1.105	1.105	1.105	1.105	1.105
WS: Measuring facili	980.241	1 110.489	1 114.349	1 114.349	1 114.349	1 117.422	1 391.351	1 402.275	1 411.585	1 411.585
Total	**18 783.30**	**19 607.14**	**19 684.28**	**19 794.54**	**20 481.81**	**20 647.83**	**21 899.24**	**22 482.68**	**23 311.98**	**23 549.36**

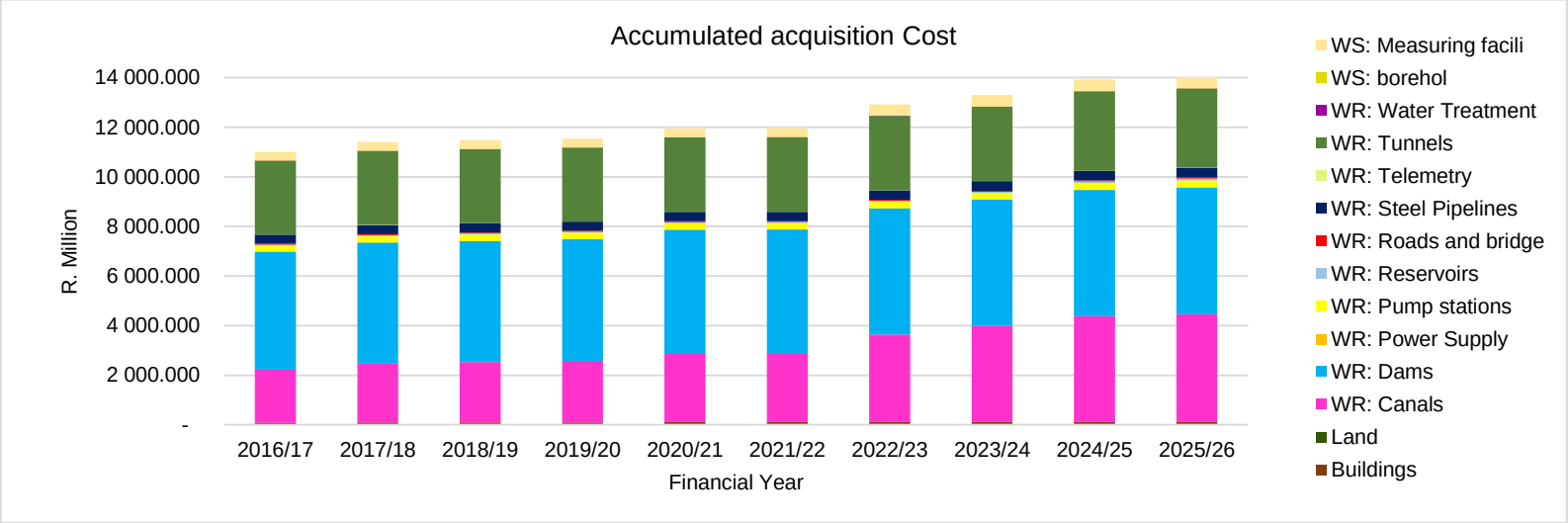


Figure 5.8: Accumulated acquisition cost per asset facility category

Table 5.10: Accumulated depreciation cost per asset facility category

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
Buildings	94.062	102.674	109.830	116.984	126.838	136.802	146.781	156.761	166.740	176.720
WR: Canals	1 346.627	1 407.917	1 460.958	1 516.593	1 585.880	1 661.410	1 740.303	1 829.799	1 927.444	2 037.999
WR: Dams	2 031.927	2 147.506	2 229.773	2 312.926	2 399.419	2 518.732	2 638.831	2 758.930	2 879.035	3 001.658
WR: Power Supply	0.441	0.493	0.532	0.599	0.667	0.728	0.789	0.850	0.918	0.985
WR: Pump stations	118.043	123.970	133.521	140.356	146.149	151.599	157.518	163.459	169.761	176.124
WR: Reservoirs	14.777	15.995	16.608	17.222	17.835	19.130	20.425	21.721	22.751	23.781
WR: Roads and bridge	12.206	13.249	14.122	14.994	15.866	16.942	17.954	18.966	19.978	20.990
WR: Steel Pipelines	171.531	186.484	198.783	211.309	225.091	241.661	258.231	274.341	290.451	306.628
WR: Telemetry	1.100	1.221	1.318	1.416	1.513	1.642	1.770	1.899	2.029	2.209
WR: Tunnels	974.400	1 001.363	1 019.290	1 037.218	1 055.773	1 083.598	1 111.423	1 139.248	1 166.081	1 192.915
WR: Water Treatment	1.462	1.521	1.576	1.631	1.685	1.756	1.849	1.942	2.035	2.128
WS: borehol	0.338	0.365	0.387	0.410	0.432	0.460	0.488	0.516	0.544	0.572
WS: Measuring facili	323.912	355.220	377.911	400.979	423.903	457.397	488.094	519.838	552.364	584.891
Total	**5 090.825**	**5 357.979**	**5 564.610**	**5 772.636**	**6 001.049**	**6 291.857**	**6 584.458**	**6 888.269**	**7 200.131**	**7 527.600**

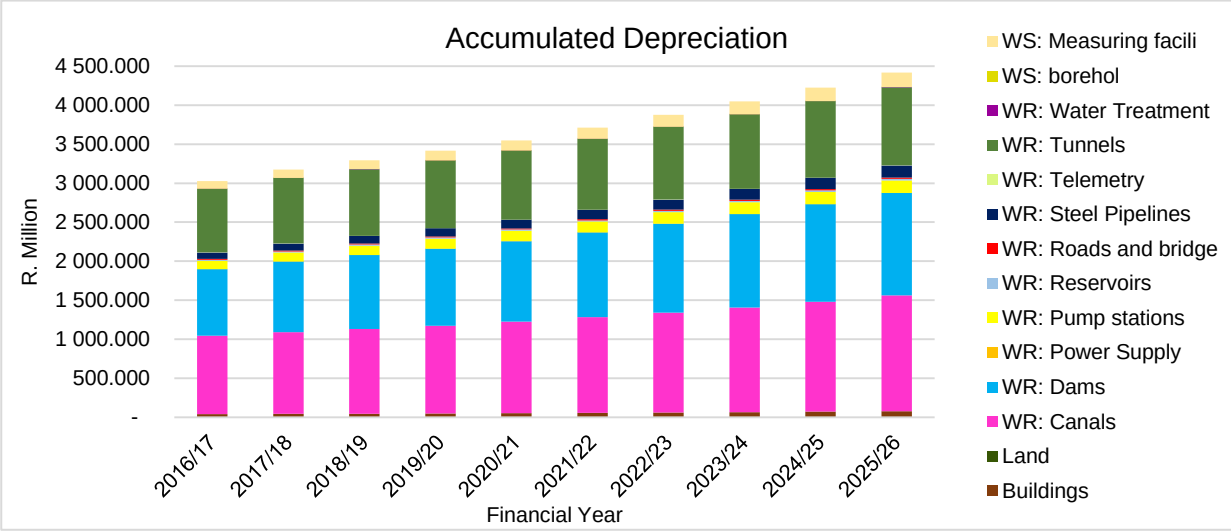


Figure 5.9: Accumulated depreciation cost per asset facility category

Table 5.11: Asset carrying value per asset facility category

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
Buildings	94.913	120.105	112.954	105.801	179.098	169.134	159.808	149.829	139.849	129.870
WR: Canals	1 421.461	1 735.735	1 755.977	1 782.398	2 176.166	2 223.637	2 962.366	3 368.783	3 808.199	3 860.694
WR: Dams	8 297.704	8 393.914	8 311.648	8 248.490	8 245.898	8 138.387	8 163.382	8 043.283	7 924.598	7 870.630
WR: Power Supply	0.332	0.357	0.319	0.832	0.765	0.704	0.643	0.582	0.773	0.705
WR: Pump stations	137.894	152.038	142.488	138.820	133.716	129.536	131.929	126.647	129.619	125.313
WR: Reservoirs	34.281	33.063	32.450	31.836	31.241	29.946	28.650	27.355	60.962	59.932
WR: Roads and bridge	31.065	32.785	31.913	31.041	30.169	29.092	32.186	31.174	30.162	29.150
WR: Steel Pipelines	368.705	401.740	389.441	381.369	405.254	415.069	398.499	458.336	442.226	427.180
WR: Telemetry	1.871	1.845	1.748	1.650	1.553	1.424	1.296	1.167	1.249	3.562
WR: Tunnels	2 646.610	2 620.440	2 602.513	2 584.585	2 584.826	2 557.001	2 529.176	2 501.351	2 711.645	2 684.811
WR: Water Treatment	1.181	1.122	1.067	1.012	0.958	1.371	2.968	2.875	2.782	2.689
WS: borehol	0.767	0.740	0.718	0.695	0.673	0.645	0.617	0.589	0.561	0.533
WS: Measuring facili	656.368	755.270	736.438	713.369	690.446	660.025	903.256	882.437	859.221	826.694
Total	**13 693.152**	**14 249.154**	**14 119.671**	**14 021.898**	**14 480.763**	**14 355.971**	**15 314.778**	**15 594.408**	**16 111.845**	**16 021.764**

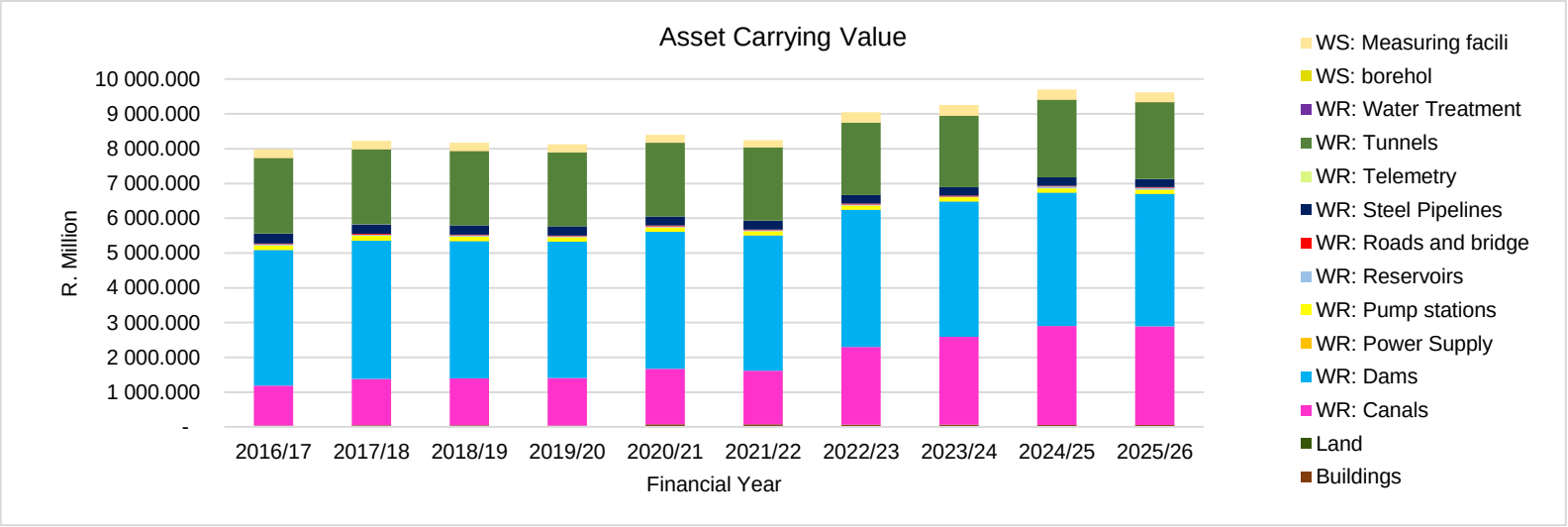


Figure 5.10: Asset carrying value per asset facility category

5.8 Summary

Modelled ten-year optimal cost requirements, per cost component (i.e. O&M (inclusive of direct and indirect labour costs); renewal works; upgrades and new capital; and asset disposal) and per asset facility category, necessary to fund the asset life cycle works identified in Section 4 were presented in this section for the Cluster.

The Cluster's projected modelled identified optimal annual total cost requirement for the first three years (2016/17, 2017/18 and 2018/19) are about: R587.464 million; R1.447 billion; and R738.284 million, respectively. The projected sharp increase in total optimal cost in 2017/18 is attributed to a high renewal capital cost requirement of about R819.735 million, and upgrade and new capital cost of R4.103 million. Such significant increase, compounded by the current economic and financial constraints facing the country, present some implementation challenges for the Cluster's modelled identified optimal total cost requirement. As such, for practical implementation purposes, the identified optimal cost requirements for the Cluster are adjusted as indicated below.

The Cluster's projected adjusted modelled optimal total cost requirement for the first three years (2016/17, 2017/18 and 2018/19) are about: R587.464 million; R746.718 million; and R814.825 million, respectively. The projected total cost breakdown for the Cluster is as follows:

- Optimal annual O&M cost requirements for the first three years (2016/17, 2017/18 and 2018/19) are about: R587.464 million; R623.142 million; and R661.141 million, respectively. Dams and Canals related asset components are the main cost drivers.
- Optimal annual renewal cost requirements for the first three years (2016/17, 2017/18 and 2018/19) amount to about: R0, R122.961 million and R141.983 million, respectively. Canals, dams and measuring facilities related asset components are the main cost drivers.

  The projected renewals cost for 2017/18 is attributed to condition backlog from the past years. It is crucial that these renewals be given high priority in the year indicated to minimise asset component condition risk and, consequently, deteriorating service delivery.
- Optimal annual upgrades and new capital cost requirements for the first three years (2016/17, 2017/18 and 2018/19) amount to: R0, R0.615 million and R11.700 million, respectively. Canals related asset components are the main cost drivers.

  There is a significant increase in the upgrades and new capital cost requirement from 2022/23 and 2025/26, mainly for canals-related asset components; traced from the 2016 reports on the Condition Assessment Audit for the Cluster's irrigation infrastructure.

The Cluster's projected optimal annual revenue requirements for the first three years (2016/17, 2017/18 and 2018/19) amount to about: R587 million, R747 million and R815 million, respectively. Over the projected 10-year period, the revenue which needs to be generated by the Cluster to fund the required immovable asset life cycle works varies between about R 587 million and about R2.2 billion. In the event that such revenue cannot be generated through user charges (an indication that the Cluster is not financially self-sustainable), external funding would need to be considered. Such funding can be in the form of fiscal support, cross subsidisation or debt raised through such institutions as TCTA.

6. RECOMMENDATIONS

6.1 Overview

This section provides recommendations for improvement on challenges identified throughout the preceding sections of this AMP, with a particular focus on best practices and AMP monitoring and control.

6.2 Practices Improvement

Key areas of concern, and recommended improvement actions thereof, identified in the preceding sections of this AMP are summarized in Table 6.1.

Table 6.1: Recommended areas for improvement

No.	Area for Improvement	Issue Description	Recommended Action
1	**Asset Information Management**		
1.1	Asset Register as the indispensable key data source for AMP development	The quality and usefulness of an AMP is highly dependent on the completeness and accuracy of the asset register used in the development of the AMP. Accordingly, the asset life cycle management activities and works (such as maintenance, renewals, upgrades and new capital, and disposals) recommended for the Cluster in this AMP are highly dependent on the asset component condition, criticality and utilisation gradings captured in the asset register used in the development of this AMP. However, during the AMPs review workshops conducted during the development of this AMP, the Cluster and scheme personnel did not fully concur with some of the asset component counts, condition as well as utilisation gradings; indicating the possibility of misalignment between the asset register and the prevailing situation on the ground.	The NWRI needs to urgently conduct physical asset verification and assessments (extent, condition, criticality, utilisation, etc.) for all its immovable assets and develop a comprehensive asset register, inclusive of all crucial asset component details, such as asset component sizes, material of construction, condition, criticality, utilisation, etc. Thereafter, the NWRI needs to conduct similar assessments at least every five years as contemplated in Section 13 of the GIAMA. The abovementioned asset assessments need to be conducted by adequately experienced professionals.

No.	Area for Improvement	Issue Description	Recommended Action
1.2	Current Replacement Cost (CRC)	Each and every asset component in the asset register needs to have a corresponding CRC. The CRCs are useful in the determination and projection of optimal asset life cycle management works, such as O&M, renewals, upgrades and new capital, etc., in line with international best practices. Ideally, the CRC of an asset component needs to be determined by multiplying the unit cost rate (cost per unit size, ideally obtained from suppliers) by the size of the asset component. Thus, the asset register needs to adequately capture such details as asset component sizes, material of construction, etc. However, such asset component details are not fully captured in the asset register used in the development of this AMP. As a result, the CRCs presented in this AMP were determined by adjusting the provided acquisition costs with PPI and an uncertainty factor; hence the projected optimal asset life cycle management costs may be on the conservative side.	The above-recommended assessments for the NWRI immovable assets need to adequately capture such asset component details as sizes and material of construction. This will enable the determination of more accurate CRCs, and consequently projection of more accurate optimal asset life cycle management costs.
2	**Financial Management**		
2.1	O&M Costs reporting	The DWS is unaware of O&M costs currently being incurred by some of the schemes being operated and maintained by other institutions, such as irrigation boards, water boards and water user associations, and no financial reports are being sent to DWS.	The DWS needs to liaise with the respective institutions and agree on frequent O&M reports, preferably on a quarterly basis.
2.2	O&M Costs splitting	O&M costs in the individual schemes are currently not being budgeted for and recorded separately per asset facility category.	Budget for and record O&M costs: separately (separate operations from maintenance). Budget for and record O&M costs per asset facility category.
3	**Human Resources**		
3.1	O&M Human Resources Requirements	The DWS is unaware of the optimum number of personnel required for effective operation and maintenance of some of the schemes being operated and maintained by other institutions, such as irrigation boards, water boards and water user associations, and no related reports are being sent to DWS.	The DWS needs to liaise with the respective institutions and agree on frequent O&M reports (including human resources), preferably on a quarterly basis.

No.	Area for Improvement	Issue Description	Recommended Action
4	**Risk Management**		
4.1	Risk Management	Risk (expected loss) is calculated by determining the product of the likelihood of the risk and the total amount of loss (impact) when the risk occurs: *Expected Loss (Risk) = Risk Likelihood x Total Loss (Impact)* For this Scheme, however, risk likelihood per asset component was not captured in the Asset Register used in the development of this AMP. Hence, an in-depth risk analysis could not be conducted.	Capture risk likelihood per asset component in the infrastructure asset register, so that the next update of this AMP can incorporate an in-depth risk analysis.
5	**Contracts Management**		
5.1	Immovable Asset Maintenance Contract	The Cluster does not have an immovable asset maintenance contract in place. The one that was there was terminated in October 2015. This poses a high risk of service delivery failure as a result of deteriorating asset condition.	Appoint an immovable asset maintenance contractor, and work towards clearing the maintenance backlog.

6.3 Asset Management Planning, Monitoring and Evaluation

The AMP development, monitoring and evaluation recommendations are consistent with the GIAMA and DWS Asset Management Policy:

- The Director for the Cluster is the *controller* for the Cluster's infrastructure assets and is required to: "safeguard and maintain" the assets; "maintain a system of internal control" over the assets; "maintain an asset register" for the assets; and appoint an Asset Manager at the Cluster level, as contemplated in Section 5 of the DWS Asset Management Policy. It is recommended that:
  - The Asset Manager (instead of working alone) sets up a dedicated Asset Management team (Asset Management Specialists) at the Cluster level to effectively plan, and effectively monitor the implementation of the AMPs for all the schemes in the cluster.
  - The NWRI appoints a dedicated in charge AMPs planning, monitoring and evaluation team (at Head Office).
- The AMPs need to be updated annually to inform the budget and after budget allocations have been finalised by the National Treasury, and incorporated into the DWS Strategic Plan, as contemplated in Section 12 of the GIAMA.

6.4 Summary

In order to effectively and efficiently deliver its service (supply of raw water) to its irrigation, and domestic and industrial water users (Section 1), meeting the required levels of service (Section 2), and meeting the projected future raw water demand (Section 3), the Cluster needs to execute the recommended asset life cycle management activities (Section 4) in line with the planned budgets and timeframes (Section 5). Furthermore, a number of recommendations made for process improvement, particularly with regards to the DWS immovable asset register, Asset Management Information System, financial management (in particular the recording of O&M costs), human resources, contract management, as well as risk management, need to be implemented. Pro-activeness and forward-looking, taking care of any changes in the assumptions made in this AMP are also of vital importance.

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APPENDICES

APPENDIX A – Asset Register for the Southern Operations Cluster

<Refer to soft-copy file>

APPENDIX B – Strategic Context

1. DWS's Vision, Mission, and Organisational Goals & Objectives

Figure B.1 shows the link between this AMP and the DWS's Vision.

Figure B.1: AMP Alignment with DWS's Vision, Mission, and Organisational Goals & Objectives

Vision

Equitable and sustainable water and sanitation that support socio-economic growth and development of the well-being of current and future generations.

Mission

To ensure the universal access of all South Africans to equitable water resources and sustainable water and sanitation services, by:

- Protecting, developing, conserving, managing and regulating water resources;
- Managing, regulating and providing efficient and effective water and sanitation

services;

- Providing strategic leadership and evidence based policy direction to a coordinated water and sanitation sector for improved sector performance and service delivery;
- Building the skills and capabilities of the sector and enhancing information management to inform decision making; and
- Enhancing communication and stakeholder partnerships with communities and sector constituencies to advance the national development agenda.

Values

- Promoting and maintaining high standards of professional ethics.
- Utilising resources efficiently and effectively.
- Providing services impartially, fairly, equitably and without bias.
- Responding to people's needs; citizens are encouraged to participate in policy-making.
- Rendering an accountable, transparent, and development-oriented public administration.

Organisational Goals and Objectives

- Enhanced and protected water as a resource across the value chain.
- Equitable access to reliable, sustainable and acceptable water resources and water and sanitation services.
- An enhanced contribution to socio-economic development and transformation by the sector.
- An efficient, effective and development oriented water and sanitation sector.
- Sound cooperative governance and an active and engaged citizenry.

APPENDIX C – Stakeholders

1. Key Stakeholders

The key stakeholders are listed in Table C.1.

Table C.1: Key Stakeholders

Stakeholder
Catchment Management Agencies (CMAs)
Water Service Authorities (WSAs)
Water Service Providers (WSPs)
The customers served by assets in the Cluster: ▪ water users (irrigation, and D&I water users).
Internal Stakeholders ▪ DWS Head Office; ▪ The Southern Cluster Office; ▪ Eastern Cape Area Office. ▪ Western Cape Area Office.

APPENDIX D – Raw Water Volumes and Future Demand

Table D.1: Registered Raw Water Volumes Specific to Each Customer

No.	Question	Answer			
1	Why does this Cluster exist?	To supply domestic and industrial water and water for irrigation.			
2	How much water was registered to the customers for the past 3 financial years?		**Cubic Metres (Million)**		
		Water User Category	**2013/14**	**2014/15**	**2015/16**
		Domestic & Industrial	1 016.936	1 016.936	1 016.936
		Irrigation	3 152.201	3 152.201	3 152.201
		Total	**4 169.137**	**4 169.137**	**4 169.137**

Table D.2 – The Likely Future Demand for Raw Water

	10 year Projections (Mm^3)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
D&I	1016.936	1016.936	1016.936	1016.936	1016.936	1016.936	1016.936	1016.936	1016.936	1016.936
IRR	3152.201	3152.201	3152.201	3152.201	3152.201	3152.201	3152.201	3152.201	3152.201	3152.201
Total	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**

Table. D.3: Sensitivity Analysis

What if Scenario demand changes by		10 year Projections (Mm^3)									
		2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
	5%	4377.594	4596.474	4826.297	5067.612	5320.993	5587.042	5866.395	6159.714	6467.700	6791.085
	3%	4294.211	4423.038	4555.729	4692.401	4833.173	4978.168	5127.513	5281.338	5439.778	5602.972
	2%	4252.520	4337.570	4424.322	4512.808	4603.064	4695.126	4789.028	4884.809	4982.505	5082.155
	Base = 0%	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**	**4169.137**
	-2%	4085.754	4004.039	3923.958	3845.479	3768.570	3693.198	3619.334	3546.948	3476.009	3406.489
	-3%	4044.063	3922.741	3805.059	3690.907	3580.180	3472.775	3368.591	3267.534	3169.508	3074.422
	-5%	3960.680	3762.646	3574.514	3395.788	3225.999	3064.699	2911.464	2765.891	2627.596	2496.216

APPENDIX E – Asset Details

Table E.1: Asset Condition - Asset component condition grading proportions per asset facility category

Asset Facility Category	Condition Grading										Total No. of Assets	Total Row N %
	1-Very Poor		2-Poor		3-Fair		4-Good		5-Very Good			
	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %		
Borehole		0.00%		0.00%		0.00%	2	100.00%		0.00%	**2**	**100.00%**
Buildings	33	4.09%	166	20.57%	375	46.47%	224	27.76%	9	1.12%	**807**	**100.00%**
Canals	62	4.12%	195	12.95%	837	55.58%	400	26.56%	12	0.80%	**1 506**	**100.00%**
Dams	66	2.41%	665	24.31%	995	36.38%	918	33.56%	91	3.33%	**2 735**	**100.00%**
Measuring facilities	19	1.84%	560	54.11%	260	25.12%	172	16.62%	24	2.32%	**1 035**	**100.00%**
Pipelines	13	5.94%	72	32.88%	92	42.01%	11	5.02%	31	14.16%	**219**	**100.00%**
Power supply		0.00%	2	22.22%	6	66.67%	1	11.11%		0.00%	**9**	**100.00%**
Pump stations	27	6.34%	8	1.88%	50	11.74%	165	38.73%	176	41.31%	**426**	**100.00%**
Reservoirs		0.00%		0.00%	20	83.33%	4	16.67%		0.00%	**24**	**100.00%**
Roads	2	2.13%	11	11.70%	26	27.66%	38	40.43%	17	18.09%	**94**	**100.00%**
Telemetry	1	9.09%		0.00%	2	18.18%	8	72.73%		0.00%	**11**	**100.00%**
Tunnels		0.00%	1	0.95%	41	39.05%	49	46.67%	14	13.33%	**105**	**100.00%**
Water Treatment		0.00%		0.00%	7	63.64%	4	36.36%		0.00%	**11**	**100.00%**
All Cluster asset components	*223*	*3.19%*	*1 680*	*24.05%*	*2 711*	*38.82%*	*1996*	*28.58%*	*374*	*5.36%*	***6 984***	***100.00%***

Table E.2: Asset RUL/EUL Ratio - Asset component RUL/EUL Ratio grading proportions per facility category

Asset Facility Category	RUL/EUL Ratio										Total No. of Assets	Total Row N %
	0-10%		11-25%		26-45%		46-70%		71-100%			
	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %		
Borehole		0.00%		0.00%		0.00%	2	100.00%		0.00%	**2**	**100.00%**
Buildings	33	4.09%	166	20.57%	375	46.47%	224	27.76%	9	1.12%	**807**	**100.00%**
Canals	62	4.12%	195	12.95%	837	55.58%	400	26.56%	12	0.80%	**1 506**	**100.00%**
Dams	66	2.41%	665	24.31%	995	36.38%	918	33.56%	91	3.33%	**2 735**	**100.00%**

Asset Facility Category	RUL/EUL Ratio										Total No. of Assets	Total Row N %
	0-10%		11-25%		26-45%		46-70%		71-100%			
	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %		
Measuring facilities	19	1.84%	560	54.11%	260	25.12%	172	16.62%	24	2.32%	**1 035**	**100.00%**
Pipelines	13	5.94%	72	32.88%	92	42.01%	11	5.02%	31	14.16%	**219**	**100.00%**
Power supply		0.00%	2	22.22%	6	66.67%	1	11.11%		0.00%	**9**	**100.00%**
Pump stations	27	6.34%	8	1.88%	50	11.74%	165	38.73%	176	41.31%	**426**	**100.00%**
Reservoirs		0.00%		0.00%	20	83.33%	4	16.67%		0.00%	**24**	**100.00%**
Roads	2	2.13%	11	11.70%	26	27.66%	38	40.43%	17	18.09%	**94**	**100.00%**
Telemetry	1	9.09%		0.00%	2	18.18%	8	72.73%		0.00%	**11**	**100.00%**
Tunnels		0.00%	1	0.95%	41	39.05%	49	46.67%	14	13.33%	**105**	**100.00%**
Water Treatment		0.00%		0.00%	7	63.64%	4	36.36%		0.00%	**11**	**100.00%**
All Cluster asset components	*223*	*3.19%*	*1680*	*24.05%*	*2711*	*38.82%*	*1996*	*28.58%*	*374*	*5.36%*	***6 984***	***100.00%***

Table E.3: Asset Criticality - Asset component Criticality grading proportions per facility category

Asset Facility Category	Criticality Grading										Total No. of Assets	Total Row N %
	1-Very Low		2-Low		3-Moderate		4-High		5-Very High			
	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %		
Borehole		0.00%		0.00%	2	100.00%		0.00%		0.00%	**2**	**100.00%**
Buildings	81	10.04%	144	17.84%	530	65.68%	52	6.44%		0.00%	**807**	**100.00%**
Canals	25	1.66%	17	1.13%	1455	96.61%	9	0.60%		0.00%	**1 506**	**100.00%**
Dams	35	1.28%	315	11.52%	613	22.41%	1516	55.43%	256	9.36%	**2 735**	**100.00%**
Measuring facilities	123	11.88%	306	29.57%	524	50.63%	82	7.92%		0.00%	**1 035**	**100.00%**
Pipelines	2	0.91%	112	51.14%	38	17.35%	55	25.11%	12	5.48%	**219**	**100.00%**
Power supply		0.00%	6	66.67%	3	33.33%		0.00%		0.00%	**9**	**100.00%**
Pump stations		0.00%	24	5.63%	186	43.66%	176	41.31%	40	9.39%	**426**	**100.00%**
Reservoirs		0.00%	12	50.00%	10	41.67%		0.00%	2	8.33%	**24**	**100.00%**
Roads	81	86.17%	7	7.45%	2	2.13%	4	4.26%		0.00%	**94**	**100.00%**
Telemetry		0.00%	6	54.55%		0.00%	5	45.45%		0.00%	**11**	**100.00%**
Tunnels		0.00%		0.00%	1	0.95%	56	53.33%	48	45.71%	**105**	**100.00%**

Asset Facility Category	Criticality Grading										Total No. of Assets	Total Row N %
	1-Very Low		2-Low		3-Moderate		4-High		5-Very High			
	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %		
Water Treatment	1	9.09%	10	90.91%		0.00%		0.00%		0.00%	**11**	**100.00%**
All Cluster asset components	*348*	*4.98%*	*959*	*13.73%*	*3364*	*48.17%*	*1955*	*27.99%*	*358*	*5.13%*	***6 984***	***100.00%***

Table E.4: Asset Utilisation - Asset component Utilisation grading proportions per asset facility category

Asset Facility Category	Utilisation Grading										Total No. of Assets	Total Row N %
	1-Strategic redundancy		2-Under-utilised		3-Moderate use		4-Approaching design capacity		5-Exceeding capacity/stressed			
	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %	No. of Assets	Row N %		
Borehole		0.00%		0.00%	1	50.00%	1	50.00%		0.00%	**2**	**100.00%**
Buildings		0.00%	34	4.21%	116	14.37%	657	81.41%		0.00%	**807**	**100.00%**
Canals		0.00%	15	1.00%	193	12.82%	1298	86.19%		0.00%	**1 506**	**100.00%**
Dams	7	0.26%	124	4.53%	318	11.63%	2284	83.51%	2	0.07%	**2 735**	**100.00%**
Measuring facilities		0.00%	7	0.68%	101	9.76%	927	89.57%		0.00%	**1 035**	**100.00%**
Pipelines		0.00%		0.00%	78	35.62%	141	64.38%		0.00%	**219**	**100.00%**
Power supply		0.00%		0.00%	1	11.11%	8	88.89%		0.00%	**9**	**100.00%**
Pump stations		0.00%	3	0.70%	148	34.74%	248	58.22%	27	6.34%	**426**	**100.00%**
Reservoirs		0.00%	8	33.33%	1	4.17%	15	62.50%		0.00%	**24**	**100.00%**
Roads		0.00%	77	81.91%	13	13.83%	4	4.26%		0.00%	**94**	**100.00%**
Telemetry		0.00%		0.00%	4	36.36%	7	63.64%		0.00%	**11**	**100.00%**
Tunnels		0.00%		0.00%	44	41.90%	61	58.10%		0.00%	**105**	**100.00%**
Water Treatment		0.00%		0.00%	2	18.18%	9	81.82%		0.00%	**11**	**100.00%**
All Cluster asset components	*7*	*0.10%*	*268*	*3.84%*	*1020*	*14.60%*	*5660*	*81.04%*	*29*	*0.42%*	***6 984***	***100.00%***

Table E.5A: Asset component proportions per Criticality - Condition grading and per asset facility category (Maintenance)

Asset Facility Category	Criticality-Condition Grading (Proportion, %)															Total
	H - F	H - G	H - VG	L - F	L - G	L - VG	M - F	M - G	M - VG	VH - F	VH - G	VH - VG	VL - F	VL - G	VL - VG	
Borehole	-	-	-	-	-	-	-	100.00%	-	-	-	-	-	-	-	**100.00%**
Buildings	4.28%	2.63%	0.33%	12.01%	5.43%	0.49%	38.82%	27.47%	0.33%	-	-	-	6.58%	1.32%	0.33%	**100.00%**
Canals	0.16%	0.32%	0.08%	1.04%	0.16%	-	64.69%	31.39%	0.88%	-	-	-	1.12%	0.16%	-	**100.00%**
Dams	28.04%	24.10%	2.84%	4.89%	5.89%	0.30%	10.58%	11.43%	1.10%	5.19%	4.14%	0.30%	0.95%	0.25%	-	**100.00%**
Measuring facilities	7.46%	6.80%	1.32%	32.24%	24.12%	1.32%	6.80%	0.22%	2.19%	-	-	-	10.53%	6.58%	0.44%	**100.00%**
Pipelines	5.97%	0.75%	0.75%	47.76%	2.24%	10.45%	10.45%	-	11.94%	2.99%	5.22%	0.00%	1.49%	-	-	**100.00%**
Power supply	-	-	-	71.43%	14.29%	-	14.29%	-	-	-	-	-	-	-	-	**100.00%**
Pump stations	3.07%	15.09%	23.02%	2.30%	2.56%	1.02%	7.16%	22.51%	15.60%	0.26%	2.05%	5.37%	-	-	-	**100.00%**
Reservoirs	-	-	-	37.50%	12.50%	-	41.67%	-	-	4.17%	4.17%	-	-	-	-	**100.00%**
Roads	-	3.70%	1.23%	-	1.23%	6.17%	-	-	2.47%	-	-	-	32.10%	41.98%	11.11%	**100.00%**
Telemetry	-	50.00%	-	20.00%	30.00%	-	-	-	0.00%	-	-	-	-	-	-	**100.00%**
Tunnels	22.12%	18.27%	13.46%	-	-	-	-	-	-	16.35%	28.85%	-	-	-	-	**100.00%**
Water Treatment	-	-	-	63.64%	27.27%	-	-	-	-	-	-	-	-	9.09%	-	**100.00%**
All Cluster asset components (in fair, good and very good conditions)	*13.13%*	*12.22%*	*3.39%*	*8.40%*	*5.65%*	*0.75%*	*26.39%*	*17.30%*	*2.44%*	*2.50%*	*2.54%*	*0.53%*	*2.93%*	*1.57%*	*0.26%*	***100.00%***

Table E.5B: CRC per asset Criticality - Condition grading and per asset facility category (Maintenance)

Asset Facility Category	Criticality-Condition Grading (CRC, R Million)																*% of Total CRC*
	H - F	H - G	H - VG	L - F	L - G	L - VG	M - F	M - G	M - VG	VH - F	VH - G	VH - VG	VL - F	VL - G	VL - VG	Total	
Borehole								3.06								**3.06**	*0.01*
Buildings	27.26	16.16	0.77	51.08	58.48	15.37	107.13	115.13	5.72				23.34	4.85	2.62	**427.91**	*0.89*
Canals	2.30	77.41	1.71	121.14	6.34		3 628.55	2 337.70	300.28				28.01	0.49		**6 503.91**	*13.45*
Dams	1 799.02	10 865.14	457.83	1 053.51	3 812.61	434.57	387.96	203.20	2 610.60	824.74	4 394.31	89.91	52.05	10.57		**26 996.00**	*55.83*

Asset Facility Category	Criticality-Condition Grading (CRC, R Million)																% of Total CRC
	H - F	H - G	H - VG	L - F	L - G	L - VG	M - F	M - G	M - VG	VH - F	VH - G	VH - VG	VL - F	VL - G	VL - VG	Total	
Measuring facilities	145.13	176.76	297.57	709.82	524.31	37.01	20.49	3.37	75.00				78.18	53.09	93.85	**2 214.59**	*4.58*
Pipelines	44.07	0.05	0.26	26.95	2.44	4.13	152.84		489.02	179.00	425.20		2.25			**1 326.21**	*2.74*
Power supply				1.21	0.23		0.56									**2.00**	*0.00*
Pump stations	7.79	59.44	202.23	3.49	23.79	1.14	6.51	73.56	149.19	0.44	15.05	79.73				**622.36**	*1.29*
Reservoirs				4.78	1.52		15.36			107.01	7.02					**135.69**	*0.28*
Roads		15.57	6.26		1.72	15.04			13.42				10.25	23.31	6.13	**91.71**	*0.19*
Telemetry		5.04		0.46	0.68											**6.18**	*0.01*
Tunnels	518.16	795.37	429.14				0.54			2 328.90	5 940.99					**10 013.10**	*20.71*
Water Treatment				4.84	2.09									0.38		**7.31**	*0.02*
Total	**2 543.73**	**12 010.94**	**1 395.77**	**1 977.28**	**4 434.22**	**507.26**	**4 319.93**	**2 736.02**	**3 643.22**	**3 440.09**	**10 782.57**	**169.63**	**194.07**	**92.68**	**102.60**	**48 350.03**	***100.00***
% of Total CRC	*5.26*	*24.84*	*2.89*	*4.09*	*9.17*	*1.05*	*8.93*	*5.66*	*7.54*	*7.11*	*22.30*	*0.35*	*0.40*	*0.19*	*0.21*	***100.00***	

Table E.6A: Asset component proportions per Criticality - Condition grading and per asset facility category (Renewals)

Asset Facility Category	Criticality-Condition Grading (Proportion, %)										Total
	H - P	H - VP	L - P	L - VP	M - P	M - VP	VH - P	VH - VP	VL - P	VL - VP	
Buildings	2.01%	2.01%	15.58%	2.01%	56.28%	6.53%	-	-	9.55%	6.03%	**100.00%**
Canals	0.39%	0.39%	0.39%	0.39%	71.98%	22.96%	-	-	3.11%	0.39%	**100.00%**
Dams	54.58%	2.05%	12.04%	0.68%	15.60%	4.92%	7.52%	1.09%	1.23%	0.27%	**100.00%**
Measuring facilities	1.73%	0.17%	5.53%	1.90%	82.90%	0.35%	-	-	6.56%	0.86%	**100.00%**
Pipelines	44.71%	8.24%	36.47%	-	3.53%	5.88%	-	1.18%	-	-	**100.00%**
Power supply	-	-	-	-	100.00%	-	-	-	-	-	**100.00%**
Pump stations	2.86%	40.00%	0.00%	2.86%	2.86%	22.86%	17.14%	11.43%	-	-	**100.00%**
Roads	-	-	7.69%	-	-	-	-	-	76.92%	15.38%	**100.00%**
Telemetry	-	-	-	100.00%	-	-	-	-	-	-	**100.00%**
Tunnels	-	-	-	-	-	-	100.00%	-	-	-	**100.00%**
All Cluster asset components (in poor and very poor conditions)	*23.80%*	*2.21%*	*9.67%*	*1.21%*	*47.14%*	*6.46%*	*3.26%*	*0.68%*	*4.41%*	*1.16%*	***100.00%***

Table E.6B: CRC per asset Criticality - Condition grading and per asset facility category (Renewals)

Asset Facility Category	Criticality-Condition Grading (CRC, R Million)										Total	*% of Total CRC*
	H - P	**H - VP**	**L - P**	**L - VP**	**M - P**	**M - VP**	**VH - P**	**VH - VP**	**VL - P**	**VL - VP**		
Buildings	1.58	4.96	22.40	1.41	41.35	7.00			7.06	4.65	**90.41**	*2.90*
Canals	11.15	83.75	0.92	1.21	791.74	235.72			2.13	1.46	**1 128.08**	*36.18*
Dams	665.94	19.15	192.82	5.81	80.37	57.75	55.14	162.20	13.76	0.87	**1 253.81**	*40.21*
Measuring facilities	27.70	1.13	125.51	56.89	212.18	2.46			53.07	10.13	**489.07**	*15.68*
Pipelines	61.79	14.68	11.56		3.72	18.27		0.25			**110.27**	*3.54*
Power supply					0.14						**0.14**	*0.00*
Pump stations	0.09	4.29		2.21	0.06	22.10	4.11	1.20			**34.05**	*1.09*
Roads			6.09						3.25	0.79	**10.12**	*0.32*
Telemetry				0.23							**0.23**	*0.01*
Tunnels							2.20				**2.20**	*0.07*
Total	**768.25**	**127.95**	**359.30**	**67.76**	**1,129.55**	**343.30**	**61.44**	**163.65**	**79.27**	**17.90**	**3 118.37**	*100.00*
% of Total CRC	*24.64*	*4.10*	*11.52*	*2.17*	*36.22*	*11.01*	*1.97*	*5.25*	*2.54*	*0.57*	***100.00***	

APPENDIX F – Risk Management

Table F.1 shows generic risks typically associated with the different asset facility categories.

Table F.1: Generic risks per asset facility category

Asset Facility Category	Generic Risks
Water Sources (i.e. Dams. Ground Water, etc.)	▪ Structural failure of embankment, valve tower and cut-off wall ▪ Failure of control valves, pipework and power supply ▪ Contamination of ground water sources ▪ Land instability ▪ Electrical systems within the dam (control system)
Raw Water Conveyance (Canals, tunnels, pipelines)	▪ Structural failure of aqueducts, canals, tunnels, portals and raw water mains ▪ Land instability
Water Pump Stations	▪ Structural failure and land instability ▪ Failure of pumps, valves, pipework, power supply, motors, drives and controls
Water Reservoirs	▪ Structural failure and land instability ▪ Failure of pumps, valves, pipework, power supply, motors, drives and controls ▪ Structural failure of walls due to design and construction deficiencies. ▪ Leaks and excessive overflow.
Telemetry and SCADA	▪ Signals from all types valves, computer systems programming ▪ Ventilation on control room

APPENDIX G – (Blank)

APPENDIX H – Optimal total cost requirement

Table H.1A: Identified optimal total cost requirement per cost component for Scheme Specific Assets

Cost Component	Financial Year (Amounts in Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
O&M	533.253	565.639	600.131	634.673	674.637	715.493	758.791	804.622	853.793	905.573
Renewal	-	699.464	2.778	78.481	553.656	41.400	631.062	157.111	299.732	156.800
Upgrade & New	-	4.103	73.284	31.772	106.570	123.001	470.455	422.415	526.487	80.587
Disposal	-	-	-	-	-	-	-	-	-	-
Total	533.253	1 269.207	676.193	744.927	1 334.863	879.894	1 860.309	1 384.149	1 680.012	1 142.959

Table H.1: Adjusted Optimal total cost requirement per cost component for Scheme Specific Assets

Cost Component	Financial Year (Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
O&M	533.251	565.640	600.132	634.675	674.637	715.493	758.792	804.622	853.793	905.572
Renewal	-	104.920	121.075	125.586	197.654	234.488	338.420	361.980	474.860	549.518
Upgrade & New	-	0.615	11.700	18.622	35.167	66.834	161.983	282.765	495.503	603.496
Disposal	-	-	-	-	-	-	-	-	-	-
Total	**533.251**	**671.175**	**732.907**	**778.882**	**907.459**	**1 016.815**	**1 259.195**	**1 449.366**	**1 824.155**	**2 058.586**

Table H.2A: Optimal total cost requirement per cost component for Non Scheme Specific Assets

Cost component	Financial Year (Amounts in Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
O&M	54.211	57.503	61.009	64.521	68.584	72.737	77.139	81.798	86.797	92.061
Renewal	-	120.271	1.081	-	27.051	1.614	149.890	3.915	3.081	-
Upgrade & New	-	-	-	-	-	-	-	-	-	-
Disposal	-	-	-	-	-	-	-	-	-	-
Total	**54.211**	**177.774**	**62.091**	**64.521**	**95.635**	**74.351**	**227.029**	**85.713**	**89.878**	**92.061**

Table H.2B: Adjusted Optimal total cost requirement per cost component for Non Scheme Specific Assets

Cost Component	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
O&M	54.210	57.503	61.010	64.522	68.582	72.737	77.140	81.798	86.796	92.061
Renewal	-	18.041	20.909	19.678	21.338	21.479	48.284	53.009	57.754	53.217
Upgrade & New	-	-	-	-	-	-	-	-	-	-
Disposal	-	-	-	-	-	-	-	-	-	-
Total	**54.210**	**75.544**	**81.919**	**84.200**	**89.920**	**94.216**	**125.424**	**134.807**	**144.550**	**145.278**

Table H.3A: Optimal total cost requirement per asset facility category for Scheme Specific

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	22.339	50.245	25.140	26.587	84.377	29.973	31.787	33.707	35.766	37.936
Land	-	-	-	-	-	-	-	-	-	-
WR: Canals	139.688	524.357	230.491	248.312	639.778	310.428	1 016.392	706.687	760.717	400.269
WR: Dams	247.650	474.480	278.709	314.747	397.212	344.088	497.487	373.678	397.933	489.217
WR: Power Supply	0.143	0.230	0.161	0.752	0.181	0.192	0.204	0.216	0.488	0.243
WR: Pump stations	19.167	40.419	21.571	25.979	24.938	26.987	35.585	29.580	39.961	34.606
WR: Reservoirs	1.073	1.138	1.208	1.277	1.360	1.440	1.527	1.619	35.982	1.822
WR: Roads and bridge	3.035	5.983	3.416	3.613	3.840	4.073	8.425	4.580	4.860	5.155
WR: Steel Pipelines	15.801	64.749	17.783	23.261	57.659	47.586	22.484	99.789	25.300	27.965
WR: Telemetry	0.314	0.428	0.353	0.373	0.397	0.421	0.446	0.473	0.608	3.025
WR: Tunnels	50.445	54.302	56.772	60.040	82.616	67.685	71.781	76.117	317.895	85.666
WR: Water Treatment	0.198	0.210	0.223	0.236	0.251	0.266	1.726	0.299	0.318	0.337
WS: borehol	0.214	0.227	0.241	0.255	0.271	0.287	0.304	0.323	0.343	0.363
WS: Measuring facili	33.185	52.438	40.125	39.497	41.984	46.468	172.160	57.082	59.842	56.355
Total	**533.253**	**1 269.207**	**676.193**	**744.927**	**1 334.863**	**879.894**	**1 860.309**	**1 384.149**	**1 680.012**	**1 142.959**

Table H.3B: Adjusted optimal total cost requirement per asset facility category for Scheme Specific

Asset Facility Category	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	22.339	27.679	29.721	30.888	40.452	45.762	46.467	44.896	46.146	46.392
Land	-	-	-	-	-	-	-	-	-	-
WR: Canals	139.688	204.600	233.092	252.697	327.674	389.835	552.350	693.205	932.887	1 068.307
WR: Dams	247.650	294.460	315.244	332.060	359.746	383.626	426.769	444.696	469.588	512.727
WR: Power Supply	0.143	0.164	0.174	0.271	0.302	0.317	0.312	0.294	0.377	0.418
WR: Pump stations	19.167	23.344	25.035	26.541	27.801	29.251	31.934	33.377	38.030	41.660
WR: Reservoirs	1.073	1.138	1.208	1.277	1.358	1.441	1.528	1.620	11.997	17.583
WR: Roads and bridge	3.035	3.635	3.893	4.061	4.233	4.417	5.415	5.833	6.220	6.405
WR: Steel Pipelines	15.801	23.959	26.061	27.249	33.296	41.712	42.440	58.517	66.660	67.588
WR: Telemetry	0.313	0.347	0.369	0.388	0.411	0.432	0.455	0.479	0.539	1.582
WR: Tunnels	50.445	53.628	56.909	60.168	66.752	71.966	75.892	79.321	154.911	197.218
WR: Water Treatment	0.198	0.210	0.223	0.236	0.251	0.267	0.571	0.674	0.739	0.733
WS: borehol	0.214	0.227	0.241	0.255	0.271	0.287	0.304	0.322	0.343	0.364
WS: Measuring facili	33.185	37.786	40.737	42.790	44.912	47.503	74.757	86.133	95.717	97.610
Total	**533.251**	**671.175**	**732.907**	**778.882**	**907.459**	**1 016.815**	**1 259.195**	**1 449.366**	**1 824.155**	**2 058.586**

Table H.4A: Optimal total cost requirement per asset facility category for Non-Scheme specific assets

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	6.687	14.353	7.526	7.959	35.496	8.973	10.170	10.091	10.707	11.357
WR: Dams	0.015	0.016	0.017	0.018	0.020	0.021	0.022	0.023	0.025	0.026
WR: Reservoirs	0.012	0.013	0.014	0.015	0.031	0.017	0.018	0.019	0.393	0.021
WR: Telemetry	0.037	0.040	0.042	0.045	0.047	0.050	0.053	0.056	0.166	0.064
WR: Water Treatment	0.052	0.055	0.059	0.062	0.066	0.554	0.321	0.079	0.084	0.089
WS: Measuring facili	47.406	163.296	54.432	56.422	59.974	64.737	216.445	75.445	78.502	80.504
Total	**54.211**	**177.774**	**62.091**	**64.521**	**95.635**	**74.351**	**227.029**	**85.713**	**89.878**	**92.061**

Table H.4B: Adjusted Optimal total cost requirement per asset facility category for Non-Scheme specific assets

Cost Component	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	6.687	8.182	8.778	9.136	13.547	15.892	16.169	15.280	15.577	15.365
WR: Dams	0.015	0.016	0.018	0.018	0.019	0.021	0.022	0.024	0.025	0.027
WR: Reservoirs	0.013	0.014	0.014	0.015	0.018	0.020	0.021	0.021	0.133	0.196
WR: Telemetry	0.038	0.040	0.043	0.045	0.047	0.050	0.054	0.056	0.092	0.112
WR: Water Treatment	0.052	0.055	0.058	0.062	0.066	0.167	0.240	0.246	0.257	0.244
WS: Measuring facili	47.405	67.237	73.008	74.924	76.222	78.066	108.919	119.180	128.466	129.336
Total	**54.210**	**75.544**	**81.919**	**84.200**	**89.920**	**94.216**	**125.424**	**134.807**	**144.550**	**145.278**

Table H.5: Adjusted Optimal total cost requirement per Scheme, including Non Scheme specific assets

SCHEME NAME	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Amabele Dam	0.124	0.131	0.139	0.147	0.156	0.166	0.176	0.186	0.198	0.210
Amatola- Wriggleswade Dam	5.634	6.119	6.522	6.971	7.625	8.215	8.634	8.974	9.548	11.230
Balura Dam	0.099	0.105	0.111	0.118	0.125	0.133	0.141	0.149	0.159	0.168
Beervlei Dam	1.704	2.358	2.550	2.623	2.732	2.864	2.957	2.976	3.433	5.115
Bekruipkop Dam	0.032	0.034	0.036	0.038	0.040	0.043	0.045	0.048	0.051	0.054
Berg River Dam (Dasbos-Drakenstein)	83.531	91.011	96.843	102.382	115.530	125.810	142.720	150.749	160.752	170.219
Binfield Park Dam Ec	2.033	2.191	2.328	2.523	2.710	2.918	3.086	3.224	3.405	3.613
Blue Crane Dam	0.247	0.262	0.278	0.294	0.313	0.331	0.369	0.395	0.421	0.443
Brand River Miertjieskraal Dam	0.637	0.742	0.793	0.830	0.901	0.969	1.358	1.490	1.599	1.616
Breede River Greater Brandvlei Dam	9.550	11.264	12.052	13.058	14.329	15.303	19.931	21.906	23.960	25.656
Buffalo River- Floriskraal Dam	1.413	1.731	1.884	1.963	2.438	2.711	3.284	3.379	3.676	3.753
Buffeljagts River & Buffeljagts Dam	4.142	8.585	9.481	9.602	9.406	9.248	9.873	13.210	14.970	15.278
Bushmanskrantz Dam	6.546	6.944	7.367	7.791	12.550	15.133	15.578	14.845	15.180	15.011
Corana Dam	0.938	1.050	1.118	1.175	1.279	1.365	1.539	1.627	1.725	1.794
Cordiers River - Oukloof Dam	0.392	0.474	0.508	0.532	0.566	0.596	0.760	0.825	0.882	0.900

SCHEME NAME	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Dabi Dam	0.133	0.157	0.168	0.175	0.183	0.192	0.290	0.325	0.351	0.355
Debe Dam	0.467	0.496	0.526	0.556	0.596	0.634	0.689	0.733	0.779	0.826
Dimbaza Dam	0.107	0.114	0.121	0.128	0.136	0.144	0.154	0.163	0.173	0.183
Donkies River - Verkeerdevlei Dam	0.144	0.153	0.162	0.172	0.182	0.193	0.205	0.218	0.231	0.245
Donnybrook 1 Dam	0.004	0.004	0.004	0.005	0.005	0.005	0.006	0.006	0.006	0.007
Donnybrook 2 Dam	0.026	0.028	0.029	0.031	0.033	0.035	0.037	0.039	0.042	0.044
Doorn River Dam	1.428	1.910	2.063	2.127	2.341	2.583	3.164	3.292	3.472	3.485
Duivenhoks River - Duivenhoks Dam	0.582	0.694	0.744	0.797	0.855	0.901	0.931	0.952	1.011	1.316
Elands River -Elandskloof Dam	3.922	4.910	5.276	5.936	6.855	7.394	8.276	11.224	12.738	13.055
Gamka River - Gamka Dam (Beaufort West)	2.031	2.448	2.624	2.734	2.932	3.092	3.547	3.816	4.066	4.197
Gamka River - Gamkapoort Dam	2.379	3.113	3.355	3.480	4.247	4.682	4.789	15.127	37.239	47.726
Gamtoos River -Kouga & Loerie Dams	42.517	62.707	68.124	71.593	81.579	87.134	97.165	107.232	133.524	149.577
Gcuwa Weir	0.197	0.209	0.240	0.257	0.271	0.284	0.297	0.309	0.413	0.476
Geluk Dam	0.061	0.064	0.068	0.072	0.077	0.081	0.086	0.091	0.097	0.103
Glen Brock Dam	2.400	4.250	4.661	4.696	4.652	4.636	4.840	4.765	4.932	4.983
Glen Mellville Dam / Lower Fish Sundays	12.866	14.573	15.803	17.643	21.265	23.884	29.085	43.300	56.599	64.097
Goukou River - Grootbos -Berg Dam	1.584	1.680	1.783	2.503	4.782	5.916	6.106	5.502	5.507	5.170
Gwaba Dam	0.044	0.047	0.049	0.052	0.056	0.059	0.063	0.066	0.070	0.075
Gxetu Dam	0.375	0.398	0.422	0.446	0.475	0.503	0.534	0.566	0.601	0.637
Hartenbosch River - Hartebeeskuil Dam	0.322	1.235	1.390	1.372	1.287	1.250	1.151	1.101	1.128	1.075
Jan Tshatshu Dam	0.222	0.235	0.250	0.264	0.281	0.298	0.316	0.335	0.355	0.377
Kamastone Dam	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022
Kat River Dam	2.584	3.256	3.502	3.695	4.084	4.426	5.434	5.705	6.138	6.952
Keisies River-Pietersfontein Dam	0.183	0.215	0.229	0.240	0.251	0.263	0.295	0.312	0.331	0.417
Keiskammahoek- Cata Dam	6.947	13.368	14.717	14.864	14.683	14.621	14.441	14.467	15.061	15.633
Keiskhoek-Mnyameni Dam	1.176	1.505	1.619	1.678	1.732	1.792	1.844	1.889	1.983	2.212
Kingna River -Portjieskloof Dam	0.625	0.700	0.745	0.804	0.938	1.024	1.245	1.313	1.390	1.412
Klipplaat River- Waterdown Dam	18.376	20.937	22.342	23.519	24.803	31.088	33.750	34.395	37.353	39.241

SCHEME NAME	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Konings River -Klipberg Dam	0.436	0.480	0.511	0.538	0.576	0.610	0.643	0.674	0.712	0.773
Korente -Vette River Korentepoort Dam	2.908	5.728	6.313	7.243	9.519	10.549	11.067	10.152	10.231	12.782
Kromme River- Impofu	7.846	9.074	9.694	10.275	11.384	12.512	14.697	15.438	16.331	17.417
Kubusi River- Gubu Dam	2.422	2.735	2.934	3.083	3.254	3.423	3.752	3.965	4.289	4.542
Kuzitungu Dam	0.011	0.011	0.012	0.013	0.013	0.014	0.015	0.016	0.017	0.018
Kwabhaca-Ntenetyane Dam	2.116	3.108	3.374	3.451	3.495	3.555	3.584	3.580	3.723	3.850
Laing Dam	2.271	3.519	3.833	4.132	4.214	4.314	4.571	4.534	4.734	4.800
Lanti Weir/Qamata Irrigation	5.292	6.518	6.997	7.370	11.088	15.745	16.502	19.622	23.673	25.303
Leeu River Leeu - Gamka Dam	0.599	0.660	0.703	0.740	0.822	0.884	1.057	1.240	1.357	1.403
Libode - Mhlanga Dam	2.788	3.075	3.274	3.446	3.639	3.839	4.132	4.373	4.637	4.909
Lower Berg River (Voelvei & Misverstand)	18.010	21.861	24.038	28.116	41.244	47.983	53.434	71.710	105.455	151.437
Lower Sundays Scheme	11.926	13.133	13.988	16.398	27.863	35.142	36.282	33.530	33.946	33.935
Macubeni Dam	1.013	1.075	1.140	1.206	1.339	1.443	1.523	1.593	1.682	1.803
Magwa Dam	1.289	1.385	1.470	1.553	1.647	1.744	1.846	1.954	2.072	2.195
Maipase Dam	0.008	0.009	0.009	0.010	0.010	0.011	0.012	0.012	0.013	0.014
Maitland Dam	0.067	0.071	0.076	0.080	0.085	0.090	0.096	0.102	0.209	0.268
Majola Dam	0.455	0.483	0.512	0.541	0.576	0.610	0.647	0.686	0.728	0.773
Maluti - Belfort Dam	0.892	1.069	1.145	1.195	1.247	1.301	1.353	1.403	1.477	1.553
Mankazana Dam	1.851	1.964	2.084	2.204	2.342	2.484	2.634	2.794	2.964	3.144
Masela 1 Dam	0.010	0.011	0.011	0.012	0.013	0.014	0.014	0.015	0.016	0.017
Masela 2 Dam	0.034	0.036	0.038	0.041	0.043	0.046	0.049	0.052	0.055	0.058
Mdantsane 1 Dam	0.012	0.061	0.070	0.067	0.062	0.057	0.074	0.072	0.074	0.068
Mdantsane 2 Dam	0.114	0.521	0.588	0.568	0.523	0.485	0.428	0.351	0.338	0.313
Mhlahlane-Mabaleni Dam	4.627	4.908	5.207	5.507	5.901	6.279	6.856	7.300	7.757	8.179
Mitford Dam	0.761	0.808	0.857	0.906	0.963	1.022	1.084	1.149	1.219	1.293
Mossel Bay - Wolwedans Dam	10.263	11.756	12.576	13.401	15.330	16.742	20.799	22.094	33.429	40.167
Mount Coke Dam	0.091	0.097	0.102	0.108	0.115	0.122	0.130	0.137	0.146	0.155
Msengeni Dam	0.106	0.113	0.120	0.127	0.135	0.143	0.151	0.161	0.170	0.181

SCHEME NAME	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Mtata Dam	19.554	20.892	22.197	23.457	25.882	27.846	29.366	30.704	32.519	34.626
Nahoon River-Dam	1.788	2.048	2.205	2.322	2.448	2.646	2.972	3.130	3.401	4.701
Ncora Dam	7.054	14.605	16.129	16.087	18.072	21.830	24.826	26.203	32.747	36.178
Ndlambe(Tyhefu) Dam	0.033	0.035	0.037	0.039	0.042	0.044	0.047	0.050	0.053	0.056
Ngwekazi Dam	0.209	0.222	0.236	0.249	0.265	0.281	0.298	0.316	0.335	0.356
Noncampa 1 Dam	0.103	0.109	0.115	0.122	0.130	0.138	0.146	0.155	0.164	0.174
Nqadu Dam	0.944	1.001	1.062	1.123	1.202	1.285	1.431	1.530	1.627	1.713
Nqwelo Dam	0.250	0.265	0.281	0.297	0.316	0.335	0.355	0.377	0.400	0.424
Ntsikizimi Dam	0.043	0.046	0.049	0.052	0.055	0.058	0.062	0.065	0.069	0.074
Olifants River - Stompdrift Dam	38.606	57.948	72.761	78.958	84.052	86.423	127.942	145.946	158.579	162.282
Olifants River Bulshoek Dam & Canal	28.490	45.662	49.821	50.611	54.356	56.481	149.018	250.033	414.278	499.501
Olifants River Dam Clanwilliam (	4.717	5.498	5.877	6.213	8.681	10.053	14.774	15.736	16.761	16.391
Orange-Fish GWS	57.561	69.054	73.995	78.480	96.345	107.190	130.010	134.410	200.161	232.924
Outspan (Chalumna) Dam	0.016	0.017	0.018	0.019	0.020	0.021	0.023	0.024	0.026	0.027
Oxkraal Dam (Ciskei)	17.533	18.833	20.020	21.143	22.434	23.778	25.176	26.625	28.314	30.207
Palmiet River (Kogelberg & Rockview)	3.783	4.415	4.720	5.195	6.376	7.206	8.385	8.545	8.948	9.030
Pleasant View Dam	0.328	0.348	0.369	0.391	0.415	0.440	0.467	0.495	0.526	0.557
Qamata (Lubisi) Dam	3.425	3.910	4.201	4.468	4.706	4.943	5.453	5.748	6.346	6.987
Qibira Dam	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003
Redhill Dam	0.092	0.097	0.103	0.109	0.116	0.123	0.131	0.138	0.147	0.156
Roodefontein Dam	0.858	0.950	1.011	1.064	1.384	1.571	2.184	2.336	2.485	2.630
Rooikrantz Dam	7.088	7.643	8.119	8.574	9.102	9.709	10.361	10.954	11.612	12.330
Roxeni Dam	1.883	1.997	2.119	2.241	2.382	2.527	2.679	2.841	3.015	3.198
Rura Dam	0.201	0.213	0.226	0.239	0.254	0.269	0.286	0.303	0.321	0.341
Sanddrift River Roode-Elsberg Lakenvalle	3.615	4.736	5.106	5.412	5.775	6.283	6.872	7.133	7.516	8.401
Sheshegu Dam	0.382	0.595	0.649	0.659	0.663	0.670	0.669	0.661	0.685	0.704
Shiloh Dam	1.223	1.297	1.376	1.455	1.547	1.640	1.740	1.845	1.958	2.076
Sinqumeni Dam	0.215	0.228	0.242	0.256	0.272	0.288	0.306	0.324	0.344	0.365

SCHEME NAME	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Tarka River - Komandodrift Dam	2.840	3.078	3.272	3.452	3.682	4.030	5.882	6.568	7.091	7.201
Tentergate Dam	0.248	0.272	0.289	0.304	0.321	0.339	0.358	0.378	0.401	0.424
Tierkloof Dam Gws	0.049	0.052	0.055	0.058	0.062	0.065	0.082	0.089	0.096	0.123
Toleni Dam	2.177	2.373	2.523	2.660	2.815	2.974	3.140	3.314	3.510	3.734
Tsojana Dam	1.718	1.845	1.960	2.069	2.195	2.324	2.546	2.741	2.923	3.082
Tyutyu Dam	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022	0.024	0.025
Vals River Ben - Etive Dam	0.122	0.211	0.232	0.234	0.240	0.243	0.264	0.263	0.272	0.273
Woburn 2 Dam	0.772	0.827	0.878	0.927	0.984	1.042	1.104	1.168	1.238	1.313
Woburn 3 Dam	0.359	0.381	0.405	0.428	0.455	0.482	0.511	0.542	0.575	0.610
Xilinxa Dam	0.595	1.054	1.192	1.209	1.195	1.188	1.182	1.138	1.343	1.449
Xonxa Dam	23.614	25.123	26.662	28.186	29.988	31.809	33.712	35.712	37.881	40.317
Zanyokwe-Sandile Dam	3.661	6.329	6.951	7.074	7.360	7.688	8.534	8.459	8.860	8.878
Subtotal	**533.120**	**670.915**	**732.199**	**778.092**	**894.349**	**980.384**	**1219.959**	**1426.978**	**1824.476**	**2073.995**
Non-Scheme Specific	54.211	75.544	81.918	84.199	89.922	94.215	125.423	134.807	144.551	145.278
Total	**587.331**	**746.459**	**814.116**	**862.292**	**984.269**	**1074.599**	**1345.382**	**1561.785**	**1969.027**	**2219.272**

APPENDIX I – Maintenance Strategy, Works and Cost Forecast

1. INTRODUCTION

'Maintenance' is *"The actions required to enable an asset to achieve its expected life – recurrent work necessary to preserve or maintain an asset so it can be used for its designated purpose. In other words, recurrent work necessary to prevent deterioration. Maintenance work can be planned or unplanned. Planned maintenance is work to prevent known failure modes and can be time or condition-based. Maintenance includes all of the actions necessary for retaining an asset as near as practicable to its original condition, but excludes renewals.*

2. MAINTENANCE STRATEGY

Refer to the DWS Infrastructure Maintenance Strategy. Table I.1 summarises the Maintenance Strategy applied per Asset Condition Grading in this AMP.

Table I.1: Maintenance Strategy per Asset Condition Grading

Condition Grade	Description	Maintenance Strategy
3	Fair	Significant/improved maintenance required.
4	Good	Target condition maintenance. Preventive maintenance.
5	Very Good	Preventative and Normal Maintenance

3. MAINTENANCE WORKS

Table I.2 Maintenance Works (Scheme Specific)

Asset Facility Category	Maintenance Strategy (No. of Asset Components)			Total
	Significant / improved	Target condition	Preventative and Normal	
Borehole	-	2	-	2
Buildings	277	198	9	484
Canals	837	400	12	1 249
Dams	993	918	91	2 002
Measuring facilities	113	81	14	208
Pipelines	92	11	31	134
Power supply	6	1	-	7
Pump stations	50	165	176	391
Reservoirs	18	4	-	22
Roads	26	38	17	81
Telemetry	1	6	-	7
Tunnels	41	49	14	104
Water Treatment	5	4	-	9
Total	**2 459**	**1 877**	**364**	**4 700**

Table I.3 Maintenance Works (Non-Scheme Specific)

Asset Facility Category	Maintenance Strategy (No. of Asset Components)			Total
	Significant / improved	Target condition	Preventative and Normal	
Buildings	98	26	-	124
Dams	2	-	-	2
Measuring facilities	147	91	10	248
Reservoirs	2	-	-	2
Telemetry	1	2	-	3
Water Treatment	2	-	-	2
Total	**252**	**119**	**10**	**381**

4. FINANCIAL FORECAST – OPERATIONS AND MAINTENANCE

The forecasted maintenance financial requirements for the next 10 years are in Table I.4.

Table I.4: Operations and Maintenance Costs per Asset Facility Category Forecast Scheme Specific

Asset Facility Category	Expenditure Type		Financial Year (Amounts in Million Rands)									
			2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	O&M	O	1.995	2.116	2.245	2.374	2.523	2.676	2.838	3.010	3.193	3.387
		M	20.344	21.580	22.896	24.213	25.738	27.297	28.949	30.697	32.573	34.548
Land	O&M	O	-	-	-	-	-	-	-	-	-	-
		M	-	-	-	-	-	-	-	-	-	-
WR: Canals	O&M	O	32.661	34.645	36.757	38.873	41.320	43.823	46.475	49.282	52.294	55.465
		M	107.027	113.527	120.450	127.383	135.404	143.604	152.294	161.493	171.362	181.754
WR: Dams	O&M	O	81.487	86.436	91.707	96.985	103.092	109.335	115.952	122.955	130.469	138.382
		M	166.163	176.255	187.003	197.766	210.219	222.950	236.442	250.723	266.044	282.179
WR: Power Supply	O&M	O	0.047	0.050	0.053	0.056	0.060	0.063	0.067	0.071	0.075	0.080
		M	0.096	0.102	0.108	0.115	0.122	0.129	0.137	0.145	0.154	0.163
WR: Pump stations	O&M	O	5.637	5.980	6.344	6.709	7.132	7.564	8.022	8.506	9.026	9.573
		M	13.530	14.351	15.226	16.103	17.117	18.153	19.252	20.415	21.662	22.976
WR: Reservoirs	O&M	O	0.134	0.142	0.151	0.160	0.170	0.180	0.191	0.202	0.215	0.228
		M	0.939	0.996	1.057	1.117	1.188	1.260	1.336	1.417	1.503	1.594
WR: Roads and bridge	O&M	O	-	-	-	-	-	-	-	-	-	-
		M	3.035	3.220	3.416	3.613	3.840	4.073	4.319	4.580	4.860	5.155
WR: Steel Pipelines	O&M	O	1.436	1.524	1.617	1.710	1.817	1.927	2.044	2.167	2.300	2.439
		M	14.365	15.237	16.166	17.097	18.173	19.274	20.440	21.675	23.000	24.394
WR: Telemetry	O&M	O	0.056	0.060	0.063	0.067	0.071	0.075	0.080	0.085	0.090	0.095
		M	0.257	0.273	0.290	0.306	0.326	0.345	0.366	0.388	0.412	0.437
WR: Tunnels	O&M	O	10.797	11.453	12.151	12.851	13.660	14.487	15.364	16.292	17.287	18.336
		M	39.648	42.056	44.621	47.189	50.160	53.198	56.417	59.825	63.481	67.331

Asset Facility Category	Expenditure Type		Financial Year (Amounts in Million Rands)									
			2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
WR: Water Treatment	O&M	O	0.065	0.069	0.073	0.078	0.083	0.088	0.093	0.098	0.104	0.111
		M	0.133	0.141	0.150	0.158	0.168	0.179	0.189	0.201	0.213	0.226
WS: borehol	O&M	O	0.092	0.097	0.103	0.109	0.116	0.123	0.130	0.138	0.147	0.156
		M	0.122	0.130	0.138	0.146	0.155	0.164	0.174	0.184	0.196	0.208
WS: Measuring facili	O&M	O	10.919	11.582	12.289	12.996	13.814	14.651	15.538	16.476	17.483	18.543
		M	22.266	23.618	25.058	26.501	28.169	29.875	31.683	33.597	35.650	37.812
Total	**O&M**	**O**	**145.327**	**154.153**	**163.553**	**172.967**	**183.858**	**194.992**	**206.793**	**219.283**	**232.683**	**246.795**
		M	**387.926**	**411.486**	**436.578**	**461.707**	**490.779**	**520.500**	**551.999**	**585.339**	**621.110**	**658.778**

Table I.5: Operations and Maintenance Costs per Asset Facility Category Forecast (Non-Scheme specific)

Asset Facility Category		Expenditure Type	Financial Year (Amounts in Million Rands)									
			2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	O&M	O	0.597	0.633	0.672	0.711	0.755	0.801	0.850	0.901	0.956	1.014
		M	6.090	6.460	6.854	7.249	7.705	8.172	8.666	9.190	9.751	10.343
WR: Dams	O&M	O	0.005	0.005	0.006	0.006	0.006	0.007	0.007	0.008	0.008	0.009
		M	0.010	0.011	0.012	0.012	0.013	0.014	0.015	0.016	0.017	0.018
WR: Reservoirs	O&M	O	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003
		M	0.011	0.012	0.012	0.013	0.014	0.015	0.016	0.016	0.017	0.019
WR: Telemetry	O&M	O	0.007	0.007	0.008	0.008	0.008	0.009	0.010	0.010	0.011	0.011
		M	0.031	0.033	0.035	0.037	0.039	0.041	0.044	0.046	0.049	0.052
WR: Water Treatment	O&M	O	0.017	0.018	0.019	0.020	0.022	0.023	0.024	0.026	0.027	0.029
		M	0.035	0.037	0.039	0.042	0.044	0.047	0.050	0.053	0.056	0.059
WS: Measuring facili	O&M	O	15.598	16.546	17.555	18.565	19.734	20.929	22.196	23.536	24.975	26.489
		M	31.807	33.739	35.796	37.857	40.240	42.677	45.260	47.994	50.927	54.015
Total	O&M	O	**16.226**	**17.211**	**18.261**	**19.312**	**20.528**	**21.771**	**23.089**	**24.483**	**25.979**	**27.555**
		M	**37.985**	**40.292**	**42.749**	**45.209**	**48.056**	**50.966**	**54.050**	**57.315**	**60.817**	**64.506**

Table I.6: Operations and Maintenance Costs per Scheme and Non-Scheme Specific

SCHEME_NAME	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Amabele Dam	0.124	0.131	0.139	0.147	0.156	0.166	0.176	0.186	0.198	0.210
Amatola- Wriggleswade Dam	5.634	5.976	6.340	6.705	7.128	7.559	8.017	8.501	9.020	9.567
Balura Dam	0.099	0.105	0.111	0.118	0.125	0.133	0.141	0.149	0.159	0.168
Beervlei Dam	1.704	1.808	1.918	2.029	2.156	2.287	2.425	2.572	2.729	2.894
Bekruipkop Dam	0.032	0.034	0.036	0.038	0.040	0.043	0.045	0.048	0.051	0.054
Berg River Dam (Dasbos-Drakenstein)	83.531	88.604	94.007	99.418	105.678	112.078	118.860	126.040	133.742	141.853
Binfield Park Dam Ec	2.033	2.156	2.288	2.419	2.572	2.727	2.892	3.067	3.255	3.452
Blue Crane Dam	0.247	0.262	0.278	0.294	0.313	0.331	0.352	0.373	0.396	0.420
Brand River Miertjieskraal Dam	0.637	0.675	0.716	0.758	0.805	0.854	0.906	0.960	1.019	1.081
Breede River Greater Brandvlei Dam	9.550	10.130	10.748	11.367	12.083	12.814	13.590	14.411	15.291	16.219
Buffalo River- Floriskraal Dam	1.413	1.499	1.591	1.682	1.788	1.896	2.011	2.132	2.263	2.400
Buffeljagts River & Buffeljagts Dam	4.142	4.393	4.661	4.929	5.240	5.557	5.893	6.249	6.631	7.033
Bushmanskrantz Dam	6.546	6.944	7.367	7.791	8.282	8.783	9.315	9.878	10.481	11.117
Corana Dam	0.938	0.995	1.055	1.116	1.187	1.258	1.335	1.415	1.502	1.593
Cordiers River - Oukloof Dam	0.392	0.416	0.441	0.467	0.496	0.526	0.558	0.592	0.628	0.666
Dabi Dam	0.133	0.141	0.150	0.158	0.168	0.179	0.189	0.201	0.213	0.226
Debe Dam	0.467	0.496	0.526	0.556	0.591	0.627	0.665	0.705	0.748	0.794
Dimbaza Dam	0.107	0.114	0.121	0.128	0.136	0.144	0.153	0.162	0.172	0.182
Donkies River - Verkeerdevlei Dam	0.144	0.153	0.162	0.172	0.182	0.193	0.205	0.218	0.231	0.245
Donnybrook 1 Dam	0.004	0.004	0.004	0.005	0.005	0.005	0.006	0.006	0.006	0.007
Donnybrook 2 Dam	0.026	0.028	0.029	0.031	0.033	0.035	0.037	0.039	0.042	0.044
Doorn River Dam	1.428	1.514	1.607	1.699	1.806	1.916	2.032	2.154	2.286	2.425
Duivenhoks River - Duivenhoks Dam	0.582	0.617	0.655	0.692	0.736	0.781	0.828	0.878	0.932	0.988
Elands River -Elandskloof Dam	3.922	4.160	4.413	4.667	4.961	5.262	5.580	5.917	6.279	6.660
Gamka River - Gamka Dam (Beaufort West)	2.031	2.154	2.286	2.417	2.570	2.725	2.890	3.065	3.252	3.449
Gamka River - Gamkapoort Dam	2.379	2.523	2.677	2.831	3.009	3.192	3.385	3.589	3.808	4.039
Gamtoos River -Kouga & Loerie Dams	42.517	45.099	47.849	50.603	53.790	57.047	60.500	64.154	68.074	72.203
Gcuwa Weir	0.197	0.209	0.222	0.235	0.250	0.265	0.281	0.298	0.316	0.335

SCHEME_NAME	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Geluk Dam	0.061	0.064	0.068	0.072	0.077	0.081	0.086	0.091	0.097	0.103
Glen Brock Dam	2.400	2.546	2.701	2.856	3.036	3.220	3.415	3.621	3.843	4.076
Glen Mellville Dam / Lower Fish Sundays	12.866	13.647	14.479	15.313	16.277	17.263	18.307	19.413	20.600	21.849
Goukou River - Grootbos -Berg Dam	1.584	1.680	1.783	1.885	2.004	2.125	2.254	2.390	2.536	2.690
Gwaba Dam	0.044	0.047	0.049	0.052	0.056	0.059	0.063	0.066	0.070	0.075
Gxetu Dam	0.375	0.398	0.422	0.446	0.475	0.503	0.534	0.566	0.601	0.637
Hartenbosch River - Hartebeeskuil Dam	0.322	0.342	0.363	0.384	0.408	0.433	0.459	0.486	0.516	0.547
Jan Tshatshu Dam	0.222	0.235	0.250	0.264	0.281	0.298	0.316	0.335	0.355	0.377
Kamastone Dam	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022
Kat River Dam	2.584	2.741	2.909	3.076	3.270	3.468	3.677	3.900	4.138	4.389
Keisies River-Pietersfontein Dam	0.183	0.194	0.205	0.217	0.231	0.245	0.260	0.275	0.292	0.310
Keiskammahoek- Cata Dam	6.947	7.369	7.818	8.268	8.789	9.321	9.885	10.482	11.122	11.797
Keiskhoek-Mnyameni Dam	1.176	1.247	1.323	1.400	1.488	1.578	1.673	1.774	1.883	1.997
Kingna River -Portjieskloof Dam	0.625	0.663	0.703	0.744	0.791	0.839	0.889	0.943	1.001	1.061
Klipplaat River- Waterdown Dam	18.376	19.492	20.681	21.871	23.248	24.656	26.148	27.728	29.422	31.207
Konings River -Klipberg Dam	0.436	0.463	0.491	0.519	0.552	0.585	0.621	0.658	0.698	0.741
Korente -Vette River Korentepoort Dam	2.908	3.084	3.272	3.461	3.678	3.901	4.137	4.387	4.655	4.938
Kromme River- Impofu	7.846	8.322	8.829	9.338	9.926	10.527	11.164	11.838	12.562	13.323
Kubusi River- Gubu Dam	2.422	2.569	2.725	2.882	3.064	3.249	3.446	3.654	3.877	4.112
Kuzitungu Dam	0.011	0.011	0.012	0.013	0.013	0.014	0.015	0.016	0.017	0.018
Kwabhaca-Ntenetyane Dam	2.116	2.245	2.381	2.519	2.677	2.839	3.011	3.193	3.388	3.594
Laing Dam	2.271	2.409	2.556	2.703	2.873	3.047	3.232	3.427	3.637	3.857
Lanti Weir/Qamata Irrigation	5.292	5.613	5.956	6.299	6.695	7.101	7.530	7.985	8.473	8.987
Leeu River Leeu - Gamka Dam	0.599	0.635	0.674	0.713	0.758	0.803	0.852	0.903	0.959	1.017
Libode - Mhlanga Dam	2.788	2.957	3.138	3.318	3.527	3.741	3.967	4.207	4.464	4.735
Lower Berg River (Voelvei & Misverstand)	18.010	19.103	20.268	21.435	22.785	24.165	25.627	27.175	28.835	30.584
Lower Sundays Scheme	11.926	12.651	13.422	14.194	15.088	16.002	16.97	17.995	19.095	20.253
Macubeni Dam	1.013	1.075	1.140	1.206	1.282	1.359	1.442	1.529	1.622	1.720
Magwa Dam	1.289	1.368	1.451	1.535	1.631	1.730	1.835	1.946	2.065	2.190

SCHEME_NAME	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Maipase Dam	0.008	0.009	0.009	0.010	0.010	0.011	0.012	0.012	0.013	0.014
Maitland Dam	0.067	0.071	0.076	0.080	0.085	0.090	0.096	0.102	0.108	0.114
Majola Dam	0.455	0.483	0.512	0.541	0.576	0.610	0.647	0.686	0.728	0.773
Maluti - Belfort Dam	0.892	0.946	1.004	1.062	1.129	1.197	1.269	1.346	1.428	1.515
Mankazana Dam	1.851	1.964	2.084	2.204	2.342	2.484	2.634	2.794	2.964	3.144
Masela 1 Dam	0.010	0.011	0.011	0.012	0.013	0.014	0.014	0.015	0.016	0.017
Masela 2 Dam	0.034	0.036	0.038	0.041	0.043	0.046	0.049	0.052	0.055	0.058
Mdantsane 1 Dam	0.012	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.020
Mdantsane 2 Dam	0.114	0.121	0.128	0.136	0.144	0.153	0.162	0.172	0.183	0.194
Mhlahlane-Mabaleni Dam	4.627	4.908	5.207	5.507	5.853	6.208	6.583	6.981	7.408	7.857
Mitford Dam	0.761	0.808	0.857	0.906	0.963	1.022	1.084	1.149	1.219	1.293
Mossel Bay - Wolwedans Dam	10.263	10.886	11.550	12.215	12.984	13.770	14.603	15.485	16.432	17.428
Mount Coke Dam	0.091	0.097	0.102	0.108	0.115	0.122	0.130	0.137	0.146	0.155
Msengeni Dam	0.106	0.113	0.120	0.127	0.135	0.143	0.151	0.161	0.170	0.181
Mtata Dam	19.554	20.742	22.007	23.273	24.739	26.237	27.825	29.505	31.308	33.207
Nahoon River-Dam	1.788	1.896	2.012	2.128	2.262	2.399	2.544	2.697	2.862	3.036
Ncora Dam	7.054	7.483	7.939	8.396	8.925	9.465	10.038	10.644	11.295	11.980
Ndlambe(Tyhefu) Dam	0.033	0.035	0.037	0.039	0.042	0.044	0.047	0.050	0.053	0.056
Ngwekazi Dam	0.209	0.222	0.236	0.249	0.265	0.281	0.298	0.316	0.335	0.356
Noncampa 1 Dam	0.103	0.109	0.115	0.122	0.130	0.138	0.146	0.155	0.164	0.174
Nqadu Dam	0.944	1.001	1.062	1.123	1.194	1.266	1.343	1.424	1.511	1.603
Nqwelo Dam	0.250	0.265	0.281	0.297	0.316	0.335	0.355	0.377	0.400	0.424
Ntsikizimi Dam	0.043	0.046	0.049	0.052	0.055	0.058	0.062	0.065	0.069	0.074
Olifants River - Stompdrift Dam	38.606	40.951	43.448	45.948	48.842	51.800	54.934	58.252	61.812	65.561
Olifants River Bulshoek Dam & Canal	28.490	30.220	32.063	33.908	36.043	38.226	40.540	42.988	45.615	48.382
Olifants River Dam Clanwilliam (	4.717	5.004	5.309	5.615	5.968	6.330	6.713	7.118	7.553	8.011
Orange-Fish Gws	57.561	61.057	64.780	68.508	72.822	77.232	81.906	86.853	92.161	97.750
Outspan (Chalumna) Dam	0.016	0.017	0.018	0.019	0.020	0.021	0.023	0.024	0.026	0.027
Oxkraal Dam (Ciskei)	17.533	18.598	19.732	20.868	22.182	23.525	24.949	26.456	28.073	29.775

SCHEME_NAME	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Palmiet River (Kogelberg & Rockview)	3.783	4.012	4.257	4.502	4.785	5.075	5.382	5.707	6.056	6.424
Pleasant View Dam	0.328	0.348	0.369	0.391	0.415	0.440	0.467	0.495	0.526	0.557
Qamata (Lubisi) Dam	3.425	3.633	3.855	4.077	4.333	4.596	4.874	5.168	5.484	5.817
Qibira Dam	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003
Redhill Dam	0.092	0.097	0.103	0.109	0.116	0.123	0.131	0.138	0.147	0.156
Roodefontein Dam	0.858	0.911	0.966	1.022	1.086	1.152	1.222	1.295	1.374	1.458
Rooikrantz Dam	7.088	7.519	7.977	8.436	8.968	9.511	10.086	10.695	11.349	12.037
Roxeni Dam	1.883	1.997	2.119	2.241	2.382	2.527	2.679	2.841	3.015	3.198
Rura Dam	0.201	0.213	0.226	0.239	0.254	0.269	0.286	0.303	0.321	0.341
Sanddrift River Roode-Elsberg Lakenvalle	3.615	3.834	4.068	4.302	4.573	4.850	5.144	5.454	5.787	6.138
Sheshegu Dam	0.382	0.405	0.430	0.454	0.483	0.512	0.543	0.576	0.611	0.648
Shiloh Dam	1.223	1.297	1.376	1.455	1.547	1.640	1.740	1.845	1.958	2.076
Sinqumeni Dam	0.215	0.228	0.242	0.256	0.272	0.288	0.306	0.324	0.344	0.365
Tarka River - Komandodrift Dam	2.840	3.012	3.196	3.380	3.592	3.810	4.041	4.285	4.547	4.822
Tentergate Dam	0.248	0.264	0.280	0.296	0.314	0.333	0.353	0.375	0.398	0.422
Tierkloof Dam Gws	0.049	0.052	0.055	0.058	0.062	0.065	0.069	0.073	0.078	0.083
Toleni Dam	2.177	2.310	2.451	2.592	2.755	2.922	3.098	3.286	3.486	3.698
Tsojana Dam	1.718	1.822	1.934	2.045	2.174	2.305	2.445	2.592	2.751	2.918
Tyutyu Dam	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022	0.024	0.025
Vals River Ben - Etive Dam	0.122	0.129	0.137	0.145	0.154	0.163	0.173	0.184	0.195	0.207
Woburn 2 Dam	0.772	0.818	0.868	0.918	0.976	1.035	1.098	1.164	1.235	1.310
Woburn 3 Dam	0.359	0.381	0.405	0.428	0.455	0.482	0.511	0.542	0.575	0.610
Xilinxa Dam	0.595	0.631	0.669	0.708	0.752	0.798	0.846	0.897	0.952	1.010
Xonxa Dam	23.614	25.048	26.576	28.105	29.875	31.684	33.602	35.631	37.808	40.101
Zanyokwe-Sandile Dam	3.661	3.883	4.120	4.357	4.631	4.912	5.209	5.524	5.861	6.217
Subtotal	**533.120**	**565.497**	**599.978**	**634.515**	**674.470**	**715.310**	**758.603**	**804.414**	**853.578**	**905.350**
Non-Scheme Specific	54.211	57.503	61.009	64.521	68.584	72.737	77.139	81.798	86.797	92.061
Total	**587.331**	**623.000**	**660.987**	**699.036**	**743.053**	**788.047**	**835.742**	**886.212**	**940.375**	**997.410**

APPENDIX J – Renewals Strategy, Works and Expenditure Forecast

1 INTRODUCTION

'**Renewals Expenditure**' is: *"Expenditure on the replacement or rehabilitation of an asset." It is expenditure on an existing asset which returns the service potential or the life of the asset to that which it had originally. It is periodically required expenditure, and relatively large (material) in value compared with the value of the components or sub-components of the asset being renewed. Renewals may reduce operating and maintenance expenditure if completed at the optimum time."*

It is very important that the NWRIB always clearly distinguishes between New Capital/Upgrade Capital expenditure and Renewals Capital expenditure. The rate at which renewal work is being carried out *over time* compared with the annual provision for depreciation (the cost of consumption – the rate at which the assets are being used) is a good indicator of the extent to which the assets are being maintained, are improving, or are deteriorating.

2. RENEWALS STRATEGY

Table J.1 summarises the Renewal Strategy applied per Asset Condition Grading in this AMP.

Table J.1 Renewal Strategy per Asset Condition Grading

Condition Grade	Description	Renewal Strategy
0	Not Working	Complete replacement of the asset before operations can be revived
1	Very Poor	Stop operating immediately and renew the asset. Replacement needed (>50%)
2	Poor	Significant renewal required.

3. RENEWAL WORKS

Table J.2: Renewals works (asset components per renewals strategy and per asset facility category) for the first projected year (scheme specific)

Asset Facility Category	Renewal strategy (No. of Assets)		Total
	Stop operating immediately and renew the asset component	Significantly renew	
Borehole	0	0	0
Buildings	29	128	157
Canals	62	195	257
Dams	66	665	731
Measuring facilities	9	33	42
Pipelines	13	72	85
Power supply	0	2	2
Pump stations	27	8	35
Reservoirs	0	0	0
Roads	2	11	13
Telemetry	1	0	1
Tunnels	0	1	1
Water Treatment	0	0	0
Total	**209**	**1 115**	**1 324**

Table J.3: Renewals works (asset components per renewals strategy and per asset facility category) for the first projected year (non-scheme specific)

Asset Facility Category	Renewal strategy (No. of Assets)		Total
	Stop operating immediately and renew the asset	Significantly renew	
Buildings	4	38	**42**
Dams	-	-	**-**
Measuring facilities	10	527	**537**
Reservoirs	-	-	-
Telemetry	-	-	-
Water Treatment	-	-	-
Total	**14**	**565**	**579**

Table J.4: Renewal Works (asset components per facility category requiring renewal works)

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4. FINANCIAL FORECAST

The forecasted renewals requirements for the next 10 years are as shown in Tables J.5 to J.7.

Table J.5A: Identified Renewals Expenditure Forecasts for Scheme Specific Asset Components

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings		26.550	-	-	56.115	-	-	-	-	-
Land		-	-	-	-	-	-	-	-	-
WR: Canals		376.185	-	50.284	356.484	-	347.168	73.497	10.575	82.463
WR: Dams		211.774	-	19.995	83.901	11.803	145.094	-	1.419	68.656
WR: Power Supply		0.078	-	0.581	-	-	-	-	0.259	-
WR: Pump stations		16.001	-	3.167	0.689	1.270	8.312	0.659	9.273	2.057
WR: Reservoirs		-	-	-	0.003	-	-	-	34.263	-
WR: Roads and bridge		2.764	-	-	-	-	4.106	-	-	-
WR: Steel Pipelines		47.988	-	4.454	37.668	26.385	-	75.947	-	1.131
WR: Telemetry		0.095	-	-	-	-	-	-	0.106	2.492
WR: Tunnels		0.793	-	-	18.796	-	-	-	237.127	-
WR: Water Treatment		-	-	-	-	-	1.444	-	-	-
WS: borehol		-	-	-	-	-	-	-	-	-
WS: Measuring facili		17.238	2.778	-	-	1.942	124.940	7.009	6.709	-
Total		**699.464**	**2.778**	**78.481**	**553.656**	**41.400**	**631.062**	**157.111**	**299.732**	**156.800**

Table J.5B: Adjusted Renewals Expenditure Forecasts for Scheme Specific Asset Components

Cost Component	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	-	3.983	4.580	4.301	12.191	15.789	14.680	11.189	10.380	8.457
Land	-	-	-	-	-	-	-	-	-	-
WR: Canals	-	56.428	64.892	68.485	116.366	136.085	192.007	199.941	213.967	227.775
WR: Dams	-	31.766	36.531	37.307	46.433	51.339	74.374	71.017	73.074	92.165
WR: Power Supply	-	0.012	0.013	0.100	0.120	0.125	0.108	0.078	0.148	0.175
WR: Pump stations	-	2.400	2.760	3.067	2.971	3.026	4.253	4.181	7.104	8.929
WR: Reservoirs	-	-	-	-	0.000	0.001	0.001	0.001	10.279	15.761
WR: Roads and bridge	-	0.415	0.477	0.448	0.393	0.344	1.096	1.253	1.360	1.250
WR: Steel Pipelines	-	7.198	8.278	8.442	13.306	20.511	19.956	34.675	41.360	40.755
WR: Telemetry	-	0.014	0.016	0.015	0.014	0.012	0.009	0.006	0.037	1.050
WR: Tunnels	-	0.119	0.137	0.128	2.932	4.281	4.111	3.204	74.143	111.551
WR: Water Treatment	-	-	-	-	-	-	0.289	0.375	0.422	0.396
WS: borehol	-	-	-	-	-	-	-	-	-	-
WS: Measuring facili	-	2.586	3.390	3.293	2.929	2.977	27.536	36.060	42.584	41.255
Total	**-**	**104.920**	**121.075**	**125.586**	**197.654**	**234.488**	**338.420**	**361.980**	**474.860**	**549.518**

Table J.6A: Identified Renewals Expenditure Forecasts Non-Scheme Specific

Asset Facility Category		Financial Year (Amounts in Million Rands								
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings		7.260	-	-	27.036	-	0.654	-	-	-
WR: Reservoirs		-	-	-	0.015	-	-	-	0.373	-
WR: Telemetry		-	-	-	-	-	-	-	0.106	-
WR: Water Treatment		-	-	-	-	0.484	0.247	-	-	-
WS: Measuring facili		113.011	1.081	-	-	1.131	148.989	3.915	2.601	-
Total		**120.271**	**1.081**	**-**	**27.051**	**1.614**	**149.890**	**3.915**	**3.081**	**-**

Table J.6B: Adjusted Renewals Expenditure Forecasts Non-Scheme Specific

Cost Component	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	-	1.089	1.252	1.176	5.087	6.919	6.653	5.189	4.870	4.008
WR: Reservoirs	-	-	-	-	0.002	0.003	0.003	0.003	0.114	0.174
WR: Telemetry	-	-	-	-	-	-	-	-	0.032	0.049
WR: Water Treatment	-	-	-	-	-	0.097	0.166	0.167	0.174	0.156
WS: Measuring facili	-	16.952	19.657	18.502	16.248	14.460	41.463	47.650	52.564	48.832
Total	**-**	**18.041**	**20.909**	**19.678**	**21.338**	**21.479**	**48.284**	**53.009**	**57.754**	**53.217**

Table J.7: Adjusted Renewals and Replacement Expenditure Forecasts (Scheme and Non-Scheme Specific)

Scheme Name	Financial Year (Amounts in Million Rands									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Amabele Dam	-	-	-	-	-	-	-	-	-	-
Amatola- Wriggleswade Dam	-	0.143	0.182	0.266	0.497	0.656	0.617	0.473	0.528	1.663
Balura Dam	-	-	-	-	-	-	-	-	-	-
Beervlei Dam	-	0.550	0.632	0.594	0.576	0.577	0.532	0.404	0.704	2.221
Bekruipkop Dam	-	-	-	-	-	-	-	-	-	-
Berg River Dam (Dasbos-Drakenstein)	-	2.231	2.634	2.774	9.686	13.586	23.743	24.631	26.941	28.313
Binfield Park Dam Ec	-	0.035	0.040	0.104	0.138	0.191	0.194	0.157	0.150	0.161
Blue Crane Dam	-	-	-	-	-	-	0.017	0.022	0.025	0.023
Brand River Miertjieskraal Dam	-	0.067	0.077	0.072	0.096	0.115	0.452	0.530	0.580	0.535
Breede River Greater Brandvlei Dam	-	1.134	1.304	1.691	2.246	2.489	6.341	7.495	8.669	9.437
Buffalo River- Floriskraal Dam	-	0.232	0.293	0.281	0.650	0.815	1.273	1.247	1.413	1.353
Buffeljagts River & Buffeljagts Dam	-	4.192	4.820	4.673	4.166	3.691	3.980	6.961	8.339	8.245
Bushmanskrantz Dam	-	-	-	-	4.268	6.350	6.263	4.967	4.699	3.894
Corana Dam	-	0.055	0.063	0.059	0.092	0.107	0.204	0.212	0.223	0.201
Cordiers River - Oukloof Dam	-	0.058	0.067	0.065	0.070	0.070	0.202	0.233	0.254	0.234
Dabi Dam	-	0.016	0.018	0.017	0.015	0.013	0.101	0.124	0.138	0.129

Scheme Name	Financial Year (Amounts in Million Rands									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Debe Dam	-	-	-	-	0.005	0.007	0.024	0.028	0.031	0.032
Dimbaza Dam	-	-	-	-	-	-	0.001	0.001	0.001	0.001
Donkies River - Verkeerdevlei Dam	-	-	-	-	-	-	-	-	-	-
Donnybrook 1 Dam	-	-	-	-	-	-	-	-	-	-
Donnybrook 2 Dam	-	-	-	-	-	-	-	-	-	-
Doorn River Dam	-	0.396	0.456	0.428	0.535	0.667	1.132	1.138	1.186	1.060
Duivenhoks River - Duivenhoks Dam	-	0.077	0.089	0.105	0.119	0.120	0.103	0.074	0.079	0.328
Elands River - Elandskloof Dam	-	0.750	0.863	1.269	1.894	2.132	2.696	5.307	6.459	6.395
Gamka River - Gamka Dam (Beaufort West)	-	0.294	0.338	0.317	0.362	0.367	0.657	0.751	0.814	0.748
Gamka River - Gamkapoort Dam	-	0.590	0.678	0.649	1.238	1.490	1.404	1.081	1.008	0.943
Gamtoos River -Kouga & Loerie Dams	-	17.608	20.275	20.990	27.789	30.087	36.665	32.621	33.026	34.629
Gcuwa Weir	-	-	0.018	0.022	0.021	0.019	0.016	0.011	0.097	0.141
Geluk Dam	-	-	-	-	-	-	-	-	-	-
Glen Brock Dam	-	1.704	1.960	1.840	1.616	1.416	1.425	1.144	1.089	0.907
Glen Mellville Dam / Lower Fish Sundays	-	0.926	1.064	2.019	4.690	6.056	10.205	23.423	35.557	41.879
Goukou River - Grootbos -Berg Dam	-	-	-	0.618	2.778	3.791	3.852	3.112	2.971	2.480
Gwaba Dam	-	-	-	-	-	-	-	-	-	-
Gxetu Dam	-	-	-	-	-	-	-	-	-	-
Hartenbosch River - Hartebeeskuil Dam	-	0.893	1.027	0.988	0.879	0.817	0.692	0.615	0.612	0.528
Jan Tshatshu Dam	-	-	-	-	-	-	-	-	-	-
Kamastone Dam	-	-	-	-	-	-	-	-	-	-
Kat River Dam	-	0.515	0.593	0.619	0.814	0.958	1.757	1.805	2.000	2.563
Keisies River-Pietersfontein Dam	-	0.021	0.024	0.023	0.020	0.018	0.035	0.037	0.039	0.107
Keiskammahoek- Cata Dam	-	5.999	6.899	6.596	5.894	5.300	4.556	3.985	3.939	3.836
Keiskhoek-Mnyameni Dam	-	0.258	0.296	0.278	0.244	0.214	0.171	0.115	0.100	0.215
Kingna River -Portjieskloof Dam	-	0.037	0.042	0.060	0.147	0.185	0.356	0.370	0.389	0.351
Klipplaat River- Waterdown Dam	-	1.445	1.661	1.648	1.555	6.432	7.602	6.667	7.931	8.034
Konings River -Klipberg Dam	-	0.017	0.020	0.019	0.024	0.025	0.022	0.016	0.014	0.032

Scheme Name	Financial Year (Amounts in Million Rands									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Korente -Vette River Korentepoort Dam	-	2.644	3.041	2.920	3.429	3.529	4.032	3.557	3.528	6.176
Kromme River- Impofu(56)	-	0.752	0.865	0.937	1.458	1.985	3.533	3.600	3.769	4.094
Kubusi River- Gubu Dam	-	0.164	0.207	0.199	0.188	0.172	0.305	0.310	0.411	0.429
Kuzitungu Dam	-	-	-	-	-	-	-	-	-	-
Kwabhaca-Ntenetyane Dam	-	0.863	0.993	0.932	0.818	0.716	0.573	0.387	0.335	0.256
Laing Dam	-	1.110	1.277	1.429	1.341	1.267	1.339	1.107	1.097	0.943
Lanti Weir/Qamata Irrigation	-	0.905	1.041	1.071	4.393	5.945	5.734	8.776	12.361	13.870
Leeu River Leeu - Gamka Dam	-	0.025	0.029	0.027	0.064	0.081	0.205	0.337	0.398	0.386
Libode - Mhlanga Dam	-	0.118	0.136	0.128	0.112	0.098	0.165	0.166	0.173	0.174
Lower Berg River (Voelvei & Misverstand)	-	2.758	3.171	3.710	14.954	20.204	24.696	22.152	22.228	20.138
Lower Sundays Scheme	-	0.482	0.566	1.974	12.363	17.323	17.276	13.797	13.150	12.233
Macubeni Dam	-	-	-	-	0.057	0.084	0.081	0.064	0.060	0.083
Magwa Dam	-	0.017	0.019	0.018	0.016	0.014	0.011	0.008	0.007	0.005
Maipase Dam	-	-	-	-	-	-	-	-	-	-
Maitland Dam	-	-	-	-	-	-	-	-	0.101	0.154
Majola Dam	-	-	-	-	-	-	-	-	-	-
Maluti - Belfort Dam	-	0.123	0.141	0.133	0.118	0.104	0.084	0.057	0.049	0.038
Mankazana Dam	-	-	-	-	-	-	-	-	-	-
Masela 1 Dam	-	-	-	-	-	-	-	-	-	-
Masela 2 Dam	-	-	-	-	-	-	-	-	-	-
Mdantsane 1 Dam	-	0.049	0.057	0.053	0.047	0.041	0.057	0.054	0.055	0.048
Mdantsane 2 Dam	-	0.400	0.460	0.432	0.379	0.332	0.266	0.179	0.155	0.119
Mhlahlane-Mabaleni Dam	-	-	-	-	0.048	0.071	0.273	0.319	0.349	0.322
Mitford Dam	-	-	-	-	-	-	-	-	-	-
Mossel Bay - Wolwedans Dam	-	0.433	0.523	0.714	1.932	2.609	5.906	6.414	16.827	22.609
Mount Coke Dam	-	-	-	-	-	-	-	-	-	-
Msengeni Dam	-	-	-	-	-	-	-	-	-	-
Mtata Dam	-	0.150	0.190	0.184	1.143	1.609	1.541	1.199	1.211	1.419

Scheme Name	Financial Year (Amounts in Million Rands									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Nahoon River-Dam	-	0.152	0.193	0.194	0.186	0.247	0.428	0.433	0.539	1.665
Ncora Dam	-	7.122	8.190	7.691	6.972	6.239	5.297	6.285	11.884	15.710
Ndlambe(Tyhefu) Dam	-	-	-	-	-	-	-	-	-	-
Ngwekazi Dam	-	-	-	-	-	-	-	-	-	-
Noncampa 1 Dam	-	-	-	-	-	-	-	-	-	-
Nqadu Dam	-	-	-	-	0.008	0.019	0.088	0.106	0.116	0.110
Nqwelo Dam	-	-	-	-	-	-	-	-	-	-
Ntsikizimi Dam	-	-	-	-	-	-	-	-	-	-
Olifants River - Stompdrift Dam	-	16.997	19.597	19.929	22.260	22.390	62.861	80.620	90.515	91.852
Olifants River Bulshoek Dam & Canal	-	15.442	17.758	16.703	18.313	18.255	17.286	13.496	14.691	37.395
Olifants River Dam Clanwilliam	-	0.494	0.568	0.598	2.713	3.723	8.061	8.618	9.208	8.380
Orange-Fish Gws	-	7.997	9.215	9.972	23.523	29.958	48.104	47.557	108.000	135.174
Outspan (Chalumna) Dam	-	-	-	-	-	-	-	-	-	-
Oxkraal Dam (Ciskei)	-	0.235	0.288	0.275	0.252	0.253	0.227	0.169	0.241	0.432
Palmiet River (Kogelberg & Rockview)	-	0.403	0.463	0.693	1.591	2.131	3.003	2.838	2.892	2.606
Pleasant View Dam	-	-	-	-	-	-	-	-	-	-
Qamata (Lubisi) Dam	-	0.277	0.346	0.391	0.373	0.347	0.579	0.580	0.862	1.170
Qibira Dam	-	-	-	-	-	-	-	-	-	-
Redhill Dam	-	-	-	-	-	-	-	-	-	-
Roodefontein Dam	-	0.039	0.045	0.042	0.298	0.419	0.962	1.041	1.111	1.172
Rooikrantz Dam	-	0.124	0.142	0.138	0.134	0.198	0.275	0.259	0.263	0.293
Roxeni Dam	-	-	-	-	-	-	-	-	-	-
Rura Dam	-	-	-	-	-	-	-	-	-	-
Sanddrift River Roode-Elsberg Lakenvalle	-	0.902	1.038	1.110	1.202	1.433	1.728	1.679	1.729	2.263
Sheshegu Dam	-	0.190	0.219	0.205	0.180	0.158	0.126	0.085	0.074	0.056
Shiloh Dam	-	-	-	-	-	-	-	-	-	-
Sinqumeni Dam	-	-	-	-	-	-	-	-	-	-
Tarka River - Komandodrift Dam	-	0.066	0.076	0.072	0.090	0.220	1.841	2.283	2.544	2.379

Scheme Name	Financial Year (Amounts in Million Rands									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Tentergate Dam	-	0.008	0.009	0.008	0.007	0.006	0.005	0.003	0.003	0.002
Tierkloof Dam Gws	-	-	-	-	-	-	0.013	0.016	0.018	0.040
Toleni Dam	-	0.063	0.072	0.068	0.060	0.052	0.042	0.028	0.024	0.036
Tsojana Dam	-	0.023	0.026	0.024	0.021	0.019	0.101	0.149	0.172	0.164
Tyutyu Dam	-	-	-	-	-	-	-	-	-	-
Vals River Ben - Etive Dam	-	0.082	0.095	0.089	0.086	0.080	0.091	0.079	0.077	0.066
Woburn 2 Dam	-	0.009	0.010	0.009	0.008	0.007	0.006	0.004	0.003	0.003
Woburn 3 Dam	-	-	-	-	-	-	-	-	-	-
Xilinxa Dam	-	0.423	0.523	0.501	0.443	0.390	0.336	0.241	0.391	0.439
Xonxa Dam	-	0.075	0.086	0.081	0.113	0.125	0.110	0.081	0.073	0.216
Zanyokwe-Sandile Dam	-	2.446	2.831	2.717	2.729	2.776	3.325	2.935	2.999	2.661
Sub-total	**-**	**104.803**	**120.940**	**125.458**	**197.543**	**234.391**	**338.262**	**361.823**	**474.599**	**549.246**
Non-Scheme Specific	-	18.041	20.909	19.678	21.338	21.478	48.284	53.009	57.754	53.217
Total	**-**	**122.843**	**141.849**	**145.137**	**218.881**	**255.869**	**386.546**	**414.832**	**532.353**	**602.463**

APPENDIX K – Upgrades and New Capital Strategy and Cost Forecast

1. INTRODUCTION

'**New and Upgrade Capital**' is:

'Expenditure that is used to create new assets, or to increase the capacity of existing assets beyond their original design capacity or service potential'.

2. NEW & UPGRADE CAPITAL STRATEGY

Table K.1 summarises the Renewal Strategy applied per Asset Condition Grading in this AMP.

Table K.1: New and Upgrade Capital Strategy per Asset Utilisation Grading

Utilisation Grade	Description	New and Upgrade Capital Strategy
5	Exceeding Capacity/Stressed	Consider upgrading the asset component

3. UPGRADE AND NEW CAPITAL WORKS

Table K.2 shows the numbers of asset components per asset facility category that are exceeding their design capacities (stressed), and require upgrading, further split into scheme-specific and non-scheme-specific.

Table K.2 Asset components requiring upgrades based on utilistion

Asset Facility Category	Asset Components Exceeding Capacity / Stressed (Require Upgrading)					
	Cluster Total		Scheme Specific		Non-Scheme Specific	
	No.	CRC (R million)	No.	CRC (R million)	No.	CRC (R million)
Buildings	-	-	-	-	-	-
WS: borehol	-	-	-	-	-	-
WR: Canals	-	-	-	-	-	-
WR: Dams	2	0.05	2	0.05	-	-
WR: Power Supply	-	-	-	-	-	-
WR: Pump stations	27	8.17	27	8.17	-	-
WR: Reservoirs	-	-	-	-	-	-
WR: Roads and bridge	-	-	-	-	-	-
WR: Steel Pipelines	-	-	-	-	-	-
WR: Telemetry	-	-	-	-	-	-
WR: Tunnels	-	-	-	-	-	-
WR: Water Treatment	-	-	-	-	-	-
WS: Measuring facili	-	-	-	-	-	-
Total	**29**	**8.23**	**29**	**8.23**	**0**	**0.00**

Table K.3: Utilisation-based upgrade works (asset components exceeding capacity in utilisation)

Scheme (Cost Ctr Name)	Asset Facility Category	Facility Type	Facility Name (Asset description)	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Drakenstein Pump Station	Control Valves - Casing	Drakenstein PS control valve-5 - casing	500010331_53	3	5	5	0.191
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Drakenstein Pump Station	Control Valves - Mechanism	Drakenstein PS control valve-5 - mechanism	500010331_58	3	5	5	0.064
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Valves - Casing	Dasbos bypass valve-1 - casing	500010336_112	3	5	5	0.254
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Valves - Casing	Dasbos inlet isolation valve-2 - casing	500010336_114	3	5	5	0.254
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Valves - Mechanism	Dasbos bypass valve-1 - mechanism	500010336_119	3	5	5	0.085
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Valves - Mechanism	Dasbos inlet isolation valve-2 - mechanism	500010336_121	3	5	5	0.085

Scheme (Cost Ctr Name)	Asset Facility Category	Facility Type	Facility Name (Asset description)	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Electric Motor - Rotor	Dasbos Motor-1 - rotor	500010336_125	3	5	5	0.177
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Electric Motor - Rotor	Dasbos Motor-2 - rotor	500010336_126	3	5	5	0.177
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Electric Motor - Rotor	Dasbos Motor-3 - rotor	500010336_127	3	5	5	0.177
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Electric Motor - Rotor	Dasbos Motor-4 - rotor	500010336_128	3	5	5	0.177
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Electric Motor - Switchgear	Dasbos Motor-1 - switchgear	500010336_129	3	5	5	0.177
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Electric Motor - Switchgear	Dasbos Motor-2 - switchgear	500010336_130	3	5	5	0.177
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Electric Motor - Switchgear	Dasbos Motor-3 - switchgear	500010336_131	3	5	5	0.177
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Pump stations	Pump Station	Dasbos Pump Station	Electric Motor - Switchgear	Dasbos Motor-4 - switchgear	500010336_132	3	5	5	0.177
KUBUSI RIVER- GUBU DAM (57)	WR: Dams	Main Damwall	Gubu Dam	Dam Outlet Valves - Casing	Outlet Sleeve Valve no.2 - casing	500019835_24	3	5	5	0.040
KUBUSI RIVER- GUBU DAM (57)	WR: Dams	Main Damwall	Gubu Dam	Dam Outlet Valves - Mechanism	Outlet Sleeve Valve no.2 - mechanism	500019835_26	3	5	5	0.013
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Pump Station	Crane Co. portal crane	500009259_22	3	4	5	0.611
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Electric Motor - Casing	Electric motor - casing	500009259_23	3	4	5	0.361
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Electric Motor - Casing	electric motor no1 - casing	500009259_24	3	4	5	0.361
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Electric Motor - Rotor	Electric motor - rotor	500009259_25	3	4	5	0.120
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Electric Motor - Rotor	electric motor no1 - rotor	500009259_26	3	4	5	0.120
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Electric Motor - Switchgear	Electric motor - switchgear	500009259_27	3	4	5	0.120
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Electric Motor - Switchgear	electric motor no1 - switchgear	500009259_28	3	4	5	0.120
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Pumpstation Pump - Casing	pump no 1 - pump - casing	500009259_29	3	4	5	1.004
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Pumpstation Pump - Casing	pump no 2 - pump - casing	500009259_30	3	4	5	1.004
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Pumpstation Pump - Casing	pump no3 - pump - casing	500009259_31	3	4	5	1.004
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Pumpstation Pump - Rotor	pump no 1 - pump - rotor	500009259_32	3	4	5	0.335
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Pumpstation Pump - Rotor	pump no 2 - pump - rotor	500009259_33	3	4	5	0.335
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Pump stations	Pump Station	Klipheuwel Pumpstation	Pumpstation Pump - Rotor	pump no3 - pump - rotor	500009259_34	3	4	5	0.335

3. FINANCIAL FORECAST

Table K.4A: Identified upgrades and new capital expenditure forecast (scheme specific)

Asset facility category	Financial Year (Amounts in Million Rands									
	2017/18	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
WR: Canals	-	-	73.284	31.772	106.570	123.001	470.455	422.415	526.487	80.587
WR: Dams	-	0.016	-	-	-	-	-	-	-	-
WR: Power Supply	-	-	-	-	-	-	-	-	-	-
WR: Pump stations	-	4.087	-	-	-	-	-	-	-	-
Total	**-**	**4.103**	**73.284**	**31.772**	**106.570**	**123.001**	**470.455**	**422.415**	**526.487**	**80.587**

Table K.4B: Adjusted upgrades and new capital expenditure forecast (cheme specific)

Cost Component	Financial Year (Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
WR: Canals	-	-	10.993	17.957	34.584	66.323	161.574	282.489	495.264	603.313
WR: Dams	-	0.016	-	-	-	-	-	-	-	-
WR: Power Supply	-	-	-	-	-	-	-	-	-	-
WR: Pump stations	-	0.613	0.705	0.662	0.581	0.508	0.407	0.275	0.238	0.182
Total	**-**	**0.615**	**11.700**	**18.622**	**35.167**	**66.834**	**161.983**	**282.765**	**495.503**	**603.496**

Table K.5: Non-scheme specific upgrades and new capital expenditure forecast

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2017/18	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-

Table K.6: Adjusted New and Upgrade Capital Projects per scheme

Scheme Name	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Amabele Dam	-	-	-	-	-	-	-	-	-	-
Amatola- Wriggleswade Dam (3)	-	-	-	-	-	-	-	-	-	-
Balura Dam	-	-	-	-	-	-	-	-	-	-
Beervlei Dam	-	-	-	-	-	-	-	-	-	-
Bekruipkop Dam	-	-	-	-	-	-	-	-	-	-
Berg River Dam (Dasbos-Drakenstein)	-	0.176	0.202	0.190	0.167	0.146	0.117	0.079	0.068	0.052
Binfield Park Dam Ec (5)	-	-	-	-	-	-	-	-	-	-
Blue Crane Dam	-	-	-	-	-	-	-	-	-	-
Brand River Miertjieskraal Dam (9)	-	-	-	-	-	-	-	-	-	-
Breede River Greater Brandvlei Dam (10)	-	-	-	-	-	-	-	-	-	-
Buffalo River- Floriskraal Dam (12)	-	-	-	-	-	-	-	-	-	-
Buffeljagts River & Buffeljagts Dam (13)	-	-	-	-	-	-	-	-	-	-
Bushmanskrantz Dam (294)	-	-	-	-	-	-	-	-	-	-
Corana Dam (18)	-	-	-	-	-	-	-	-	-	-
Cordiers River - Oukloof Dam (17)	-	-	-	-	-	-	-	-	-	-
Dabi Dam (22)	-	-	-	-	-	-	-	-	-	-
Debe Dam (23)	-	-	-	-	-	-	-	-	-	-
Dimbaza Dam	-	-	-	-	-	-	-	-	-	-
Donkies River - Verkeerdevlei Dam	-	-	-	-	-	-	-	-	-	-
Donnybrook 1 Dam	-	-	-	-	-	-	-	-	-	-
Donnybrook 2 Dam	-	-	-	-	-	-	-	-	-	-
Doorn River Dam (24)	-	-	-	-	-	-	-	-	-	-
Duivenhoks River - Duivenhoks Dam (25)	-	-	-	-	-	-	-	-	-	-
Elands River -Elandskloof Dam (26)	-	-	-	-	-	-	-	-	-	-
Gamka River - Gamka Dam (Beaufort West)	-	-	-	-	-	-	-	-	-	-
Gamka River - Gamkapoort Dam (31)	-	-	-	-	-	-	-	10.457	32.424	42.745
Gamtoos River -Kouga & Loerie Dams	-	-	-	-	-	-	-	10.457	32.424	42.745

Scheme Name	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Gcuwa Weir	-	-	-	-	-	-	-	-	-	-
Geluk Dam	-	-	-	-	-	-	-	-	-	-
Glen Brock Dam	-	-	-	-	-	-	-	-	-	-
Glen Mellville Dam / Lower Fish Sundays	-	-	0.259	0.311	0.298	0.565	0.574	0.463	0.442	0.369
Goukou River - Grootbos -Berg Dam (33)	-	-	-	-	-	-	-	-	-	-
Gwaba Dam	-	-	-	-	-	-	-	-	-	-
Gxetu Dam	-	-	-	-	-	-	-	-	-	-
Hartenbosch River - Hartebeeskuil Dam (5	-	-	-	-	-	-	-	-	-	-
Jan Tshatshu Dam	-	-	-	-	-	-	-	-	-	-
Kamastone Dam	-	-	-	-	-	-	-	-	-	-
Kat River Dam (44)	-	-	-	-	-	-	-	-	-	-
Keisies River-Pietersfontein Dam (45)	-	-	-	-	-	-	-	-	-	-
Keiskammahoek- Cata Dam (16)	-	-	-	-	-	-	-	-	-	-
Keiskhoek-Mnyameni Dam (75)	-	-	-	-	-	-	-	-	-	-
Kingna River -Portjieskloof Dam (46)	-	-	-	-	-	-	-	-	-	-
Klipplaat River- Waterdown Dam	-	-	-	-	-	-	-	-	-	-
Konings River -Klipberg Dam (52)	-	-	-	-	-	-	-	-	-	-
Korente -Vette River Korentepoort Dam (7	-	-	-	0.862	2.412	3.118	2.898	2.208	2.048	1.668
Kromme River- Impofu(56)	-	-	-	-	-	-	-	-	-	-
Kubusi River- Gubu Dam (57)	-	0.002	0.003	0.003	0.002	0.002	0.002	0.001	0.001	0.001
Kuzitungu Dam	-	-	-	-	-	-	-	-	-	-
Kwabhaca-Ntenetyane Dam (295)	-	-	-	-	-	-	-	-	-	-
Laing Dam (58)	-	-	-	-	-	-	-	-	-	-
Lanti Weir/Qamata Irrigation	-	-	-	-	-	2.699	3.238	2.861	2.839	2.446
Leeu River Leeu - Gamka Dam (60)	-	-	-	-	-	-	-	-	-	-
Libode - Mhlanga Dam (293)	-	-	-	-	-	-	-	-	-	-
Lower Berg River (Voelvei & Misverstand)	-	-	0.599	2.972	3.505	3.614	3.110	22.383	54.393	100.715
Lower Sundays Scheme	-	-	-	0.230	0.412	1.817	2.036	1.738	1.700	1.449

Scheme Name	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Macubeni Dam (67)	-	-	-	-	-	-	-	-	-	-
Magwa Dam	-	-	-	-	-	-	-	-	-	-
Maipase Dam	-	-	-	-	-	-	-	-	-	-
Maitland Dam	-	-	-	-	-	-	-	-	-	-
Majola Dam	-	-	-	-	-	-	-	-	-	-
Maluti - Belfort Dam (4)	-	-	-	-	-	-	-	-	-	-
Mankazana Dam	-	-	-	-	-	-	-	-	-	-
Masela 1 Dam	-	-	-	-	-	-	-	-	-	-
Masela 2 Dam	-	-	-	-	-	-	-	-	-	-
Mdantsane 1 Dam	-	-	-	-	-	-	-	-	-	-
Mdantsane 2 Dam	-	-	-	-	-	-	-	-	-	-
Mhlahlane-Mabaleni Dam (66)	-	-	-	-	-	-	-	-	-	-
Mitford Dam	-	-	-	-	-	-	-	-	-	-
Mossel Bay - Wolwedans Dam (342)	-	0.437	0.503	0.472	0.414	0.363	0.290	0.196	0.170	0.130
Mount Coke Dam	-	-	-	-	-	-	-	-	-	-
Msengeni Dam	-	-	-	-	-	-	-	-	-	-
Mtata Dam (74)	-	-	-	-	-	-	-	-	-	-
Nahoon River-Dam (81	-	-	-	-	-	-	-	-	-	-
Ncora Dam (82)	-	-	-	-	2.175	6.126	9.490	9.274	9.567	8.487
Ndlambe(Tyhefu) Dam	-	-	-	-	-	-	-	-	-	-
Ngwekazi Dam	-	-	-	-	-	-	-	-	-	-
Noncampa 1 Dam	-	-	-	-	-	-	-	-	-	-
Nqadu Dam	-	-	-	-	-	-	-	-	-	-
Nqwelo Dam	-	-	-	-	-	-	-	-	-	-
Ntsikizimi Dam	-	-	-	-	-	-	-	-	-	-
Olifants River - Stompdrift Dam (89)	-	-	9.716	13.080	12.950	12.233	10.147	7.075	6.252	4.869
Olifants River Bulshoek Dam & Canal (90)	-	-	-	-	-	-	91.192	193.549	353.972	413.724
Olifants River Dam Clanwilliam (343)	-	-	-	-	-	-	-	-	-	-

Scheme Name	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Orange-Fish Gws	-	-	-	-	-	-	-	-	-	-
Outspan (Chalumna) Dam (97)	-	-	-	-	-	-	-	-	-	-
Oxkraal Dam (Ciskei)	-	-	-	-	-	-	-	-	-	-
Palmiet River (Kogelberg & Rockview)	-	-	-	-	-	-	-	-	-	-
Pleasant View Dam (100)	-	-	-	-	-	-	-	-	-	-
Qamata (Lubisi) Dam	-	-	-	-	-	-	-	-	-	-
Qibira Dam	-	-	-	-	-	-	-	-	-	-
Redhill Dam	-	-	-	-	-	-	-	-	-	-
Roodefontein Dam (107)	-	-	-	-	-	-	-	-	-	-
Rooikrantz Dam (108)	-	-	-	-	-	-	-	-	-	-
Roxeni Dam	-	-	-	-	-	-	-	-	-	-
Rura Dam	-	-	-	-	-	-	-	-	-	-
Sanddrift River Roode-Elsberg Lakenvalle	-	-	-	-	-	-	-	-	-	-
Sheshegu Dam	-	-	-	-	-	-	-	-	-	-
Shiloh Dam	-	-	-	-	-	-	-	-	-	-
Sinqumeni Dam	-	-	-	-	-	-	-	-	-	-
Tarka River - Komandodrift Dam (121)	-	-	-	-	-	-	-	-	-	-
Tentergate Dam	-	-	-	-	-	-	-	-	-	-
Tierkloof Dam Gws	-	-	-	-	-	-	-	-	-	-
Toleni Dam (292)	-	-	-	-	-	-	-	-	-	-
Tsojana Dam (123)	-	-	-	-	-	-	-	-	-	-
Tyutyu Dam	-	-	-	-	-	-	-	-	-	-
Vals River Ben - Etive Dam (136)	-	-	-	-	-	-	-	-	-	-
Woburn 2 Dam	-	-	-	-	-	-	-	-	-	-
Woburn 3 Dam	-	-	-	-	-	-	-	-	-	-
Xilinxa Dam (140)	-	-	-	-	-	-	-	-	-	-
Xonxa Dam (141)	-	-	-	-	-	-	-	-	-	-
Zanyokwe-Sandile Dam (111)	-	-	-	-	-	-	-	-	-	-

Scheme Name	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Sub-total	**-**	**0.615**	**11.281**	**18.119**	**22.336**	**30.683**	**123.094**	**260.741**	**496.299**	**619.399**
Non Scheme Specific	-	-	-	-	-	-	-	-	-	-
Total	**-**	**0.615**	**11.281**	**18.119**	**22.336**	**30.683**	**123.094**	**260.741**	**496.299**	**619.399**

APPENDIX L – Asset Impairment, Disposal, Disposal Strategy and Cost Forecast

1 INTRODUCTION

This Appendix covers the: asset disposal strategy; impaired assets; under-utilised or not-in-use assets; as well as assets to be disposed of.

2 DISPOSAL STRATEGY

Refer to the DWS Disposal Strategy for Immovable Assets.

3 IMPAIRED ASSETS

Table L.1: Impaired asset components

Asset Facility Category	Impaired Asset Components					
	Cluster Total		Scheme Specific		Non Scheme Specific	
	No.	CRC (R million)	No.	CRC (R million)	No.	CRC (R million)
Buildings	20	11.86	20	11.86	-	-
WS: borehol	-	-	-	-	-	-
WR: Canals	11	285.18	11	285.18	-	-
WR: Dams	208	1 016.00	208	1 016.00	-	-
WR: Power Supply	-	-	-	-	-	-
WR: Pump stations	1	2.59	1	2.59	-	-
WR: Reservoirs	-	-	-	-	-	-
WR: Roads and bridge	1	0.68	1	0.68	-	-
WR: Steel Pipelines	-	-	-	-	-	-
WR: Telemetry	-	-	-	-	-	-
WR: Tunnels	-	-	-	-	-	-
WR: Water Treatment	-	-	-	-	-	-
WS: Measuring facilities	20	65.08	9	33.43	11	31.65
Total	**261**	**1 381.39**	**250**	**1 349.74**	**11**	**31.65**

Table L.2: Impaired asset components (based on zero asset carrying values) per scheme and per facility category

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
AMABELE DAM	WR: Dams	Main Damwall	Amabele Gws Dam	Dam Wall-15m<Height<30m	Amabele Dam Wall	500000512_1	3	3	10.478
AMABELE DAM	WR: Dams	Main Damwall	Amabele Gws Dam	Dam Spillway	Amabele Spillway	500000512_2	3	3	3.411
AMABELE DAM	WR: Dams	Main Damwall	Amabele Dam	Dam Outlet - Pipework- Steel	Outlet Pipe	500000512_3	3	3	0.144
AMABELE DAM	WR: Dams	Main Damwall	Amabele Dam	Gate Valves	Main outlet isolating gate valve	500000512_4	4	3	0.040
AMABELE DAM	WR: Dams	Main Damwall	Amabele Dam	Gate Valves	Supply outlet Isolating gate valve	500000512_5	4	3	0.028
AMATOLA-WRIGGLESWADE DAM (3)	Buildings	Residential Housing	Wriggleswade staff house (1)(park home)	Outbuildings	Garages for staff houses 1 and 3	500000480_1	1	3	0.106
AMATOLA-WRIGGLESWADE DAM (3)	Buildings	Residential Housing	Wriggleswade staff house (1)(park home)	Main Building	Main building	500000480_0	3	2	0.536
BALURA DAM	WR: Dams	Main Damwall	BALURA DAM	Dam Outlet - Pipework- Steel	BALURA DAM outlet pipes	500009123_5	2	2	0.011
BALURA DAM	WR: Dams	Main Damwall	BALURA DAM	Dam Outlet Valves - Casing	BALURA DAM - outlet valve - casing	500009123_6	2	2	0.011
BALURA DAM	WR: Dams	Main Damwall	BALURA DAM	Dam Outlet Valves - Mechanism	BALURA DAM - outlet valve - mechanism	500009123_7	2	2	0.004
BALURA DAM	WR: Dams	Main Damwall	BALURA DAM	Dam Wall-15m<Height<30m	Balura Earth Embankment	500009123_1	2	3	32.101
BALURA DAM	WR: Dams	Main Damwall	BALURA DAM	Dam Spillway	Balura Dams Spilway	500009123_2	2	3	1.535
BALURA DAM	WR: Dams	Main Damwall	Balura Dam	Dam Wall-Height>60m	Balura Twins Dam South Wall	500009123_8	4	3	3.139
BEKRUIPKOP DAM	WR: Dams	Main Damwall	BEKRUIPKOP - CISKEI	Dam Wall - 12m<Height<30m	Bekruipkop Dam Wall	500009477_1	3	2	5.348
BEKRUIPKOP DAM	WR: Dams	Main Damwall	BEKRUIPKOP - CISKEI	Dam Spillway	Bekruipkop Dam Spilway	500009477_2	3	2	0.798
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	Buildings	Residential Housing	Jonkershoek House J4	Main Building	Main building	500006340_0	1	3	0.473
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Dams	Separate Dam Abstraction	Berg river Dam Abstraction tower	Measuring Facility - Instrumen	Berg river dam hydro station	500010311_11	4	5	1.846
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Dams	Separate Dam Abstraction	Berg river Dam Abstraction tower	Measuring Facility - Instrumen	Berg River Dam meteorological station	500010311_13	4	5	1.846
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WS: Measuring facili	Meteorological Station	G1E013 MOUNTAIN PRECIPITATION PROJECT NOODE KLOOF	Meteorological Station	not componentised	500007447_0	1	3	0.135

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WS: Measuring facili	Hydrological Station	G1H004 Berg River @ Bergriviershoek	Hydrological Station	not componentised	500001902_0	2	2	0.497
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WS: Measuring facili	Hydrological Station	H6H012 Riviersonderend @ Dwarstrek	Hydrological Station	not componentised	500004773_0	2	2	1.759
BLUE CRANE DAM	WR: Dams	Main Damwall	Blue Crane Dam	Dam Wall-15m<Height<30m	Blue Crane Dam (Earthfill Embankment)	500006250_1	1	2	4.002
BLUE CRANE DAM	WR: Dams	Main Damwall	Blue Crane Dam	Dam Spillway	Blue Crane Dam - Bywash Channel	500006250_2	1	3	7.439
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WR: Dams	Main Damwall	Smalblaar River Canal Diversion Weir	Intake Gates - Gate	Smalblaar river canal diversion weir - intake gate	500000492_9	4	3	0.036
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WS: Measuring facili	Hydrological Station	H4H019 Vink River @ De Gorree	Hydrological Station	not componentised	500001485_0	1	1	3.341
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WS: Measuring facili	Hydrological Station	H4H020 Nuy River @ Doorn River	Hydrological Station	not componentised	500001971_0	1	1	3.628
BUFFALO RIVER-FLORISKRAAL DAM (12)	Buildings	Residential Housing	Floriskraal Residential B no. 5	Main Building	Main building	500007437_0	3	1	0.402
BUFFALO RIVER-FLORISKRAAL DAM (12)	Buildings	Residential Housing	Floriskraal Residential B no. 2	Main Building	Main building	500007435_0	3	2	0.402
BUFFELJAGTS RIVER & BUFFELJAGTS DAM (13)	WR: Canals	Canal Section	left bank section 2	Canal Lining - TA3	Canal Lining	500005559_3	3	1	24.125
BUFFELJAGTS RIVER & BUFFELJAGTS DAM (13)	WR: Canals	Canal Section	left bank section 1	Canal Lining - TA3	Canal Lining	500006450_3	3	1	35.920
DIMBAZA DAM	WR: Dams	Main Damwall	DIMBAZA DAM	Dam Outlet Valves - Mechanism	DIMBAZA DAM - outlet valve - mechanism	500009132_7	3	2	0.003
DIMBAZA DAM	WR: Dams	Main Damwall	DIMBAZA DAM	Dam Wall-15m<Height<30m	Dimbaza Dam Wall	500009132_1	3	3	3.239
DIMBAZA DAM	WR: Dams	Main Damwall	DIMBAZA DAM	Dam Spillway	Dimbaza Dam Spilway	500009132_2	3	3	3.411
DIMBAZA DAM	WR: Dams	Main Damwall	DIMBAZA DAM	Dam Outlet - Pipework- Steel	DIMBAZA DAM outlet pipes	500009132_5	3	3	0.007
DIMBAZA DAM	WR: Dams	Main Damwall	DIMBAZA DAM	Dam Outlet Valves - Casing	DIMBAZA DAM - outlet valve - casing	500009132_6	3	3	0.007
DONKIES RIVER - VERKEERDEVLEI DAM	WR: Dams	Main Damwall	Verkeerdevlei Dam	Dam Wall-15m<Height<30m	Verkeerdevlei Dam	500003045_1	2	2	3.967
DONKIES RIVER - VERKEERDEVLEI DAM	WR: Dams	Main Damwall	Verkeerdevlei Dam	Dam Outlet Valves - Casing	Verkeerdevlei Dam - outlet valve - casing	500003045_5	3	2	0.198

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
DONKIES RIVER - VERKEERDEVLEI DAM	WR: Dams	Main Damwall	Verkeerdevlei Dam	Dam Outlet Valves - Mechanism	Verkeerdevlei Dam - outlet valve - mechanism	500003045_6	3	2	0.076
DONKIES RIVER - VERKEERDEVLEI DAM	WS: Measuring facili	Hydrological Station	J1H016 Smalblaar River @ Verlorenvalley	Hydrological Station	not componentised	500001980_0	2	2	2.875
DONKIES RIVER - VERKEERDEVLEI DAM	WS: Measuring facili	Hydrological Station	J1H016 Smalblaar River @ Verloren Valley	Hydrological Station	not componentised	500007396_0	2	2	1.489
DONNYBROOK 1 DAM	WR: Dams	Main Damwall	DONNYBROOK 1 (CISKEI)	Dam Wall-15m<Height<30m	Donnybrook 1 Earth Embankment	500009481_1	4	1	1.013
DONNYBROOK 1 DAM	WR: Dams	Main Damwall	DONNYBROOK 1 (CISKEI)	Dam Spillway	Donnybrook 1 Spillway	500009481_2	4	1	0.082
DONNYBROOK 2 DAM	WR: Dams	Main Damwall	DONNYBROOK 2 - CISKEI	Dam Wall-15m<Height<30m	Donnybrook 2 Earth Embankment	500009482_1	3	1	1.893
DONNYBROOK 2 DAM	WR: Dams	Main Damwall	DONNYBROOK 2 - CISKEI	Dam Spillway	Donnybrook2 Spillway	500009482_2	3	3	0.775
GAMKA RIVER - GAMKA DAM (BEAUFORT WEST)	WR: Roads and bridge	Road Section	Access road to Gamka dam	Road Section		500021656_0	1	1	0.678
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Canals	Canal Syphon (Large)	"Primary, Chigville Siphon"	Canal Syphon (large)	not componentised	500003345_0	3	1	15.720
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Canals	Canal Syphon (Large)	"Primary, Milton Siphon"	Canal Syphon (large)	not componentised	500003054_0	3	3	92.604
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Canals	Canal Syphon (Large)	"Primary, De Konings Siphon"	Canal Syphon (large)	not componentised	500003966_0	3	5	48.504
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Control Valves - Casing	Kouga dam hydropower control valve 1(left) -casing	500000908_41	4	2	0.350
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Generator - Casing	Kouga small hydro - generator - casing	500000908_70	4	2	1.063
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Control Valves - Casing	Kouga small hydro - control valve - casing	500000908_71	4	2	0.061
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Turbine - Casing	Kouga small hydro - turbine - casing	500000908_72	4	2	1.063
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Control Valves - Mechanism	Kouga small hydro - control valve - mechanism	500000908_73	4	2	0.020
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Switchgear	Kouga small hydro - switchgear	500000908_74	4	2	1.214
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Generator - Rotor	Kouga small hydro - generator - rotor	500000908_75	4	2	0.354
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Turbine - Rotor	Kouga small hydro - turbine - rotor	500000908_76	4	2	0.709
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Dam	Dam Hydro Power	Kouga Hydro Power Station	500000908_1	4	3	34.811

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Building	Kouga dam hydropower building	500000908_39	4	3	11.574
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Control Valves - Mechanism	Kouga dam hydropower control valve1(left) - mechans	500000908_42	4	3	0.130
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Control Valves - Casing	Kouga dam hydropower control valve2(centre)-casing	500000908_44	4	3	0.350
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Control Valves - Mechanism	Kouga dam hydropower control valve2(centre) mechan	500000908_45	4	3	0.130
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Control Valves - Casing	Kouga dam hydropower control valve 3(right)-casing	500000908_47	4	3	0.350
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Control Valves - Mechanism	Kouga dam hydropower control valve 3(right)-mechan	500000908_48	4	3	0.130
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Turbine - Casing	Kouga dam hydropower turbine 1 (left) - casing	500000908_50	4	3	3.376
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Turbine - Rotor	Kouga dam hydropower turbine 1 (left) - rotor	500000908_51	4	3	1.125
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Turbine - Casing	Kouga dam hydropower turbine 2 (centre) - casing	500000908_53	4	3	3.376
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Turbine - Rotor	Kouga dam hydropower turbine 2 (centre) - rotor	500000908_54	4	3	1.125
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Turbine - Casing	Kouga dam hydropower turbine 3 (right) - casing	500000908_56	4	3	3.376
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Turbine - Rotor	Kouga dam hydropower turbine 3 (right) - rotor	500000908_57	4	3	1.125
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Generator - Casing	Kouga dam hydropower generator 1 (left) - casing	500000908_59	4	3	4.066
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Generator - Rotor	Kouga dam hydropower generator 1 (left) - rotor	500000908_60	4	3	1.355
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Generator - Casing	Kouga dam hydropower generator 2 (centre) - casing	500000908_62	4	3	4.066
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Generator - Rotor	Kouga dam hydropower generator 2 (centre) - rotor	500000908_63	4	3	1.355
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Generator - Casing	Kouga dam hydropower generator 3 (right) - casing	500000908_65	4	3	4.066
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Generator - Rotor	Kouga dam hydropower generator 3 (right) - rotor	500000908_66	4	3	1.355
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Switchgear	Kouga dam hydropower switchgear 1 (left)	500000908_67	4	3	1.929
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Switchgear	Kouga dam hydropower switchgear 2 (centre)	500000908_68	4	3	1.929
GAMTOOS RIVER -KOUGA & LOERIE DAMS	WR: Dams	Main Damwall	Kouga Hydropower Plant	Hydropower Switchgear	Kouga dam hydropower switchgear 3 (right)	500000908_69	4	3	1.929
GCUWA WEIR	Buildings	Office Building	Gcuwa Office	Main Building	Main building	500009580_0	2	2	0.107

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
GELUK DAM	WR: Dams	Main Damwall	GELUK - CS*	Dam Wall-15m<Height<30m	Geluk Dam Wall	500009483_1	1	2	4.106
GELUK DAM	WR: Dams	Main Damwall	GELUK - CS*	Dam Spillway	Geluk Dam Spillway	500009483_2	1	2	1.822
GELUK DAM	WR: Dams	Main Damwall	GELUK - CS*	Dam Outlet - Pipework- Steel	GELUK - CS* outlet pipes	500009483_5	1	2	0.001
GELUK DAM	WR: Dams	Main Damwall	GELUK - CS*	Dam Outlet Valves - Mechanism	GELUK - CS* - outlet valve - mechanism	500009483_7	1	2	0.001
GLEN BROCK DAM	WR: Dams	Main Damwall	Glen Brock - CS*	Dam Meter & Instrumentation	Glen Brock flow meter	500009484_9	2	1	0.385
GWABA DAM	WR: Dams	Main Damwall	GWABA	Dam Wall-15m<Height<30m	Gwaba Dam Wall	500009486_1	3	2	2.218
GWABA DAM	WR: Dams	Main Damwall	GWABA	Dam Spillway	Gwaba Dam Spilway	500009486_2	3	3	1.364
GXETU DAM	WR: Dams	Main Damwall	GXETHU DAM	Dam Wall-15m<Height<30m	Gxethu Earth Embankment	500009135_1	2	3	11.881
GXETU DAM	WR: Dams	Main Damwall	GXETHU DAM	Dam Spillway	Gxethu Dam Spilway	500009135_2	2	3	11.947
GXETU DAM	WR: Dams	Main Damwall	GXETHU DAM	Dam Outlet - Pipework- Steel	GXETHU DAM outlet pipes	500009135_5	2	3	0.014
GXETU DAM	WR: Dams	Main Damwall	GXETHU DAM	Dam Outlet Valves - Casing	GXETHU DAM - outlet valve - casing	500009135_6	2	3	0.014
GXETU DAM	WR: Dams	Main Damwall	GXETHU DAM	Dam Outlet Valves - Mechanism	GXETHU DAM - outlet valve - mechanism	500009135_7	2	3	0.005
GXETU DAM	WR: Dams	Main Damwall	Gxethu Dam	Dam Outlet Valves - Casing	Scour Valve - casing	500009135_8	3	3	0.007
GXETU DAM	WR: Dams	Main Damwall	Gxethu Dam	Dam Outlet Valves - Mechanism	Scour Valve - mechanism	500009135_9	3	3	0.002
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Hydrological Station	G2H029 Lourens River @ Strand	Hydrological Station	not componentised	500001468_0	1	1	0.090
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Meteorological Station	G2E001 Brakke Fontein @ Atlantis Sewage Works	Meteorological Station	not componentised	500004770_0	1	3	0.264
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Meteorological Station	G2E015 Simon's Town	Meteorological Station	not componentised	500001116_0	1	4	0.325
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Meteorological Station	G1E009 Withoogte @ Purification Works	Meteorological Station	not componentised	500006118_0	1	4	0.325
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Hydrological Station	H4H015 Houtbaais River @ Schurfberg	Hydrological Station	not componentised	500001483_0	2	1	10.227

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Hydrological Station	H6H005 Baviaans River @ Genadendal	Hydrological Station	not componentised	500001487_0	2	1	2.769
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Hydrological Station	J1H019 Groot River @ Buffelsfontein	Hydrological Station	not componentised	500001495_0	2	1	6.749
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Hydrological Station	E2H010 Kruis River @ Ebenezer	Hydrological Station	not componentised	500006125_0	2	1	4.789
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Hydrological Station	G2H015 Eerste River @ Faure	Hydrological Station	not componentised	500001915_0	2	2	0.314
JAN TSHATSHU DAM	WR: Dams	Main Damwall	JAN TSHATSHU	Dam Wall-15m<Height<30m	Jan Tshatshu Dam Wall	500009488_1	4	3	3.480
JAN TSHATSHU DAM	WR: Dams	Main Damwall	JAN TSHATSHU	Dam Spillway	Jan Tshatshu Dam Spillway	500009488_2	4	3	7.272
KAMASTONE DAM	WR: Dams	Main Damwall	KAMASTONE - CISKEI	Dam Wall-15m<Height<30m	Kamastone Dam Wall	500009138_1	3	1	0.791
KAMASTONE DAM	WR: Dams	Main Damwall	KAMASTONE - CISKEI	Dam Spillway	Kamastone Dam Spillway	500009138_2	3	2	0.403
KAT RIVER DAM (44)	Buildings	Boat House	Kat River Dam Boat house	Main Building	Main building	500001027_0	1	2	0.235
KAT RIVER DAM (44)	Buildings	Stores	Kat River Dam Open Shed Stores	Main Building	Open Shed Stores	500001026_0	2	2	1.750
KLIPPLAAT RIVER-WATERDOWN DAM	Buildings	Stores	Waterdown Dam Store	Main Building	Main building	500003005_0	2	3	0.093
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Canals	Canal Balancing Dam	Shiloh balancing dam	Canal Balancing Dam	not componentised	500006400_0	2	3	47.546
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Canals	Canal Section	primary	Canal Excavation	Canal excavation	500006399_0	3	2	3.964
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Canals	Canal Section	primary	Canal Lining - TA2	Canal Lining	500006399_1	3	2	16.467
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Canals	Canal Section	primary	Canal Berm	Canal berm	500006399_5	3	2	0.132
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Pump stations	Pump Station	Shilo pump station	Electric Motor - Switchgear	Shiloh Pump Station motors & switchgear	500007274_4	3	4	2.587
KUZITUNGU DAM	WR: Dams	Main Damwall	KUZITUNGU - CISKEI	Dam Wall-15m<Height<30m	Kuzitungu Dam Wall	500009489_1	3	1	2.031
KUZITUNGU DAM	WR: Dams	Main Damwall	KUZITUNGU - CISKEI	Dam Spillway	Kuzitungu Dam Spillway	500009489_2	3	1	0.247

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
KUZITUNGU DAM	WR: Dams	Main Damwall	KUZITUNGU - CISKEI	Dam Outlet - Pipework- Steel	KUZITUNGU - CISKEI outlet pipes	500009489_4	3	1	0.004
KUZITUNGU DAM	WR: Dams	Main Damwall	KUZITUNGU - CISKEI	Dam Outlet Valves - Casing	KUZITUNGU - CISKEI - outlet valve - casing	500009489_5	3	1	0.004
KUZITUNGU DAM	WR: Dams	Main Damwall	KUZITUNGU - CISKEI	Dam Outlet Valves - Mechanism	KUZITUNGU - CISKEI - outlet valve - mechanism	500009489_6	3	1	0.001
LAING DAM (58)	WR: Dams	Main Damwall	LAING DAM	Dam Outlet Valves - Casing	LAING DAM - outlet valve - casing	500009277_5	3	1	0.871
LAING DAM (58)	WR: Dams	Main Damwall	LAING DAM	Dam Intake Gates - Casing	LAING DAM - intake gate - casing	500009277_2	4	1	0.653
LANTI WEIR/QAMATA IRRIGATION	WR: Canals	Canal Section	sec_canal4	Canal Fencing	Canal Fence Rigth	500000520_2	3	3	0.100
LANTI WEIR/QAMATA IRRIGATION	WR: Canals	Canal Section	sec_canal4	Canal Fencing	Canal Fence Left	500000520_1	3	4	0.100
LOWER BERG RIVER (VOELVEI & MISVERSTAND)	WS: Measuring facili	Hydrological Station	G1H035 Matjiesrivier @ Marjiesfontein	Hydrological Station	not componentised	500004775_0	2	2	7.234
LOWER SUNDAYS SCHEME	Buildings	Residential Housing	Korhaansdrift housing 1	Main Building	Main building	500001056_0	3	1	0.053
LOWER SUNDAYS SCHEME	WR: Dams	Main Damwall	Scheepersvlakte Dam (balancing)	Dam Spillway	Scheepersvlakte Dam Spillway	500009165_2	4	3	15.701
LOWER SUNDAYS SCHEME	WR: Dams	Main Damwall	Scheepersvlakte Dam (balancing)	Cranes	Scheepersvlakte outlet structure Jib Crane 1.5t	500009165_17	4	3	0.083
LOWER SUNDAYS SCHEME	WR: Dams	Main Damwall	Scheepersvlakte Dam (balancing)	Dam Wall-15m<Height<30m	Scheepersvlakte Earth Embarkment	500009165_1	4	4	41.113
MAIPASE DAM	WR: Dams	Main Damwall	MAIPASE - CISKEI	Dam Wall-15m<Height<30m	Maipase Dam Wall	500009490_1	3	1	0.598
MAIPASE DAM	WR: Dams	Main Damwall	MAIPASE - CISKEI	Dam Spillway	Maipase Dam Spillway	500009490_2	3	1	0.247
MAITLAND DAM	WR: Dams	Main Damwall	MAITLAND - CISKEI	Dam Wall-15m<Height<30m	Maitland Dam Wall	500009491_1	3	2	0.587
MAITLAND DAM	WR: Dams	Main Damwall	MAITLAND - CISKEI	Dam Spillway	Maitland Dam Spilway	500009491_2	3	3	1.364
MAJOLA DAM	WR: Dams	Main Damwall	MAJOLA - TS*	Dam Outlet - Intake Tower	Majola Intake	500009142_2	2	2	3.101
MAJOLA DAM	WR: Dams	Main Damwall	Majola - TS*	Dam Outlet - Pipework- Steel	Majola dam outlet pipe	500009142_4	2	2	0.231
MAJOLA DAM	WR: Dams	Main Damwall	Majola - TS*	Dam Outlet Valves	Majola dam outlet gate valve	500009142_5	2	2	0.035

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
MAJOLA DAM	WR: Dams	Main Damwall	MAJOLA - TS*	Dam Wall-15m<Height<30m	Majola Earth Embankment	500009142_1	2	3	10.818
MAJOLA DAM	WR: Dams	Main Damwall	MAJOLA - TS*	Dam Spillway	Majola Spillway	500009142_3	2	3	11.354
MALUTI - BELFORT DAM (4)	Buildings	Office Building	Maluti Belfort Residential and Office Building	Office Building	WCO 2 bedroom flat with garage & office unit	500010518_0	3	1	2.566
MANKAZANA DAM	WR: Dams	Main Damwall	MANKAZANA DAM (CISKEI)	Dam Outlet - Pipework- Steel	MANKAZANA (CISKEI) outlet pipes	500009143_5	2	4	1.154
MANKAZANA DAM	WR: Dams	Main Damwall	MANKAZANA DAM (CISKEI)	Dam Outlet Valves - Casing	MANKAZANA (CISKEI) - outlet valve - casing	500009143_6	3	4	1.154
MANKAZANA DAM	WR: Dams	Main Damwall	MANKAZANA DAM (CISKEI)	Dam Outlet Valves - Mechanism	MANKAZANA (CISKEI) - outlet valve - mechanism	500009143_7	3	4	0.410
MASELA 1 DAM	WR: Dams	Main Damwall	MASELA 1 DAM	Dam Wall-15m<Height<30m	Masela 1 Dam Wall	500009493_1	3	1	1.853
MASELA 1 DAM	WR: Dams	Main Damwall	MASELA 1 DAM	Dam Spillway	Masela 1 Dam Spillway	500009493_2	3	1	0.247
MASELA 2 DAM	WR: Dams	Main Damwall	MASELA 2 - CISKEI	Dam Wall-15m<Height<30m	Masela 2 Dam Wall	500009144_1	1	3	2.450
MASELA 2 DAM	WR: Dams	Main Damwall	MASELA 2 - CISKEI	Dam Spillway	Masela 2 Dam Spillway	500009144_2	1	3	1.023
MITFORD DAM	WR: Dams	Main Damwall	Midfort Dam	Dam Wall-15m<Height<30m	Mitford Earth Embankment	500009146_1	3	1	8.138
MITFORD DAM	WR: Dams	Main Damwall	Midfort Dam	Dam Spillway	Mitford Dam Spillway	500009146_2	3	1	24.620
MITFORD DAM	WR: Dams	Main Damwall	Midfort Dam	Dam Outlet Structure	Midford Dam Outlet Pipe	500009146_3	3	1	0.466
MITFORD DAM	WR: Dams	Main Damwall	Midfort Dam	Dam Outlet Valves - Casing	Mitford dam outlet valve (gate) - casing	500009146_4	3	4	0.039
MITFORD DAM	WR: Dams	Main Damwall	Midfort Dam	Dam Outlet Valves - Mechanism	Mitford dam outlet valve (gate) - mechanism	500009146_5	3	4	0.013
MOUNT COKE DAM	WR: Dams	Main Damwall	MOUNT COKE	Dam Wall-15m<Height<30m	Mount Coke Dam Wall	500009494_1	3	2	2.609
MOUNT COKE DAM	WR: Dams	Main Damwall	MOUNT COKE	Dam Spillway	Mount Coke Dam Spilway	500009494_2	3	2	2.911
MOUNT COKE DAM	WR: Dams	Main Damwall	MOUNT COKE	Dam Outlet - Pipework- Steel	MOUNT COKE outlet pipes	500009494_5	3	2	0.006
MOUNT COKE DAM	WR: Dams	Main Damwall	MOUNT COKE	Dam Outlet Valves - Casing	MOUNT COKE - outlet valve - casing	500009494_6	3	3	0.006

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
MOUNT COKE DAM	WR: Dams	Main Damwall	MOUNT COKE	Dam Outlet Valves - Mechanism	MOUNT COKE - outlet valve - mechanism	500009494_7	3	3	0.002
MSENGENI DAM	WR: Dams	Main Damwall	MSENGENI	Dam Spillway	Msengeni Dam Spillway - Right Flank	500009148_2	2	2	0.798
MSENGENI DAM	WR: Dams	Main Damwall	MSENGENI	Dam Wall-15m<Height<30m	Msengeni Dam Wall	500009148_1	2	3	55.469
MTATA DAM (74)	WS: Measuring facili	Hydrological Station	Umtata River @ Umtata Dam	Hydrological Station	not componentised	500002006_0	2	4	12.473
MZIMVUBU-TSITSIKAMA	WS: Measuring facili	Hydrological Station	Closed T1H010 Mgwali River @ Clarkebury	Hydrological Station	not componentised	500002003_0	1	2	3.050
MZIMVUBU-TSITSIKAMA	WS: Measuring facili	Hydrological Station	Bashee River @ Bashee Bridge	Hydrological Station	not componentised	500002151_0	4	2	2.745
NDLAMBE(TYHEFU) DAM	WR: Dams	Main Damwall	NDLAMBE DAM	Dam Wall-15m<Height<30m	Ndlambe Dam Wall	500009097_1	2	3	15.528
NDLAMBE(TYHEFU) DAM	WR: Dams	Main Damwall	Ndlambe Dam	Dam Outlet - Pipework- Steel	Ndlambe Dam outlet pipe	500009097_2	3	3	0.304
NDLAMBE(TYHEFU) DAM	WR: Dams	Main Damwall	Ndlambe Dam	Valves - Casing	Scour Outlet Valve - casing	500009097_3	4	3	0.024
NDLAMBE(TYHEFU) DAM	WR: Dams	Main Damwall	Ndlambe Dam	Valves - Mechanism	Scour Outlet Valve - mechanism	500009097_4	4	3	0.008
NGWEKAZI DAM	WR: Dams	Main Damwall	NGWEKAZI	Dam Outlet - Pipework- Steel	NGWEKAZI outlet pipes	500009495_5	3	2	0.009
NGWEKAZI DAM	WR: Dams	Main Damwall	NGWEKAZI	Dam Wall - 12m<Height<30m	Ngwekazi Earth Embankment	500009495_1	3	3	20.043
NGWEKAZI DAM	WR: Dams	Main Damwall	NGWEKAZI	Dam Spillway	Nqwekazi Dam Spilway	500009495_2	3	3	6.000
NGWEKAZI DAM	WR: Dams	Main Damwall	NGWEKAZI	Dam Outlet Valves - Casing	NGWEKAZI - outlet valve - casing	500009495_6	3	4	0.009
NGWEKAZI DAM	WR: Dams	Main Damwall	NGWEKAZI	Dam Outlet Valves - Mechanism	NGWEKAZI - outlet valve - mechanism	500009495_7	3	4	0.003
NONCAMPA 1 DAM	WR: Dams	Main Damwall	Noncampa 2	Dam Wall-15m<Height<30m	Noncampa 2 Dam Wall	500002939_1	1	3	1.092
NONCAMPA 1 DAM	WR: Dams	Main Damwall	Noncampa 2	Dam Spillway	Noncampa 2 Dam Spillway	500002939_2	1	3	1.182
NONCAMPA 1 DAM	WR: Dams	Main Damwall	NONCAMPA 1 - CISKEI	Dam Wall-15m<Height<30m	Noncampa 1 Dam Wall	500009496_1	1	3	6.277

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
NONCAMPA 1 DAM	WR: Dams	Main Damwall	NONCAMPA 1 - CISKEI	Dam Spillway	Noncampa 1 Dam Spillway	500009496_2	1	3	1.891
NQWELO DAM	WR: Dams	Main Damwall	NQWELO DAM (CISKEI)	Dam Outlet Valves - Casing	NQWELO (CISKEI) - outlet valve - casing	500009498_6	3	3	0.014
NQWELO DAM	WR: Dams	Main Damwall	NQWELO DAM (CISKEI)	Dam Outlet Valves - Mechanism	NQWELO (CISKEI) - outlet valve - mechanism	500009498_7	3	3	0.005
NQWELO DAM	WR: Dams	Main Damwall	NQWELO DAM (CISKEI)	Dam Spillway	Nqwelo Spillway	500009498_2	4	3	6.111
NQWELO DAM	WR: Dams	Main Damwall	NQWELO DAM (CISKEI)	Dam Outlet - Pipework- Steel	NQWELO (CISKEI) outlet pipes	500009498_5	4	3	0.014
NQWELO DAM	WR: Dams	Main Damwall	NQWELO DAM(CISKEI)	Dam Wall - 12m<Height<30m	Nqwelo Earth Embankment	500009498_1	4	4	44.673
NTSIKIZIMI DAM	WR: Dams	Main Damwall	NTSIKIZINI DAM	Dam Wall- 15m<Height<30m	Nzikizini Earth Embankment	500009499_1	2	2	17.088
NTSIKIZIMI DAM	WR: Dams	Main Damwall	Ntsikizini Dam	Dam Outlet Valves - Casing	Nzikizini dam outlet valve - casing	500009499_2	3	2	0.051
NTSIKIZIMI DAM	WR: Dams	Main Damwall	Ntsikizini Dam	Dam Outlet Valves - Mechanism	Nzikizini dam outlet valve - mechanism	500009499_3	3	2	0.017
NTSIKIZIMI DAM	WR: Dams	Main Damwall	NTSIKIZINI DAM	Dam Outlet - Pipework- Steel	Ntsikizini Dam Outlet Pipe	500009499_4	3	3	0.531
ORANGE-FISH GWS	WR: Dams	Main Damwall	Darlington Dam	Dam Outlet Valves - Casing	Darlington Dam - outlet valve 1 - casing	500009126_3	3	1	0.774
ORANGE-FISH GWS	WR: Dams	Main Damwall	Darlington Dam	Dam Outlet Valves - Casing	Darlington Dam - outlet valve 2 - casing	500009126_5	3	1	0.774
ORANGE-FISH GWS	WR: Dams	Main Damwall	Darlington Dam	Dam Outlet Valves - Casing	Darlington Dam - outlet valve 3 - casing	500009126_7	3	1	0.774
ORANGE-FISH GWS	WR: Dams	Main Damwall	Darlington Dam	Dam Outlet Valves - Casing	Darlington Dam - outlet valve 4 - casing	500009126_9	3	1	0.774
ORANGE-FISH GWS	WR: Dams	Main Damwall	Darlington Dam	Dam Outlet Valves - Casing	Darlington Dam - outlet valve 5 - casing	500009126_11	3	1	0.774
ORANGE-FISH GWS	WR: Dams	Main Damwall	Darlington Dam	Dam Outlet Valves - Casing	Darlington Dam - outlet valve 6 - casing	500009126_13	3	1	0.774
ORANGE-FISH GWS	WR: Dams	Main Damwall	Darlington Dam	Dam Intake Gates - Casing	Darlington Dam - intake gate - casing	500009126_15	4	1	3.481
ORANGE-FISH GWS	WR: Dams	Main Damwall	ELANDSDRIFT BARRAGE	Dam Intake Gates - Mechanism	ELANDSDRIFT BARRAGE - intake gate - mechanism	500010378_10	4	4	1.785
ORANGE-FISH GWS	WR: Dams	Main Damwall	Darlington Dam	Dam Outlet - Pipework- Steel	Darlington Dam outlet pipes	500009126_2	5	1	2.559
OUTSPAN (CHALUMNA) DAM (97)	WR: Dams	Main Damwall	Outspan Dam	Dam Wall- 15m<Height<30m	Outspan Dam Wall	500009500_1	3	2	10.747

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
PLEASANT VIEW DAM (100)	WR: Dams	Main Damwall	PLEASANT VIEW DAM	Dam Wall - 12m<Height<30m	Pleasant View Earth Embankment	500009461_1	2	4	103.971
PLEASANT VIEW DAM (100)	WR: Dams	Main Damwall	PLEASANT VIEW DAM	Dam Spillway	Pleasant View Dam Spilway	500009461_2	2	4	5.134
PLEASANT VIEW DAM (100)	WR: Dams	Main Damwall	PLEASANT VIEW DAM	Dam Outlet - Pipework- Steel	PLEASANT VIEW DAM outlet pipes	500009461_5	2	4	0.180
PLEASANT VIEW DAM (100)	WR: Dams	Main Damwall	PLEASANT VIEW DAM	Dam Outlet Valves - Casing	PLEASANT VIEW DAM - outlet valve - casing	500009461_6	3	4	0.180
PLEASANT VIEW DAM (100)	WR: Dams	Main Damwall	PLEASANT VIEW DAM	Dam Outlet Valves - Mechanism	PLEASANT VIEW DAM - outlet valve - mechanism	500009461_7	3	4	0.064
PLEASANT VIEW DAM (100)	WR: Dams	Main Damwall	Pleasant View Dam	Dam Outlet Valves - Mechanism	Pleasant View Dam - outlet valve no.1 - mech	500009461_8	4	3	0.009
PLEASANT VIEW DAM (100)	WR: Dams	Main Damwall	Pleasant View Dam	Dam Outlet Valves - Mechanism	Pleasant View Dam - outlet valve no.2 - mech	500009461_9	4	3	0.009
PLEASANT VIEW DAM (100)	WR: Dams	Main Damwall	Pleasant View Dam	Dam Outlet Valves - Casing	Pleasant View Dam - outlet valve no.1 - casing	500009461_10	4	3	0.028
PLEASANT VIEW DAM (100)	WR: Dams	Main Damwall	Pleasant View Dam	Dam Outlet Valves - Casing	Pleasant View Dam - outlet valve no.2 - casing	500009461_11	4	3	0.028
PLEASANT VIEW DAM (100)	WR: Dams	Main Damwall	PLEASANT VIEW DAM	Dam Intake Gates - Casing	PLEASANT VIEW DAM - intake gate - casing	500009461_3	4	4	0.135
PLEASANT VIEW DAM (100)	WR: Dams	Main Damwall	PLEASANT VIEW DAM	Dam Intake Gates - Mechanism	PLEASANT VIEW DAM - intake gate - mechanism	500009461_4	4	4	0.048
QIBIRA DAM	WR: Dams	Main Damwall	QIBIRA DAM	Dam Wall- 15m<Height<30m	Qibira Dam Wall	500009160_1	2	3	0.999
REDHILL DAM	WR: Dams	Main Damwall	REDHILL DAM	Dam Wall- 15m<Height<30m	Redhill Dam Wall	500009161_1	4	2	6.238
REDHILL DAM	WR: Dams	Main Damwall	REDHILL DAM	Dam Spillway	Redhill Dam Spillway	500009161_2	4	2	2.751
REDHILL DAM	WR: Dams	Main Damwall	REDHILL DAM	Dam Outlet Valves - Casing	REDHILL DAM - outlet valve - casing	500009161_6	4	2	0.006
REDHILL DAM	WR: Dams	Main Damwall	REDHILL DAM	Dam Outlet Valves - Mechanism	REDHILL DAM - outlet valve - mechanism	500009161_7	4	2	0.002
REDHILL DAM	WR: Dams	Main Damwall	REDHILL DAM	Dam Outlet - Pipework- Steel	REDHILL DAM outlet pipes	500009161_5	4	3	0.006
ROOIKRANTZ DAM (108)	Buildings	Stores	Rooikrantz Dam Store	Main Building	Main building	500002712_0	2	2	0.508
ROOIKRANTZ DAM (108)	Buildings	Office Building	Rooikrantz Dam WTW Office	Main Building	Main building	500002708_0	2	4	1.919
ROOIKRANTZ DAM (108)	Buildings	Guard Building	Rooikrantz Dam WTW Guard House	Main Building	Main building	500002709_0	3	2	0.091
ROOIKRANTZ DAM (108)	Buildings	Residential Housing	Rooikrantz Dam Worker House	Main Building	Main building	500002710_0	3	2	0.248
ROOIKRANTZ DAM (108)	Buildings	Residential Housing	Rooikrantz Dam Old House	Main Building	Main building	500002705_0	3	3	0.509

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
ROOIKRANTZ DAM (108)	Buildings	Residential Housing	Rooikrantz Dam WTW House 1	Main Building	Main building	500002350_0	3	4	0.562
ROOIKRANTZ DAM (108)	Buildings	Residential Housing	Rooikrantz Dam WTW House 2	Main Building	Main building	500002706_0	3	4	0.631
ROOIKRANTZ DAM (108)	Buildings	Residential Housing	Rooikrantz Dam WTW House 3	Main Building	Main building	500002707_0	3	4	0.631
ROXENI DAM	WR: Dams	Main Damwall	Roxeni Dam	Dam Outlet Structure	Roxeni Dam Outlet Structure	500009502_10	3	2	0.759
ROXENI DAM	WR: Dams	Main Damwall	ROXENI DAM	Dam Outlet - Pipework- Steel	ROXENI DAM outlet pipes	500009502_5	4	2	0.006
ROXENI DAM	WR: Dams	Main Damwall	Roxeni Dam	Butterfly Valves	Scour outlet butterfly valve	500009502_8	4	2	0.029
ROXENI DAM	WR: Dams	Main Damwall	Roxeni Dam	Butterfly Valves	Supply isolating butterfly valve	500009502_9	4	2	0.029
ROXENI DAM	WR: Dams	Main Damwall	ROXENI DAM	Dam Wall- 15m<Height<30m	Roxeni Earth Embankment	500009502_1	4	3	27.367
ROXENI DAM	WR: Dams	Main Damwall	ROXENI DAM	Dam Spillway	Roxeni Dam Spillway	500009502_2	4	3	60.973
ROXENI DAM	WR: Dams	Main Damwall	ROXENI DAM	Dam Outlet Valves - Casing	ROXENI DAM - outlet valve - casing	500009502_6	4	3	0.006
ROXENI DAM	WR: Dams	Main Damwall	ROXENI DAM	Dam Outlet Valves - Mechanism	ROXENI DAM - outlet valve - mechanism	500009502_7	4	3	0.002
RURA DAM	WR: Dams	Main Damwall	RURA DAM - (CISKEI)	Dam Wall- 15m<Height<30m	Rura Earth Embankment	500009503_1	3	1	2.227
RURA DAM	WR: Dams	Main Damwall	RURA DAM- (CISKEI)	Dam Spillway	Rura Dam Spillway	500009503_2	3	2	6.573
RURA DAM	WR: Dams	Main Damwall	RURA DAM - (CISKEI)	Dam Outlet Valves - Casing	RURA - (CISKEI) - outlet valve - casing	500009503_6	3	2	0.021
RURA DAM	WR: Dams	Main Damwall	RURA DAM - (CISKEI)	Dam Outlet Valves - Mechanism	RURA - (CISKEI) - outlet valve - mechanism	500009503_7	3	2	0.008
RURA DAM	WR: Dams	Main Damwall	RURA DAM - (CISKEI)	Dam Outlet - Pipework- Steel	RURA - (CISKEI) outlet pipes	500009503_5	3	3	0.021
SHESHEGU DAM	WR: Dams	Main Damwall	Sheshegu Dam	Dam Wall - 12m<Height<30m	Sheshegu Dam Wall	500003295_1	3	3	21.958
SHESHEGU DAM	WR: Dams	Main Damwall	Sheshegu Dam	Dam Spillway	Sheshegu Dam Spillway	500003295_2	3	3	8.788
SHESHEGU DAM	WR: Dams	Main Damwall	Sheshegu Dam	Dam Outlet - Pipework- Steel	Sheshegu Dam outlet pipes	500003295_5	3	3	0.034
SHESHEGU DAM	WR: Dams	Main Damwall	Sheshegu Dam	Dam Outlet Valves - Casing	Sheshegu Dam - outlet valve - casing	500003295_6	3	3	0.034
SHESHEGU DAM	WR: Dams	Main Damwall	Sheshegu Dam	Dam Outlet Valves - Mechanism	Sheshegu Dam - outlet valve - mechanism	500003295_7	3	3	0.012

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
SHILOH DAM	WR: Dams	Main Damwall	SHILOH DAM	Dam Outlet Valves - Casing	SHILOH DAM - outlet valve - casing	500009166_6	3	1	0.059
SHILOH DAM	WR: Dams	Main Damwall	SHILOH DAM	Dam Outlet Valves - Mechanism	SHILOH DAM - outlet valve - mechanism	500009166_7	3	1	0.023
SHILOH DAM	WR: Dams	Main Damwall	SHILOH DAM	Dam Outlet - Pipework- Steel	SHILOH DAM outlet pipes	500009166_5	4	1	0.059
SHILOH DAM	WR: Dams	Main Damwall	Shiloh Dam	Gate Valves - Casing	River release gate valve - casing	500009166_8	4	2	0.017
SHILOH DAM	WR: Dams	Main Damwall	Shiloh Dam	Gate Valves - Mechanism	River release gate valve - mechanism	500009166_9	4	2	0.006
SHILOH DAM	WR: Dams	Main Damwall	SHILOH DAM	Dam Wall - 12m<Height<30m	Shiloh Earth Embankment	500009166_1	4	3	81.135
SHILOH DAM	WR: Dams	Main Damwall	SHILOH DAM	Dam Spillway	Shiloh Dam Spillway	500009166_2	4	3	36.797
SINQUMENI DAM	WR: Dams	Main Damwall	SINQUMENI DAM (CISKEI)	Dam Wall - 12m<Height<30m	Sinqumeni Earth Embankment	500009174_1	3	3	29.143
SINQUMENI DAM	WR: Dams	Main Damwall	SINQUMENI DAM (CISKEI)	Dam Spillway	Sinqumeni Dam Spillway	500009174_2	3	3	5.700
SINQUMENI DAM	WR: Dams	Main Damwall	SINQUMENI DAM (CISKEI)	Dam Outlet - Pipework- Steel	SINQUMENI (CISKEI) outlet pipes	500009174_5	3	3	0.023
SINQUMENI DAM	WR: Dams	Main Damwall	SINQUMENI DAM (CISKEI)	Dam Outlet Valves - Casing	SINQUMENI (CISKEI) - outlet valve - casing	500009174_6	3	3	0.023
SINQUMENI DAM	WR: Dams	Main Damwall	SINQUMENI DAM (CISKEI)	Dam Outlet Valves - Mechanism	SINQUMENI (CISKEI) - outlet valve - mechanism	500009174_7	3	3	0.008
TENTERGATE DAM	WR: Dams	Main Damwall	TENTERGATE DAM	Dam Outlet Valves - Casing	TENTERGATE DAM - outlet valve - casing	500009175_5	3	1	0.065
TSOJANA DAM (123)	Buildings	Office Building	Tsojana Dam Office Building	Main Building	Office Building	500009579_0	1	1	0.043
TYUTYU DAM	WR: Dams	Main Damwall	TYUTYU - CISKEI	Dam Wall- 15m<Height<30m	Tyutyu Dam - Earthfill Wall	500009506_1	1	1	0.806
TYUTYU DAM	WR: Dams	Main Damwall	TYUTYU - CISKEI	Dam Spillway	Tyutyu Dam - Spillway	500009506_2	1	2	0.455
WOBURN 2 DAM	WR: Dams	Main Damwall	"Woburn 2, earth wall"	Dam Wall- 15m<Height<30m	Woburn 2 Dam Wall	500003111_1	3	2	10.912
WOBURN 2 DAM	WR: Dams	Main Damwall	Woburn 2, earth wall	Dam Outlet - Pipework- Steel	Woburn 2, earth wall outlet pipes	500003111_5	3	2	0.012
WOBURN 2 DAM	WR: Dams	Main Damwall	Woburn 2, earth wall	Dam Outlet Valves - Mechanism	Woburn 2, earth wall - outlet valve - mechanism	500003111_7	3	2	0.004
WOBURN 2 DAM	WR: Dams	Main Damwall	Woburn 2, earth wal	Dam Outlet Valves - Casing	Woburn 2, earth wall - outlet valve - casing	500003111_6	3	3	0.012

Scheme Name	Asset Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	CRC 2016 (R Million)
WOBURN 2 DAM	WR: Dams	Main Damwall	Woburn 2, earth wall	Dam Spillway	Woburn 2 Dam Spillway	500003111_2	3	4	25.058
WOBURN 3 DAM	WR: Dams	Main Damwall	Woburn 3 Earth Wall	Dam Wall-15m<Height<30m	Woburn 3 Dam Wall	500003113_1	2	2	8.449
WOBURN 3 DAM	WR: Dams	Main Damwall	Woburn 3 Earth Wall	Dam Spillway	Woburn 3 Dam Spillway	500003113_2	2	4	11.621
WOBURN 3 DAM	WR: Dams	Main Damwall	Woburn 3 Earth Wall	Dam Outlet - Pipework- Steel	Woburn 3 Earth Wall outlet pipes	500003113_5	2	4	0.006
WOBURN 3 DAM	WR: Dams	Main Damwall	Woburn 3 Earth Wall	Dam Outlet Valves - Casing	Woburn 3 Earth Wall - outlet valve - casing	500003113_6	3	1	0.006
WOBURN 3 DAM	WR: Dams	Main Damwall	Woburn 3 Earth Wall	Dam Outlet Valves - Mechanism	Woburn 3 Earth Wall - outlet valve - mechanism	500003113_7	3	3	0.002

4 UNDER-UTILISED OR NOT-IN-USE ASSETS

Table L.3: Under-utilised asset components

Asset Facility Category	Under Utilised Asset Components					
	Cluster Total		Scheme Specific		Non Scheme Specific	
	No.	CRC (R million)	No.	CRC (R million)	No.	CRC (R million)
Buildings	34	11.12	29	10.36	5	0.77
WS: borehol	0	-	0	-	-	-
WR: Canals	15	75.84	15	75.84	-	-
WR: Dams	124	615.09	124	615.09	-	-
WR: Power Supply	0	-	0	-	-	-
WR: Pump stations	3	0.98	3	0.98	-	-
WR: Reservoirs	8	22.72	6	21.16	2	1.56
WR: Roads and bridge	77	42.14	77	42.14	-	-
WR: Steel Pipelines	0	-	0	-	-	-
WR: Telemetry	0	0	0	-	-	-
WR: Tunnels	0	0	0	-	-	-
WR: Water Treatment	0	-	0	-	-	-
WS: Measuring facili	7	16.66	2	6.97	5	9.69
Total	**268**	**784.56**	**256**	**772.53**	**12**	**12.02**

Table L.4: Under-utilised asset components per scheme and per facility category

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
AMABELE DAM	WR: Dams	Main Damwall	Amabele Gws Dam	Dam Wall-15m<Height<30m	Amabele Dam Wall	500000512_1	3	3	2	10.478
AMABELE DAM	WR: Dams	Main Damwall	Amabele Gws Dam	Dam Spillway	Amabele Spillway	500000512_2	3	3	2	3.411
AMATOLA-WRIGGLESWADE DAM (3)	Buildings	Residential Housing	Wriggleswade staff house 3(park home)	Main Building	Main building	500003381_0	3	3	2	0.182
AMATOLA-WRIGGLESWADE DAM (3)	WR: Dams	Main Damwall	Wriggleswade Dam	Auxilliary Equip. Main Damwall	Handrails	500009476_28	4	4	2	0.380
BALURA DAM	WR: Dams	Main Damwall	BALURA DAM	Dam Outlet - Pipework- Steel	BALURA DAM outlet pipes	500009123_5	2	2	2	0.011
BALURA DAM	WR: Dams	Main Damwall	BALURA DAM	Dam Outlet Valves - Casing	BALURA DAM - outlet valve - casing	500009123_6	2	2	2	0.011
BALURA DAM	WR: Dams	Main Damwall	BALURA DAM	Dam Outlet Valves - Mechanism	BALURA DAM - outlet valve - mechanism	500009123_7	2	2	2	0.004
BALURA DAM	WR: Dams	Main Damwall	BALURA DAM	Dam Wall-15m<Height<30m	Balura Earth Embankment	500009123_1	2	3	2	32.101
BALURA DAM	WR: Dams	Main Damwall	BALURA DAM	Dam Spillway	Balura Dams Spilway	500009123_2	2	3	2	1.535
BEERVLEI DAM	Buildings	Residential Housing	Beervlei dam Residential 5	Main Building	Residential 5	500002761_0	3	3	2	0.693
BEERVLEI DAM	Buildings	Residential Housing	Beervlei dam Building	Outbuildings	Residential outbuilding - Generator storeroom	500002761_1	3	3	2	0.231
BEERVLEI DAM	Buildings	Residential Housing	Beervlei dam Residential 1	Main Building	Main building	500002759_0	3	4	2	0.470
BEERVLEI DAM	WR: Canals	Canal Section	Beervlei Canal Section	Canal Excavation	Canal excavation	500003589_0	3	2	2	0.104
BEERVLEI DAM	WR: Canals	Canal Section	Beervlei Canal Section	Canal Lining - TA2	Canal Lining	500003589_1	3	2	2	0.470
BEERVLEI DAM	WR: Canals	Canal Section	Beervlei Canal Section	Canal Service Road	Canal service road	500003589_2	3	2	2	0.050
BEERVLEI DAM	WR: Canals	Canal Section	Beervlei Canal Section	Canal Berm	Canal berm	500003589_3	3	2	2	0.076
BEKRUIPKOP DAM	WR: Dams	Main Damwall	BEKRUIPKOP - CISKEI	Dam Wall - 12m<Height<30m	Bekruipkop Dam Wall	500009477_1	3	2	2	5.348
BEKRUIPKOP DAM	WR: Dams	Main Damwall	BEKRUIPKOP - CISKEI	Dam Spillway	Bekruipkop Dam Spilway	500009477_2	3	2	2	0.798
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Dams	Main Damwall	Berg River Dam	Auxilliary Equip. Main Damwall	hand rails	500010308_5	4	5	2	0.380
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Dams	Main Damwall	Berg River Dam	Gates	security gate	500010308_9	4	5	2	0.228
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Dams	Separate Dam Abstraction	Berg river Dam Abstraction tower	Auxilliary Equip. Main Damwall	handrail	500010311_36	4	5	2	0.228
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Theewaterskloof dam access road to Weir and quarry	Road Section		500021827_0	1	2	2	0.482

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Theewaterskloof dam access road to bottom outlets	Road Section		500021826_0	1	3	2	0.155
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Theewaterskloof dam left bank service road sec 1	Road Section		500021650_0	1	4	2	3.416
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Theewaterskloof dam left bank service road sec 2	Road Section		500021651_0	1	4	2	0.554
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Theewaterskloof dam left bank service road sec 3	Road Section		500021652_0	1	4	2	1.129
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Theewaterskloof dam Right bank service road	Road Section		500021828_0	1	4	2	5.308
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Right bank service road Charmaine A	Road Section	Right bank service road Charmaine A	500021798_0	1	4	2	0.675
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Right bank service road Charmaine B	Road Section	Right bank service road Charmaine B	500021799_0	1	4	2	0.778
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	"Theewaterskloof dam access road office, w station	Road Section	Pumpstation Building & Pit	500021649_0	1	5	2	0.107
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Access road to Charmaine pump station	Road Section		500021677_0	1	5	2	1.992
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Bridge	Berg River Bridge	Road Bridge		500021703_0	1	5	2	0.531
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Bridge	Charmaine Access Bridge	Road Bridge	Pumpstation Building & Pit	500021712_0	1	5	2	0.531
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Portals-Berg River Siphon Road	Road Section		500021788_0	1	5	2	0.644
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Road to Airvalve	Road Section	Road to Airvalve	500021805_0	1	5	2	0.080
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Road to Wolwekloof	Road Section	Road to Wolwekloof	500021809_0	1	5	2	1.549
BERG RIVER DAM (DASBOS-DRAKENSTEIN)	WR: Roads and bridge	Road Section	Robertsvlei Access Road	Road Section	Robertsvlei Access Road	500021810_0	1	5	2	0.120
BINFIELD PARK DAM EC (5)	Buildings	Office Building	Binfield Park Security Gate Building	Outbuildings	Main building	500002547_0	2	3	2	0.153
BINFIELD PARK DAM EC (5)	WR: Dams	Main Damwall	Binfield Dam	Auxilliary Equip. Main Damwall	Binfield Park Handrails	500009055_21	4	4	2	0.380

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
BRAND RIVER MIERTJIESKRAAL DAM (9)	WR: Roads and bridge	Road Section	Access road to Miertjieskraal dam	Road Section		500021689_0	1	3	2	0.096
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WR: Roads and bridge	Road Section	Access road to Brandvlei pump station	Road Section		500021676_0	1	2	2	0.113
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WR: Roads and bridge	Road Section	Access road to Brandvlei housing	Road Section		500021674_0	1	3	2	0.179
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WR: Roads and bridge	Road Section	Access road to Brandvlei main dam wall	Road Section		500021675_0	1	3	2	1.035
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WR: Roads and bridge	Road Section	Access road to Kwaggaskloof dam	Road Section		500021687_0	1	3	2	0.196
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WR: Roads and bridge	Road Section	Access road to Kwaggaskloof houses	Road Section		500021688_0	1	3	2	0.241
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WR: Roads and bridge	Road Section	Access road to Nekkies dam wall 3	Road Section		500021690_0	1	3	2	0.185
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WR: Roads and bridge	Road Section	Access road to Pokkraal control room	Road Section		500021692_0	1	3	2	0.110
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WR: Roads and bridge	Road Section	Access road to Pokkraal dam wall	Road Section		500021693_0	1	3	2	0.137
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WR: Roads and bridge	Road Section	Access road to Smalblaar and Holsloot weirs	Road Section		500021697_0	1	3	2	0.408
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WR: Roads and bridge	Road Section	Service road to Brandvlei right bank	Road Section	Service road to Brandvlei right bank	500021815_0	1	3	2	0.974
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WS: Measuring facili	Hydrological Station	H4H019 Vink River @ De Gorree	Hydrological Station	not componentised	500001485_0	1	1	2	3.341
BREEDE RIVER GREATER BRANDVLEI DAM (10)	WS: Measuring facili	Hydrological Station	H4H020 Nuy River @ Doorn River	Hydrological Station	not componentised	500001971_0	1	1	2	3.628

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
BUFFALO RIVER-FLORISKRAAL DAM (12)	WR: Roads and bridge	Road Section	Access road to Hydro station	Road Section		500021683_0	1	2	2	0.027
BUFFALO RIVER-FLORISKRAAL DAM (12)	WR: Roads and bridge	Road Section	Access road to dam wall	Road Section		500021679_0	1	3	2	0.090
BUFFALO RIVER-FLORISKRAAL DAM (12)	WR: Roads and bridge	Road Section	Access road to Residential B houses	Road Section		500021695_0	1	3	2	0.040
BUFFELJAGTS RIVER & BUFFELJAGTS DAM (13)	WR: Roads and bridge	Road Section	Gravel road section from entrance to office	Road Section		500021740_0	1	4	2	0.157
BUFFELJAGTS RIVER & BUFFELJAGTS DAM (13)	WR: Roads and bridge	Road Section	Gravel road section to residential houses	Road Section		500021742_0	1	4	2	0.108
BUFFELJAGTS RIVER & BUFFELJAGTS DAM (13)	WR: Roads and bridge	Road Section	Road section from gate to dam (Paving)	Road Section	Road section from gate to dam (Paving)	500021803_0	1	4	2	0.074
DONNYBROOK 1 DAM	WR: Dams	Main Damwall	DONNYBROOK 1 (CISKEI)	Dam Wall-15m<Height<30m	Donnybrook 1 Earth Embankment	500009481_1	4	1	2	1.013
DONNYBROOK 1 DAM	WR: Dams	Main Damwall	DONNYBROOK 1 (CISKEI)	Dam Spillway	Donnybrook 1 Spillway	500009481_2	4	1	2	0.082
DONNYBROOK 2 DAM	WR: Dams	Main Damwall	DONNYBROOK 2 - CISKEI	Dam Wall-15m<Height<30m	Donnybrook 2 Earth Embankment	500009482_1	3	1	2	1.893
DONNYBROOK 2 DAM	WR: Dams	Main Damwall	DONNYBROOK 2 - CISKEI	Dam Spillway	Donnybrook2 Spillway	500009482_2	3	3	2	0.775
DOORN RIVER DAM (24)	Buildings	Boat House	Doorn River Dam Boat House	Main Building	Main building	500002660_0	1	3	2	0.168
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Cranes	Hand-operated 5ton winch	500009036_6	3	2	2	0.531
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Dam Outlet - Pipework- Steel	Indwe supply pipe (NB150)	500009036_15	3	2	2	0.431
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Auxilliary Equip. Main Damwall	3ton Crawl Beam at intake	500009036_7	2	2	2	0.531
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Dam Meter & Instrumentation	Magflo meter on Indwe supply pipe	500009036_21	2	2	2	0.228
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Auxilliary Equip. Main Damwall	Handrails on access bridge	500009036_26	2	2	2	0.531
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Auxilliary Equip. Main Damwall	Ladders in intake tower	500009036_33	2	2	2	1.708
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Auxilliary Equip. Main Damwall	Ladders in intake tower	500009036_34	2	2	2	1.708
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Auxilliary Equip. Main Damwall	Crawl Beam at outlet structure (5ton)	500009036_8	2	3	2	0.531
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Dam Tunnel	Dam tunnel	500009036_17	2	4	2	2.577
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Dam Intake Gates	Service gate	500009036_36	2	4	2	0.816

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Dam Meter & Instrumentation	Electronic flowmeter no.1	500009036_19	1	3	2	0.228
DOORN RIVER DAM (24)	WR: Dams	Main Damwall	Doorn River Dam (Main Wall Earth)	Dam Meter & Instrumentation	Electronic flowmeter no.2	500009036_20	1	3	2	0.228
DUIVENHOKS RIVER - DUIVENHOKS DAM (25)	WR: Roads and bridge	Road Section	Wolwedans dam intersection to slipway	Road Section		500021847_0	1	4	2	0.624
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Section	Access road to dam basin and slipway	Road Section		500021678_0	1	3	2	0.184
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Section	Access road to top of Elandskloof dam	Road Section		500021699_0	1	4	2	0.433
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Section	Elandskloof dam Bottom access road section 1	Road Section		500021728_0	1	4	2	0.106
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Section	Elandskloof dam Bottom access road section 2	Road Section		500021729_0	1	4	2	0.048
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Section	Elandskloof dam Bottom access road section 3	Road Section		500021730_0	1	4	2	0.023
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Section	Elandskloof dam Bottom access road section 4	Road Section		500021731_0	1	4	2	0.115
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Section	Elandskloof dam Bottom access road section 5	Road Section		500021732_0	1	4	2	0.144
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Section	Elandskloof dam Bottom access road section 6	Road Section		500021733_0	1	4	2	0.821
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Bridge	Elandskloof dam bridge 5	Road Bridge		500021734_0	1	4	2	0.531
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Bridge	Elandskloof dam Low water bridge 1	Road Bridge		500021735_0	1	4	2	0.531
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Bridge	Elandskloof dam low water bridge 3	Road Bridge		500021736_0	1	4	2	0.531
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Bridge	Elandskloof dam low water bridge 4	Road Bridge		500021737_0	1	4	2	0.531
ELANDS RIVER - ELANDSKLOOF DAM (26)	WR: Roads and bridge	Road Parking Area	Parking Area below Elandskloof dam	Road Parking Area		500021785_0	1	4	2	0.076
GAMKA RIVER - GAMKA DAM (BEAUFORT WEST)	WR: Dams	Main Damwall	Gamka Dam	Auxilliary Equip. Main Damwall	Steel staircase	500003050_29	2	2	2	1.708

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
GAMKA RIVER - GAMKA DAM (BEAUFORT WEST)	WR: Roads and bridge	Road Section	Access road to Gamka dam	Road Section		500021656_0	1	1	2	0.678
GAMKA RIVER - GAMKAPOORT DAM (31)	WR: Roads and bridge	Road Section	Access road to Gamkapoort dam	Road Section		500021680_0	1	2	2	0.559
GAMKA RIVER - GAMKAPOORT DAM (31)	WR: Roads and bridge	Road Section	Road from Gamkapoort dam to Residential Houses	Road Section	Road from Gamkapoort dam to Residential Houses	500021802_0	1	2	2	0.259
GAMKA RIVER - GAMKAPOORT DAM (31)	WR: Roads and bridge	Road Section	Road section to Boathouse	Road Section	Road section to Boathouse	500021804_0	1	2	2	0.171
GAMKA RIVER - GAMKAPOORT DAM (31)	WR: Roads and bridge	Road Section	Road to Residential houses on koppie	Road Section	Road to Residential houses on koppie	500021807_0	1	2	2	0.043
GELUK DAM	WR: Dams	Main Damwall	GELUK - CS*	Dam Wall-15m<Height<30m	Geluk Dam Wall	500009483_1	1	2	2	4.106
GELUK DAM	WR: Dams	Main Damwall	GELUK - CS*	Dam Spillway	Geluk Dam Spillway	500009483_2	1	2	2	1.822
GELUK DAM	WR: Dams	Main Damwall	GELUK - CS*	Dam Outlet - Pipework- Steel	GELUK - CS* outlet pipes	500009483_5	1	2	2	0.001
GELUK DAM	WR: Dams	Main Damwall	GELUK - CS*	Dam Outlet Valves - Casing	GELUK - CS* - outlet valve - casing	500009483_6	1	2	2	0.001
GELUK DAM	WR: Dams	Main Damwall	GELUK - CS*	Dam Outlet Valves - Mechanism	GELUK - CS* - outlet valve - mechanism	500009483_7	1	2	2	0.001
GLEN BROCK DAM	WR: Dams	Main Damwall	GLEN BROCK - CS*	Dam Wall - 12m<Height<30m	Glenbrock Earth Embankment	500009484_1	2	1	2	3.756
GLEN BROCK DAM	WR: Dams	Main Damwall	Glen Brock - CS*	Dam Meter & Instrumentation	Glen Brock flow meter	500009484_9	2	1	2	0.385
GLEN BROCK DAM	WR: Dams	Main Damwall	Glen Brock - CS*	Dam Outlet - Gates & Valves	Glen Brock dam wall drainage	500009484_10	2	1	2	0.342
GLEN BROCK DAM	WR: Dams	Main Damwall	GLEN BROCK - CS*	Dam Spillway	Glenbrock Dam Spillway	500009484_2	2	2	2	75.437
GLEN BROCK DAM	WR: Dams	Main Damwall	GLEN BROCK - CS*	Dam Outlet - Pipework- Steel	GLEN BROCK - CS* outlet pipes	500009484_5	2	3	2	0.042
GLEN BROCK DAM	WR: Roads and bridge	Road Section	GLEN BROCK - CS*	Road Section	GLEN BROCK - CS Access Road	500021638_0	1	3	2	4.028
GLEN MELLVILLE DAM / LOWER FISH SUNDAYS	Buildings	Residential Housing	Glen Melville Dam House 2	Main Building	Main building	500003194_0	3	3	2	0.713
GLEN MELLVILLE DAM / LOWER FISH SUNDAYS	Buildings	Residential Housing	Glen Melville Dam House 2	Outbuildings	Store Size 48	500003194_1	3	3	2	0.106
GLEN MELLVILLE DAM / LOWER FISH SUNDAYS	Buildings	Residential Housing	Glen Melville Dam House 3	Main Building	Main building	500003195_0	3	3	2	0.713
GLEN MELLVILLE DAM / LOWER FISH SUNDAYS	Buildings	Workshops	Glen Melville Dam Workshop	Main Building	Main building	500003197_0	2	1	2	0.211

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
GLEN MELLVILLE DAM / LOWER FISH SUNDAYS	WR: Dams	Main Damwall	Glen Boyd Dam	Auxilliary Equip. Main Damwall	Handrails	500004450_22	4	3	2	0.080
GLEN MELLVILLE DAM / LOWER FISH SUNDAYS	WR: Dams	Main Damwall	Glen Melville Dam (Balancing)	Auxilliary Equip. Main Damwall	Handrails (Ballustrades)	500003330_36	4	4	2	0.380
GXETU DAM	WR: Dams	Main Damwall	Gxethu Dam	Dam Outlet Valves - Casing	Scour Valve - casing	500009135_8	3	3	2	0.007
GXETU DAM	WR: Dams	Main Damwall	Gxethu Dam	Dam Outlet Valves - Mechanism	Scour Valve - mechanism	500009135_9	3	3	2	0.002
GXETU DAM	WR: Dams	Main Damwall	GXETHU DAM	Dam Wall-15m<Height<30m	Gxethu Earth Embankment	500009135_1	2	3	2	11.881
GXETU DAM	WR: Dams	Main Damwall	GXETHU DAM	Dam Spillway	Gxethu Dam Spilway	500009135_2	2	3	2	11.947
GXETU DAM	WR: Dams	Main Damwall	GXETHU DAM	Dam Outlet - Pipework- Steel	GXETHU DAM outlet pipes	500009135_5	2	3	2	0.014
GXETU DAM	WR: Dams	Main Damwall	GXETHU DAM	Dam Outlet Valves - Casing	GXETHU DAM - outlet valve - casing	500009135_6	2	3	2	0.014
GXETU DAM	WR: Dams	Main Damwall	GXETHU DAM	Dam Outlet Valves - Mechanism	GXETHU DAM - outlet valve - mechanism	500009135_7	2	3	2	0.005
HARTENBOSCH RIVER - HARTEBEESKUIL DAM (3	WR: Roads and bridge	Road Section	Access road to Hartebeeskuil dam rght bank	Road Section		500021682_0	1	1	2	0.107
HARTENBOSCH RIVER - HARTEBEESKUIL DAM (3	WR: Roads and bridge	Road Section	Access road to Hartebeeskuil dam	Road Section		500021681_0	1	3	2	0.061
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Hydrological Station	Closed H2H003 Hex River @ De Wet	Hydrological Station	not componentised	500001478_0	1	2	2	3.050
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Hydrological Station	Closed H2H001 Hex River @ New Glen Heatlie	Hydrological Station	not componentised	500001964_0	1	2	2	3.050
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Meteorological Station	H1E002 Wolseley @Experimental Farm	Meteorological Station	not componentised	500004769_0	1	3	2	0.218
HYDROMETRY WESTERN CAPE	WS: Measuring facili	Meteorological Station	G2E015 Simon's Town	Meteorological Station	not componentised	500001116_0	1	4	2	0.325
KAMASTONE DAM	WR: Dams	Main Damwall	KAMASTONE - CISKEI	Dam Wall-15m<Height<30m	Kamastone Dam Wall	500009138_1	3	1	2	0.791
KAT RIVER DAM (44)	Buildings	Residential Housing	Kat River Dam Worker House 3	Main Building	Main building	500001029_0	3	2	2	0.312
KAT RIVER DAM (44)	Buildings	Residential Housing	Kat River Dam Worker House 2	Main Building	Main building	500001574_0	3	2	2	0.312
KAT RIVER DAM (44)	Buildings	Residential Housing	Kat River Dam Worker House 4	Main Building	Main building	500002323_0	3	2	2	0.312
KAT RIVER DAM (44)	Buildings	Stores	Kat River Dam Open Shed Stores	Main Building	Open Shed Stores	500001026_0	2	2	2	1.750

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
KAT RIVER DAM (44)	Buildings	Boat House	Kat River Dam Boat house	Main Building	Main building	500001027_0	1	2	2	0.235
KAT RIVER DAM (44)	Buildings	Residential Housing	Kat River Dam Worker House 5	Main Building	Main building	500001028_0	1	2	2	0.312
KAT RIVER DAM (44)	WR: Dams	Main Damwall	Kat River Dam	Auxilliary Equip. Main Damwall	Handrails	500010371_44	4	3	2	0.380
KEISIES RIVER-PIETERSFONTEIN DAM (45)	WR: Roads and bridge	Road Section	Access road to Pietersfontein dam	Road Section		500021691_0	1	3	2	0.222
KINGNA RIVER - PORTJIESKLOOF DAM (46)	WR: Roads and bridge	Road Section	Access road to Poortjieskloof dam	Road Section		500021694_0	1	3	2	0.711
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Canals	Canal Section	primary	Canal Service Road	Canal service road	500006399_4	3	1	2	2.611
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Canals	Canal Section	primary	Canal Excavation	Canal excavation	500006399_0	3	2	2	3.964
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Canals	Canal Section	primary	Canal Lining - TA2	Canal Lining	500006399_1	3	2	2	16.467
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Canals	Canal Section	primary	Canal Fencing	Canal Fence Left	500006399_2	3	2	2	0.169
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Canals	Canal Section	primary	Canal Fencing	Canal Fence Rigth	500006399_3	3	2	2	0.169
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Canals	Canal Section	primary	Canal Berm	Canal berm	500006399_5	3	2	2	0.132
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Canals	Canal Balancing Dam	Shiloh balancing dam	Canal Balancing Dam	not componentised	500006400_0	2	3	2	47.546
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Dams	Main Damwall	Waterdown Dam	Auxilliary Equip. Main Damwall	Handrails	500009120_52	4	3	2	0.380
KLIPPLAAT RIVER-WATERDOWN DAM	WR: Reservoirs	Reservoir	Lei Dam 5	Reservoir	not componentised	500007333_0	3	3	2	6.587
KLIPPLAAT RIVER-	WR: Reservoirs	Reservoir	New Lei Dam	Reservoir	not componentised	500007334_0	3	3	2	6.587

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
WATERDOWN DAM										
KONINGS RIVER -KLIPBERG DAM (52)	WR: Roads and bridge	Road Section	Access road to Klipberg dam	Road Section		500021684_0	1	4	2	1.841
KORENTE - VETTE RIVER KORENTEPOORT DAM (5	WR: Roads and bridge	Road Bridge	Korente Kristalkloof Weir Low water bridge	Road Bridge		500021761_0	1	3	2	0.531
KORENTE - VETTE RIVER KORENTEPOORT DAM (5	WR: Roads and bridge	Road Section	Road to Kristalkloof	Road Section	Road to Kristalkloof	500021806_0	1	4	2	0.266
KUBUSI RIVER-GUBU DAM (57)	WR: Dams	Main Damwall	Gubu Dam	Dam Outlet Valves - Casing	Outlet Sleeve Valve no.1 - mechanism	500019835_25	3	2	2	0.044
KUBUSI RIVER-GUBU DAM (57)	WR: Dams	Main Damwall	Gubu Dam	Auxilliary Equip. Main Damwall	Hand Rails	500019835_27	3	2	2	0.015
KUZITUNGU DAM	WR: Dams	Main Damwall	KUZITUNGU - CISKEI	Dam Wall-15m<Height<30m	Kuzitungu Dam Wall	500009489_1	3	1	2	2.031
KUZITUNGU DAM	WR: Dams	Main Damwall	KUZITUNGU - CISKEI	Dam Spillway	Kuzitungu Dam Spillway	500009489_2	3	1	2	0.247
KUZITUNGU DAM	WR: Dams	Main Damwall	KUZITUNGU - CISKEI	Dam Outlet - Pipework- Steel	KUZITUNGU - CISKEI outlet pipes	500009489_4	3	1	2	0.004
KUZITUNGU DAM	WR: Dams	Main Damwall	KUZITUNGU - CISKEI	Dam Outlet Valves - Casing	KUZITUNGU - CISKEI - outlet valve - casing	500009489_5	3	1	2	0.004
KUZITUNGU DAM	WR: Dams	Main Damwall	KUZITUNGU - CISKEI	Dam Outlet Valves - Mechanism	KUZITUNGU - CISKEI - outlet valve - mechanism	500009489_6	3	1	2	0.001
LOWER SUNDAYS SCHEME	Buildings	Residential Housing	Korhaansdrift housing 1	Main Building	Main building	500001056_0	3	1	2	0.053
LOWER SUNDAYS SCHEME	Buildings	Residential Housing	Coerny 1	Main Building	Main building	500021585_0	3	1	2	0.421
LOWER SUNDAYS SCHEME	Buildings	Residential Housing	Coerny 2	Main Building	Main building	500021586_0	3	1	2	0.421
LOWER SUNDAYS SCHEME	Buildings	Residential Housing	Kylemore 1	Main Building	Main building	500021591_0	3	1	2	0.421
LOWER SUNDAYS SCHEME	Buildings	Residential Housing	Kylemore 2	Main Building	Main building	500021592_0	3	1	2	0.421
LOWER SUNDAYS SCHEME	Buildings	Stores	Kylemore Store	Main Building	Main building	500021593_0	2	1	2	0.044
MAIPASE DAM	WR: Dams	Main Damwall	MAIPASE - CISKEI	Dam Wall-15m<Height<30m	Maipase Dam Wall	500009490_1	3	1	2	0.598
MAIPASE DAM	WR: Dams	Main Damwall	MAIPASE - CISKEI	Dam Spillway	Maipase Dam Spillway	500009490_2	3	1	2	0.247

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
MAITLAND DAM	WR: Dams	Main Damwall	MAITLAND - CISKEI	Dam Wall-15m<Height<30m	Maitland Dam Wall	500009491_1	3	2	2	0.587
MAITLAND DAM	WR: Dams	Main Damwall	MAITLAND - CISKEI	Dam Spillway	Maitland Dam Spilway	500009491_2	3	3	2	1.364
MAITLAND DAM	WR: Pump stations	Pump Station	Maitland - Pump House	Pump Station	not componentised	500020008_0	3	3	2	0.759
MAJOLA DAM	WR: Dams	Main Damwall	MAJOLA - TS*	Dam Outlet - Intake Tower	Majola Intake	500009142_2	2	2	2	3.101
MAJOLA DAM	WR: Dams	Main Damwall	Majola - TS*	Dam Outlet - Pipework- Steel	Majola dam outlet pipe	500009142_4	2	2	2	0.231
MAJOLA DAM	WR: Dams	Main Damwall	Majola - TS*	Dam Outlet Valves	Majola dam outlet gate valve	500009142_5	2	2	2	0.035
MAJOLA DAM	WR: Dams	Main Damwall	MAJOLA - TS*	Dam Wall-15m<Height<30m	Majola Earth Embankment	500009142_1	2	3	2	10.818
MAJOLA DAM	WR: Dams	Main Damwall	MAJOLA - TS*	Dam Spillway	Majola Spillway	500009142_3	2	3	2	11.354
MANKAZANA DAM	WR: Dams	Main Damwall	MANKAZANA DAM (CISKEI)	Dam Wall - 12m<Height<30m	Mankazana Earth Embankment	500009143_1	2	3	2	75.476
MANKAZANA DAM	WR: Dams	Main Damwall	MANKAZANA DAM (CISKEI)	Dam Spillway	Mankazana Dam Spillway	500009143_4	2	3	2	55.620
MANKAZANA DAM	WR: Dams	Main Damwall	MANKAZANA DAM (CISKEI)	Dam Outlet - Pipework- Steel	MANKAZANA (CISKEI) outlet pipes	500009143_5	2	4	2	1.154
MASELA 1 DAM	WR: Dams	Main Damwall	MASELA 1 DAM	Dam Wall-15m<Height<30m	Masela 1 Dam Wall	500009493_1	3	1	2	1.853
MASELA 1 DAM	WR: Dams	Main Damwall	MASELA 1 DAM	Dam Spillway	Masela 1 Dam Spillway	500009493_2	3	1	2	0.247
MASELA 2 DAM	WR: Dams	Main Damwall	MASELA 2 - CISKEI	Dam Wall-15m<Height<30m	Masela 2 Dam Wall	500009144_1	1	3	2	2.450
MASELA 2 DAM	WR: Dams	Main Damwall	MASELA 2 - CISKEI	Dam Spillway	Masela 2 Dam Spillway	500009144_2	1	3	2	1.023
Mdantsane 2 Dam	WR: Dams	Main Damwall	Mdantsane 2 Dam	Main Damwall	Main Damwall	500020010_0	3	2	2	3.331
MECHANICAL ENGINEERING SUPPORT SO_CLUSTE	Buildings	Ablution Building	Uitkeer Settlement Ablutions 1	Main Building	Main building	500002963_0	3	2	2	0.188
MECHANICAL ENGINEERING SUPPORT SO_CLUSTE	Buildings	Ablution Building	Uitkeer Settlement Ablutions 2	Main Building	Main building	500002965_0	3	2	2	0.131
MECHANICAL ENGINEERING SUPPORT SO_CLUSTE	Buildings	Ablution Building	Uitkeer Settlement Change Rooms	Main Building	Main building	500006175_0	1	1	2	0.237
MECHANICAL ENGINEERING SUPPORT SO_CLUSTE	Buildings	Ablution Building	Uitkeer Settlement Change Rooms	Main Building	Main building	500019838_1	1	1	2	0.106
MECHANICAL ENGINEERING SUPPORT SO_CLUSTE	Buildings	Ablution Building	Uitkeer Settlement Change Rooms	Outbuildings	Filter Room Size 20	500019838_2	1	1	2	0.106

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
MECHANICAL ENGINEERING SUPPORT SO_CLUSTE	WR: Reservoirs	Reservoir	Uitkeer Reservoir	Reservoir	not componentised	500006632_0	3	3	2	1.536
MECHANICAL ENGINEERING SUPPORT SO_CLUSTE	WR: Reservoirs	Reservoir	Uitkeer Reservoir	Reservoir Valves	Uitkeer reservoir valve	500006632_1	3	3	2	0.025
MITFORD DAM	WR: Dams	Main Damwall	Midfort Dam	Dam Wall-15m<Height<30m	Mitford Earth Embankment	500009146_1	3	1	2	8.138
MITFORD DAM	WR: Dams	Main Damwall	Midfort Dam	Dam Spillway	Mitford Dam Spillway	500009146_2	3	1	2	24.620
MITFORD DAM	WR: Dams	Main Damwall	Midfort Dam	Dam Outlet Structure	Midford Dam Outlet Pipe	500009146_3	3	1	2	0.466
MITFORD DAM	WR: Dams	Main Damwall	Midfort Dam	Dam Outlet Valves - Casing	Mitford dam outlet valve (gate) - casing	500009146_4	3	4	2	0.039
MITFORD DAM	WR: Dams	Main Damwall	Midfort Dam	Dam Outlet Valves - Mechanism	Mitford dam outlet valve (gate) - mechanism	500009146_5	3	4	2	0.013
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Reservoirs	Reservoir	Klein Brak Rreservoir	Reservoir	not componentised	500009591_0	5	4	2	7.022
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Roads and bridge	Road Section	Access road toMoordkuil PS Klipheuwel dam rh bank	Road Section		500021641_0	1	4	2	0.150
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Roads and bridge	Road Section	Access road to Klipheuwel dam	Road Section		500021685_0	1	4	2	0.076
MOSSEL BAY - WOLWEDANS DAM (342)	WR: Roads and bridge	Road Section	Access Road to Klipheuwel pump station	Road Section		500021686_0	1	4	2	0.119
MOUNT COKE DAM	WR: Dams	Main Damwall	MOUNT COKE	Dam Wall-15m<Height<30m	Mount Coke Dam Wall	500009494_1	3	2	2	2.609
MOUNT COKE DAM	WR: Dams	Main Damwall	MOUNT COKE	Dam Spillway	Mount Coke Dam Spilway	500009494_2	3	2	2	2.911
MOUNT COKE DAM	WR: Dams	Main Damwall	MOUNT COKE	Dam Outlet - Pipework- Steel	MOUNT COKE outlet pipes	500009494_5	3	2	2	0.006
MSENGENI DAM	WR: Dams	Main Damwall	MSENGENI	Dam Spillway	Msengeni Dam Spillway - Right Flank	500009148_2	2	2	2	0.798
MSENGENI DAM	WR: Dams	Main Damwall	MSENGENI	Dam Wall-15m<Height<30m	Msengeni Dam Wall	500009148_1	2	3	2	55.469
MZIMVUBU-TSITSIKAMA	WS: Measuring facili	Hydrological Station	Closed T1H010 Mgwali River @ Clarkebury	Hydrological Station	not componentised	500002003_0	1	2	2	3.050
NCORA DAM (82)	WR: Canals	Canal Balancing Dam	Leidam J	Canal Balancing Dam	not componentised	500004982_0	3	3	2	0.856
NCORA DAM (82)	WR: Canals	Canal Balancing Dam	Leidam J	Balancing Dam - Lining	Leidam J Lining	500004982_1	3	3	2	1.511
NCORA DAM (82)	WR: Canals	Canal Balancing Dam	Leidam C2	Canal Balancing Dam	not componentised	500004984_0	3	3	2	0.856

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
NCORA DAM (82)	WR: Canals	Canal Balancing Dam	Leidam C3	Canal Balancing Dam	not componentised	500006192_0	3	3	2	0.856
NDLAMBE(TYHEFU) DAM	WR: Dams	Main Damwall	NDLAMBE DAM	Dam Wall-15m<Height<30m	Ndlambe Dam Wall	500009097_1	2	3	2	15.528
NONCAMPA 1 DAM	WR: Dams	Main Damwall	Noncampa 2	Dam Wall-15m<Height<30m	Noncampa 2 Dam Wall	500002939_1	1	3	2	1.092
NONCAMPA 1 DAM	WR: Dams	Main Damwall	Noncampa 2	Dam Spillway	Noncampa 2 Dam Spillway	500002939_2	1	3	2	1.182
NQADU DAM	WR: Dams	Main Damwall	Nqadu - TS*	Auxilliary Equip. Main Damwall	Handrails on bridge and tower	500009156_27	4	3	2	0.380
NQWELO DAM	WR: Dams	Main Damwall	NQWELO DAM (CISKEI)	Dam Spillway	Nqwelo Spillway	500009498_2	4	3	2	6.111
NQWELO DAM	WR: Dams	Main Damwall	NQWELO DAM (CISKEI)	Dam Outlet - Pipework- Steel	NQWELO (CISKEI) outlet pipes	500009498_5	4	3	2	0.014
NQWELO DAM	WR: Dams	Main Damwall	NQWELO DAM(CISKEI)	Dam Wall - 12m<Height<30m	Nqwelo Earth Embankment	500009498_1	4	4	2	44.673
NTSIKIZIMI DAM	WR: Dams	Main Damwall	Ntsikizini Dam	Dam Outlet Valves - Casing	Nzikizini dam outlet valve - casing	500009499_2	3	2	2	0.051
NTSIKIZIMI DAM	WR: Dams	Main Damwall	Ntsikizini Dam	Dam Outlet Valves - Mechanism	Nzikizini dam outlet valve - mechanism	500009499_3	3	2	2	0.017
NTSIKIZIMI DAM	WR: Dams	Main Damwall	NTSIKIZINI DAM	Dam Wall-15m<Height<30m	Nzikizini Earth Embankment	500009499_1	2	2	2	17.088
OLIFANTS RIVER - STOMPDRIFT DAM (89)	Buildings	Residential Housing	Stompdrift Residential B x 4	Main Building	Main building (neglected & vandalized)	500004115_0	3	3	2	0.183
OLIFANTS RIVER - STOMPDRIFT DAM (89)	WR: Dams	Main Damwall	Stompdrift Dam	Dam Meter & Instrumentation	GPS Monitoring System	500009062_29	1	2	2	0.607
OLIFANTS RIVER - STOMPDRIFT DAM (89)	WR: Roads and bridge	Road Section	Concrete drift on overflow channel	Road Section		500021717_0	1	3	2	0.023
OLIFANTS RIVER - STOMPDRIFT DAM (89)	WR: Roads and bridge	Road Section	Concrete road section	Road Section		500021718_0	1	3	2	0.054
OLIFANTS RIVER - STOMPDRIFT DAM (89)	WR: Roads and bridge	Road Section	Concrete road section to managers house	Road Section		500021719_0	1	3	2	0.040
OLIFANTS RIVER - STOMPDRIFT DAM (89)	WR: Roads and bridge	Road Section	Gravel Road section on Right bank	Road Section		500021741_0	1	3	2	0.160
OLIFANTS RIVER - STOMPDRIFT DAM (89)	WR: Roads and bridge	Road Section	Gravel Road section to Right bank	Road Section		500021743_0	1	3	2	0.106
OLIFANTS RIVER - STOMPDRIFT DAM (89)	WR: Roads and bridge	Road Section	Stompdrift Dam Road section	Road Section		500021822_0	1	3	2	0.144
OLIFANTS RIVER - STOMPDRIFT DAM (89)	WR: Roads and bridge	Road Bridge	Bridge to canal below Stompdrift dam	Road Bridge		500021707_0	1	4	2	0.531

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
OLIFANTS RIVER BULSHOEK DAM & CANAL (90)	Buildings	Residential Housing	Vanrhynsdorp Worker House W3-20 Old	Main Building	Main building	500003181_0	3	1	2	0.026
OLIFANTS RIVER BULSHOEK DAM & CANAL (90)	Buildings	Hostels / Flats / Compounds	Vredendal Compound Dorm 3	Main Building	Main building	500002545_0	3	3	2	0.321
OLIFANTS RIVER BULSHOEK DAM & CANAL (90)	Buildings	Hostels / Flats / Compounds	Vredendal Compound Single Dorm	Main Building	Main building	500002552_0	3	3	2	0.098
OLIFANTS RIVER BULSHOEK DAM & CANAL (90)	Buildings	Hostels / Flats / Compounds	Vredendal Compound Dorm 4	Main Building	Main building	500003115_0	3	3	2	0.321
OLIFANTS RIVER BULSHOEK DAM & CANAL (90)	WR: Dams	Main Damwall	Bulshoek Dam	Auxilliary Equip. Main Damwall	handrails on walk way	500009031_66	4	4	2	0.272
OLIFANTS RIVER BULSHOEK DAM & CANAL (90)	WR: Dams	Main Damwall	Bulshoek Dam	Auxilliary Equip. Main Damwall	safety bouys	500009031_67	4	4	2	0.163
ORANGE-FISH GWS	WR: Dams	Main Damwall	De Mistkraal Weir	Auxilliary Equip. Main Damwall	De Mistkraal Dam Slipway	500009130_22	4	3	2	0.380
ORANGE-FISH GWS	WR: Reservoirs	Reservoir	Elandsdrift Dam Reservoir	Reservoir	not componentised	500006631_0	3	3	2	0.202
ORANGE-FISH GWS	WR: Reservoirs	Reservoir	Elandsdrift Dam Reservoir	Reservoir Valves	Elandsdrift reservoir valve	500006631_1	3	3	2	0.004
OUTSPAN (CHALUMNA) DAM (97)	WR: Dams	Main Damwall	Outspan Dam	Dam Wall-15m<Height<30m	Outspan Dam Wall	500009500_1	3	2	2	10.747
OXKRAAL DAM (CISKEI)	WR: Dams	Main Damwall	Oxkraal Dam	Auxilliary Equip. Main Damwall	Handrails on access bridge	500009157_45	4	4	2	0.380
QAMATA (LUBISI) DAM	WR: Dams	Main Damwall	Lubisi Dam	Auxilliary Equip. Main Damwall	Handrails	500009280_33	4	4	2	0.380
QAMATA (LUBISI) DAM	WR: Reservoirs	Reservoir	Lubisi Dam Concrete Reservoir 1	Reservoir	not componentised	500020025_0	2	3	2	0.759
QIBIRA DAM	WR: Dams	Main Damwall	QIBIRA DAM	Dam Wall-15m<Height<30m	Qibira Dam Wall	500009160_1	2	3	2	0.999
REDHILL DAM	WR: Dams	Main Damwall	REDHILL DAM	Dam Wall-15m<Height<30m	Redhill Dam Wall	500009161_1	4	2	2	6.238
REDHILL DAM	WR: Dams	Main Damwall	REDHILL DAM	Dam Spillway	Redhill Dam Spillway	500009161_2	4	2	2	2.751
REDHILL DAM	WR: Dams	Main Damwall	REDHILL DAM	Dam Outlet Valves - Casing	REDHILL DAM - outlet valve - casing	500009161_6	4	2	2	0.006
REDHILL DAM	WR: Dams	Main Damwall	REDHILL DAM	Dam Outlet Valves - Mechanism	REDHILL DAM - outlet valve - mechanism	500009161_7	4	2	2	0.002
REDHILL DAM	WR: Dams	Main Damwall	REDHILL DAM	Dam Outlet - Pipework- Steel	REDHILL DAM outlet pipes	500009161_5	4	3	2	0.006
ROODEFONTEIN DAM (107)	WR: Roads and bridge	Road Section	Access road to Roodefontein dam	Road Section		500021696_0	1	2	2	0.500
ROODEFONTEIN DAM (107)	WR: Roads and bridge	Road Section	Access road to Tierkloof dam	Road Section		500021698_0	1	3	2	0.133
ROOIKRANTZ DAM (108)	Buildings	Residential Housing	Rooikrantz Dam Worker House	Main Building	Main building	500002710_0	3	2	2	0.248

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
ROOIKRANTZ DAM (108)	Buildings	Stores	Rooikrantz Dam Store	Main Building	Main building	500002712_0	2	2	2	0.508
SANDDRIFT RIVER ROODE-ELSBERG LAKENVALLE	WR: Roads and bridge	Road Section	Lakenvlei Access Road	Road Section		500021767_0	1	4	2	0.528
SANDDRIFT RIVER ROODE-ELSBERG LAKENVALLE	WR: Roads and bridge	Road Section	Paving road section to Roode-Elsberg dam	Road Section		500021786_0	1	4	2	0.101
SANDDRIFT RIVER ROODE-ELSBERG LAKENVALLE	WR: Roads and bridge	Road Section	Paving section to Water control officers house	Road Section		500021787_0	1	4	2	0.011
SANDDRIFT RIVER ROODE-ELSBERG LAKENVALLE	WR: Roads and bridge	Road Section	Two track concrete road section	Road Section		500021830_0	1	4	2	2.198
SHILOH DAM	WR: Dams	Main Damwall	SHILOH DAM	Dam Outlet - Pipework- Steel	SHILOH DAM outlet pipes	500009166_5	4	1	2	0.059
SINQUMENI DAM	WR: Dams	Main Damwall	SINQUMENI DAM (CISKEI)	Dam Wall - 12m<Height<30m	Sinqumeni Earth Embankment	500009174_1	3	3	2	29.143
SINQUMENI DAM	WR: Dams	Main Damwall	SINQUMENI DAM (CISKEI)	Dam Spillway	Sinqumeni Dam Spillway	500009174_2	3	3	2	5.700
SINQUMENI DAM	WR: Dams	Main Damwall	SINQUMENI DAM (CISKEI)	Dam Outlet - Pipework- Steel	SINQUMENI (CISKEI) outlet pipes	500009174_5	3	3	2	0.023
SINQUMENI DAM	WR: Dams	Main Damwall	SINQUMENI DAM (CISKEI)	Dam Outlet Valves - Casing	SINQUMENI (CISKEI) - outlet valve - casing	500009174_6	3	3	2	0.023
SINQUMENI DAM	WR: Dams	Main Damwall	SINQUMENI DAM (CISKEI)	Dam Outlet Valves - Mechanism	SINQUMENI (CISKEI) - outlet valve - mechanism	500009174_7	3	3	2	0.008
TARKA RIVER - KOMANDODRIFT DAM (121)	WR: Dams	Main Damwall	Kommandodrift Dam	Auxilliary Equip. Main Damwall	Handrails on access bridge	500009273_23	4	3	2	0.380
TYUTYU DAM	WR: Dams	Main Damwall	TYUTYU - CISKEI	Dam Wall- 15m<Height<30m	Tyutyu Dam - Earthfill Wall	500009506_1	1	1	2	0.806
TYUTYU DAM	WR: Dams	Main Damwall	TYUTYU - CISKEI	Dam Spillway	Tyutyu Dam - Spillway	500009506_2	1	2	2	0.455
VALS RIVER BEN - ETIVE DAM (136)	WR: Roads and bridge	Road Section	Access road to Ben-Etive dam	Road Section		500021673_0	1	2	2	0.862
WOBURN 2 DAM	WR: Dams	Main Damwall	"Woburn 2, earth wall"	Dam Wall- 15m<Height<30m	Woburn 2 Dam Wall	500003111_1	3	2	2	10.912
WOBURN 2 DAM	WR: Dams	Main Damwall	Woburn 2, earth wall	Dam Outlet - Pipework- Steel	Woburn 2, earth wall outlet pipes	500003111_5	3	2	2	0.012
WOBURN 2 DAM	WR: Pump stations	Pump Station	Woburn 3 - Pump house 2 (abandoned)	Pump Station	not componentised	500020031_0	3	1	2	0.164
WOBURN 2 DAM	WR: Pump stations	Pump Station	Woburn 3 - Pump house 1 (abandoned)	Pump Station	not componentised	500020030_0	3	2	2	0.058
WOBURN 3 DAM	WR: Dams	Main Damwall	Woburn 3 Earth Wall	Dam Wall- 15m<Height<30m	Woburn 3 Dam Wall	500003113_1	2	2	2	8.449

Scheme	Facility Category	Facility Type	Facility Name	Component Type	Component Name	Component UID	Criticality	Condition	Utilisation	CRC 2016 (R Million)
XILINXA DAM (140)	WR: Dams	Main Damwall	Xilinxa Dam Wall	Auxilliary Equip. Main Damwall	Handrails on bridge and tower	500002585_29	4	3	2	0.187
ZANYOKWE-SANDILE DAM (111)	WR: Dams	Main Damwall	Sandile Dam	Auxilliary Equip. Main Damwall	Handrails on access bridge	500003219_40	4	4	2	0.380

5 ASSETS TO BE DISPOSED OF

Table L.5: Assets to be disposed of

Facility Category (Asset Class)	Facility Type	Facility Name (Asset Description)	Component Type	Component Name (Additional Description)	Component No.	Comment
-	-	-	-	-	-	-
-	-	-	-	-	-	-

APPENDIX M – Infrastructure Assets Movement

Table M.1:1 Accumulated acquisition cost per asset facility category for Scheme Specific Assets

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
Buildings	145.799	172.349	172.349	172.349	228.464	228.464	228.464	228.464	228.464	228.464
WR: Canals	2 767.467	3 143.652	3 216.935	3 298.991	3 762.045	3 885.047	4 702.669	5 198.582	5 735.643	5 898.693
WR: Dams	10 325.876	10 537.665	10 537.665	10 557.661	10 641.562	10 653.365	10 798.458	10 798.458	10 799.877	10 868.534
WR: Power Supply	0.773	0.851	0.851	1.432	1.432	1.432	1.432	1.432	1.690	1.690
WR: Pump stations	255.920	276.009	276.009	279.176	279.865	281.135	289.447	290.106	299.380	301.437
WR: Reservoirs	48.494	48.494	48.494	48.494	48.496	48.496	48.496	48.496	82.760	82.760
WR: Roads and bridge	43.271	46.034	46.034	46.034	46.034	46.034	50.140	50.140	50.140	50.140
WR: Steel Pipelines	540.236	588.224	588.224	592.678	630.346	656.730	656.730	732.677	732.677	733.808
WR: Telemetry	2.724	2.819	2.819	2.819	2.819	2.819	2.819	2.819	2.925	5.418
WR: Tunnels	3 621.010	3 621.803	3 621.803	3 621.803	3 640.599	3 640.599	3 640.599	3 640.599	3 877.726	3 877.726
WR: Water Treatment	2.093	2.093	2.093	2.093	2.093	2.093	3.536	3.536	3.536	3.536
WS: borehol	1.105	1.105	1.105	1.105	1.105	1.105	1.105	1.105	1.105	1.105
WS: Measuring facili	405.254	422.492	425.270	425.270	425.270	427.212	552.152	559.160	565.870	565.870
Total	**18 160**	**18 864**	**18 940**	**19 050**	**19 710**	**19 875**	**20 976**	**21 556**	**22 382**	**22 619**

Table M.1:2 Accumulated acquisition cost per asset facility category Non Scheme Specific

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
Buildings	43.175	50.435	50.435	50.435	77.471	77.471	78.125	78.125	78.125	78.125
WR: Dams	3.755	3.755	3.755	3.755	3.755	3.755	3.755	3.755	3.755	3.755
WR: Reservoirs	0.564	0.564	0.564	0.564	0.580	0.580	0.580	0.580	0.953	0.953
WR: Telemetry	0.247	0.247	0.247	0.247	0.247	0.247	0.247	0.247	0.353	0.353
WR: Water Treatment	0.551	0.551	0.551	0.551	0.551	1.034	1.281	1.281	1.281	1.281
WS: Measuring facili	574.987	687.998	689.079	689.079	689.079	690.210	839.199	843.114	845.715	845.715
Total	**623**	**744**	**745**	**745**	**772**	**773**	**923**	**927**	**930**	**930**

Table M.2:1 Accumulated depreciation cost per asset facility for Scheme Specific Assets

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	71.713	78.324	83.856	89.386	96.715	104.228	111.741	119.255	126.768	134.281
WR: Canals	1 346.627	1 407.917	1 460.958	1 516.593	1 585.880	1 661.410	1 740.303	1 829.799	1 927.444	2 037.999
WR: Dams	2 030.009	2 145.570	2 227.825	2 310.965	2 397.445	2 516.742	2 636.823	2 756.904	2 876.991	2 999.597
WR: Power Supply	0.441	0.493	0.532	0.599	0.667	0.728	0.789	0.850	0.918	0.985
WR: Pump stations	118.043	123.970	133.521	140.356	146.149	151.599	157.518	163.459	169.761	176.124
WR: Reservoirs	14.631	15.834	16.440	17.046	17.652	18.930	20.209	21.487	22.504	23.522
WR: Roads and bridge	12.206	13.249	14.122	14.994	15.866	16.942	17.954	18.966	19.978	20.990
WR: Steel Pipelines	171.531	186.484	198.783	211.309	225.091	241.661	258.231	274.341	290.451	306.628
WR: Telemetry	0.969	1.087	1.181	1.275	1.370	1.495	1.620	1.746	1.872	2.048
WR: Tunnels	974.400	1 001.363	1 019.290	1 037.218	1 055.773	1 083.598	1 111.423	1 139.248	1 166.081	1 192.915
WR: Water Treatment	1.082	1.129	1.171	1.213	1.254	1.303	1.370	1.437	1.503	1.570
WS: borehol	0.338	0.365	0.387	0.410	0.432	0.460	0.488	0.516	0.544	0.572
WS: Measuring facili	119.062	132.299	141.138	150.244	159.240	173.611	186.397	199.855	213.878	227.901
Total	**4 861.051**	**5 108.084**	**5 299.203**	**5 491.608**	**5 703.532**	**5 972.708**	**6 244.866**	**6 527.862**	**6 818.694**	**7 125.132**

Table M.2:2 Accumulated depreciation cost per asset facility category Non Scheme Specific

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Buildings	22.349	24.351	25.974	27.598	30.123	32.574	35.040	37.506	39.972	42.439
WR: Dams	1.918	1.936	1.948	1.961	1.973	1.991	2.008	2.026	2.044	2.061
WR: Reservoirs	0.146	0.161	0.168	0.175	0.182	0.200	0.217	0.234	0.246	0.259
WR: Telemetry	0.130	0.134	0.137	0.140	0.144	0.147	0.150	0.153	0.157	0.162
WR: Water Treatment	0.381	0.393	0.405	0.418	0.431	0.453	0.479	0.505	0.531	0.557
WS: Measuring facili	204.850	222.921	236.773	250.735	264.663	283.785	301.697	319.982	338.486	356.990
Total	**229.774**	**249.895**	**265.406**	**281.028**	**297.517**	**319.149**	**339.591**	**360.407**	**381.437**	**402.467**

Table M.3.1: Asset carrying value per asset facility category for Scheme Specific Assets

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
Buildings	74.087	94.024	88.493	82.964	131.750	124.237	116.723	109.210	101.696	94.183
WR: Canals	1 421.461	1 735.735	1 755.977	1 782.398	2 176.166	2 223.637	2 962.366	3 368.783	3 808.199	3 860.694
WR: Dams	8 295.867	8 392.095	8 309.841	8 246.695	8 244.116	8 136.623	8 161.635	8 041.554	7 922.886	7 868.937
WR: Power Supply	0.332	0.357	0.319	0.832	0.765	0.704	0.643	0.582	0.773	0.705
WR: Pump stations	137.894	152.038	142.488	138.820	133.716	129.536	131.929	126.647	129.619	125.313
WR: Reservoirs	33.862	32.660	32.054	31.447	30.844	29.566	28.288	27.009	60.255	59.238
WR: Roads and bridge	31.065	32.785	31.913	31.041	30.169	29.092	32.186	31.174	30.162	29.150
WR: Steel Pipelines	368.705	401.740	389.441	381.369	405.254	415.069	398.499	458.336	442.226	427.180
WR: Telemetry	1.755	1.732	1.638	1.543	1.449	1.324	1.199	1.073	1.053	3.370
WR: Tunnels	2 646.610	2 620.440	2 602.513	2 584.585	2 584.826	2 557.001	2 529.176	2 501.351	2 711.645	2 684.811
WR: Water Treatment	1.011	0.964	0.922	0.880	0.838	0.790	2.167	2.100	2.033	1.966
WS: borehol	0.767	0.740	0.718	0.695	0.673	0.645	0.617	0.589	0.561	0.533
WS: Measuring facili	286.192	290.193	284.132	275.025	266.030	253.601	365.755	359.305	351.991	337.968
Total	**13 299.608**	**13 755.502**	**13 640.446**	**13 558.295**	**14 006.597**	**13 901.824**	**14 731.182**	**15 027.713**	**15 563.100**	**15 494.048**

Table M.3.2: Asset carrying value per asset facility category for Non Scheme specific assets

Asset Facility Category	Financial Year (Amounts in Million Rands)									
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
Buildings	20.826	26.085	24.461	22.837	47.348	44.897	43.085	40.619	38.153	35.686
WR: Dams	1.837	1.819	1.807	1.794	1.782	1.764	1.747	1.729	1.711	1.694
WR: Reservoirs	0.419	0.403	0.396	0.389	0.397	0.380	0.363	0.346	0.707	0.694
WR: Telemetry	0.116	0.113	0.110	0.107	0.103	0.100	0.097	0.094	0.196	0.192
WR: Water Treatment	0.170	0.158	0.145	0.132	0.120	0.581	0.802	0.775	0.749	0.723
WS: Measuring facili	370.176	465.071	452.306	438.344	424.416	406.424	537.502	523.132	507.229	488.726
Total	**393.544**	**493.649**	**479.225**	**463.603**	**474.165**	**454.147**	**583.595**	**566.695**	**548.746**	**527.715**