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NATIONAL WATER INVESTMENT FRAMEWORK

Executive Summary



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

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INTRODUCTION

The National Water Investment Framework (NWIF) is a key instrument in the planning and management of financial investment in the water sector. It quantifies the funds required to provide sustainable water to all people, businesses and industries within the means of the South Africa economy and the natural capacity of our water resources.

This document provides an Executive Summary of the Investment Framework. The initial cost estimates were based on typical infrastructure profiles for domestic and commercial use utilizing a detailed demographic and costing model per local authority.

This was subsequently re-calculated using the actual infrastructure in each of the water supply schemes involving the raw water infrastructure of the Department of Water and Sanitation (DWS), regional bulk water distribution by water boards (WBs) and irrigation water user associations (WUAs), internal bulk water supply (water treatment and water storage) by Water Services Authorities (WSAs), water reticulation to domestic households and commercial users, wastewater collection and treatment before returning the effluent back to the water source.

Life-cycle costs are currently being finalized to confirm the refurbishment cost of poorly maintained infrastructure, renewal of ageing infrastructure and upgrades to existing infrastructure that is over-utilized. This required information on the age, condition, utilization and criticality of each individual infrastructure, which is currently not readily available. An extensive data collection exercise was undertaken to gather the water infrastructure footprints and to determine the key performance indicators for the life-cycle costing. Final results will be included in the next update of this report.

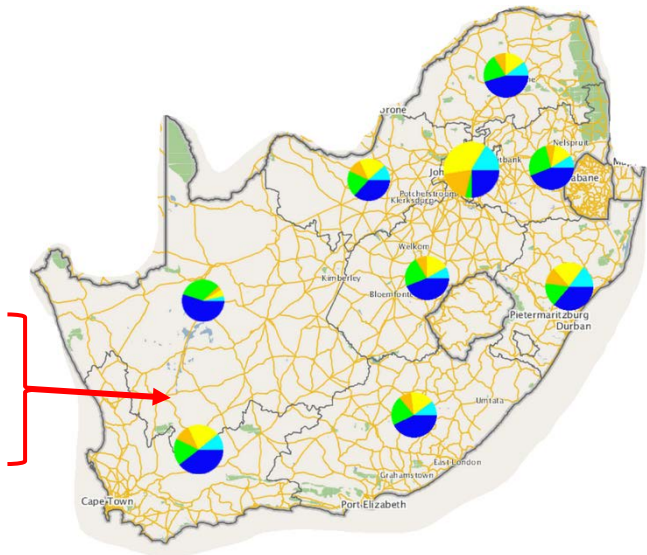
FIRST-ORDER CAPITAL REPLACEMENT VALUE

The first-order Water Investment Framework used a regional model of demography and associated water uses, readily available information from existing infrastructure, asset registers and a project assessment across sector institutions to estimate the national water investment requirement.

This was presented to the Cabinet Portfolio Committee in 2016 and again in March 2017.

Adjacent map shows the estimated infrastructure **Capital Replacement Cost (CRC)** per water supply element in each of the provinces.

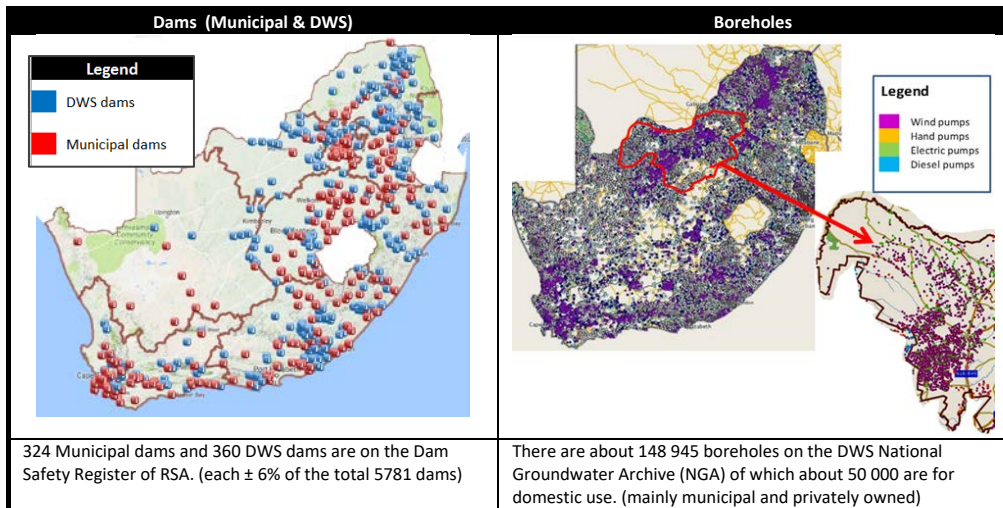
2017 Capital Replacement Value	R billion
Sanitation (ex MIIF)	213
Water: Internal	117
Water: Connector - potable	112
Water: Connector - non-potable	178
Water: Bulk	213
Water resources	529
Total (R billion)	1 362



DETAILED INFRASTRUCTURE FOOTPRINT

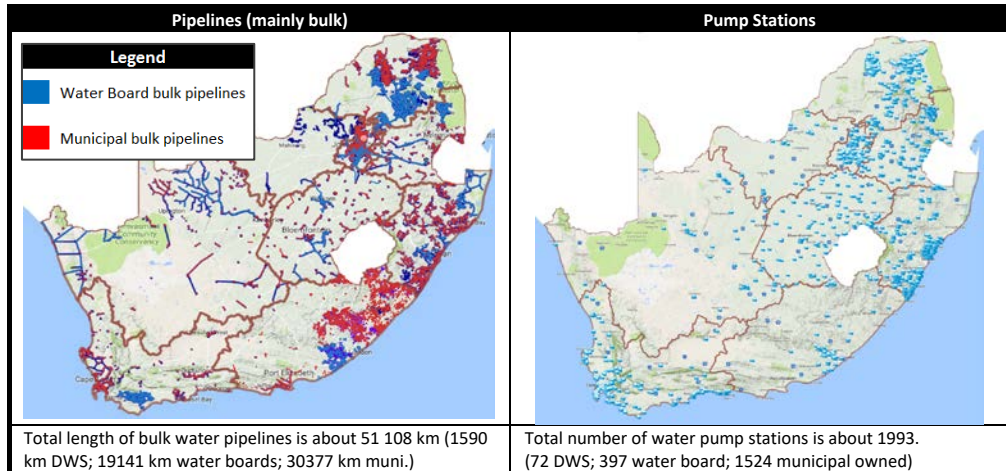
A detailed investigation was subsequently undertaken to establish the actual water infrastructure footprint across all sector role players. This included the DWS-WTE raw water infrastructure asset register, regional bulk water infrastructure of Water Boards (WBs) and Water User Associations (WUAs), as well as the internal bulk and reticulation infrastructure of Water Services Authorities (WSAs).

The following maps summarize the extent of each asset class along the water supply chain:

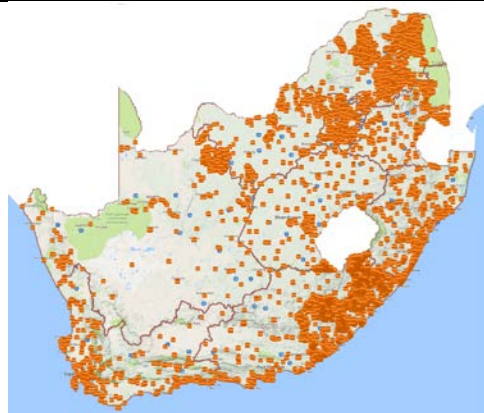


Water is then distributed in bulk to multiple water users (domestic, commercial, industrial, mining & agriculture). This uses canals, bulk pipelines and pump stations and is primarily owned by the DWS, water boards and WUAs.

The following maps and statistics summarize the bulk water infrastructure of South Africa:

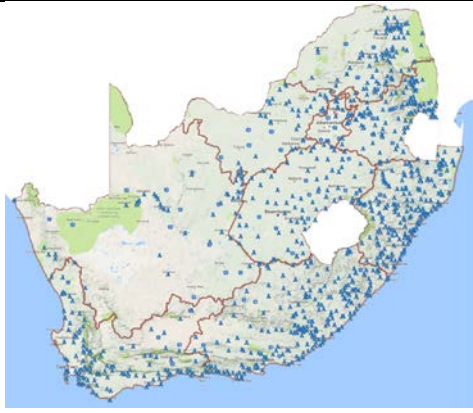


Reservoirs



Total number of water reservoirs is about 14 644.
(172 of DWS; 1025 of water board; 13447 municipal)

Water Treatment Works



Total number of domestic water treatment works is 962
(46 DWS; 78 water board; 838 municipal owned)

Finally, the water is reticulated to the end-users (domestic households, industries, mines and farmers) who also return part of their water use through wastewater collection systems and wastewater treatment works back to the water resources for environmental and other re-use opportunities.

UPDATED CAPITAL REPLACEMENT VALUE

The following map summarizes the Capital Replacement Cost (CRC) of individual infrastructure installations across South Africa. Figures generally relate back to the first-order estimate of 2016 and March 2017, albeit with slightly different splits and more detailed representation.

The following table lists the count of dams and boreholes with their capital replacement value per province

Dams		
Operating Area	Count of Facility UID	Sum of Capital Cost 2017 - Total
Eastern Cape Province	866	R54 677 234 822
Free State Province	453	R51 102 554 517
Gauteng Province	206	R39 606 637 776
KwaZulu-Natal Province	1039	R50 510 905 772
Limpopo Province	564	R104 498 137 753
Mpumalanga Province	680	R66 220 891 329
North West Province	122	R18 952 804 370
Northern Cape Province	219	R21 049 818 816
Western Cape Province	1612	R95 412 082 091
Grand Total	5761	R502 031 067 244

Boreholes						
Operating Area	Municipal		Private		Total	
	Count	Sum of Capital Cost 2017 - Total	Count	Sum of Capital Cost 2017 - Total		
Eastern Cape	14 727	R3 214 017 968	6 161	R1 275 948 321	20 888	R4 489 966 289
Free State	3 794	R765 872 670	12 227	R2 325 934 386	16 021	R3 091 807 056
Gauteng	2 115	R490 455 920	3 210	R619 723 600	5 325	R1 110 179 520
KwaZulu-Natal	24 748	R5 671 485 078	10 000	R1 708 254 400	34 748	R7 379 739 478
Limpopo	24 517	R5 229 978 762	12 959	R2 848 661 702	37 476	R8 078 640 464
Mpumalanga	7 109	R1 292 301 378	10 887	R1 828 973 042	17 996	R3 121 274 418
North West	11 465	R2 799 469 694	11 726	R3 104 689 476	23 191	R5 904 159 170
Northern Cape	1 862	R399 432 936	31 086	R6 479 448 476	32 948	R6 878 881 412
Western Cape	8 856	R2 047 350 524	15 759	R3 760 046 088	24 615	R5 807 396 610
Grand Total	99 193	R21 910 364 926	104 084	R23 951 879 489	203 277	R45 862 044 416

The Capital Replacement Cost of the bulk pipelines and canals is summarized below:

Pipelines			
Operating Area	Count of Facility	Sum of bulk pipeline length (m)	Sum of Capital Replacement Cost 2017
Eastern Cape Province	47589	6 267 727	R19 947 477 205
Free State Province	1249	2 849 335	R6 980 397 211
Gauteng Province	40824	9 006 054	R18 749 663 515
KwaZulu-Natal Province	1329	8 237 609	R20 012 164 472
Limpopo Province	5756	10 246 939	R31 939 235 669
Mpumalanga Province	1633	3 306 697	R9 174 689 334
North West Province	1156	1 855 369	R6 130 960 869
Northern Cape Province	2061	4 968 148	R10 581 039 162
Western Cape Province	5310	3 192 158	R8 117 833 074
Grand Total	106907	49 930 036	R131 633 460 511

Canals			
Operating Area	Count of Facility	Sum of Canal Length (km)	Sum of Capital Replacement Cost 2017
Eastern Cape	1 779	1 077	R11 029 176 529
Free State	2 361	2 291	R10 815 724 503
Gauteng	1 924	162	R640 062 053
Kwa-Zulu Natal	176	142	R4 362 885 646
Limpopo	3 263	1 920	R3 064 805 811
Mpumalanga	1 542	847	R8 686 122 396
Northern Cape	3 334	2 156	R6 984 348 666
North-West	4 800	3 516	R5 035 968 061
Western Cape	1 052	1 845	R9 149 221 174
Grand Total	20 230	13 956	R59 768 314 839

The Capital Replacement Cost of Water Treatment Works, Pump Stations, Reservoirs and Reticulation is shown below. Further refinement of reticulation costs is part of the life-cycle costing:

Water Treatment Works			
Operating Area	Count of Facility	Sum of Generic Capacity (Ml/d)	Sum of Capital Replacement Cost 2017
Eastern Cape Province	225	2 485	R9 908 813 465
Free State Province	71	1 273	R5 144 393 369
Gauteng Province	11	5 631	R14 793 177 399
KwaZulu-Natal Province	212	4 440	R15 551 213 883
Limpopo Province	85	734	R3 486 726 090
Mpumalanga Province	113	1 133	R5 293 703 728
North West Province	36	831	R3 166 774 698
Northern Cape Province	44	298	R1 378 859 827
Western Cape Province	119	1 964	R7 521 149 842
Grand Total	916	18 789	R66 244 812 301

Bulk Pump Stations			
Operating Area	Count of Facility	Sum of Capacity (kW)	Sum of Capital Replacement Cost 2017
Eastern Cape Province	79	39 441	R817 886 336
Free State Province	252	229 067	R4 683 970 432
Gauteng Province	223	408 419	R8 278 948 224
KwaZulu-Natal Province	330	562 696	R11 413 538 816
Limpopo Province	391	155 329	R3 246 611 584
Mpumalanga Province	192	129 196	R2 657 762 816
North West Province	25	30 612	R623 178 752
Northern Cape Province	82	13 072	R288 934 912
Western Cape Province	368	576 454	R11 702 179 584
Grand Total	1942	2 144 286	R43 713 011 456

Reservoirs				
Province	Count	Sum of Capacity (kl)	Sum of Generic Capacity (Ml/d)	Sum of Capital Replacement Cost 2017
Eastern Cape	2 933	1 750 150	959	R3 123 909 232
Free State	676	1 934 196	989	R2 724 521 867
Gauteng	690	9 706 977	4 865	R11 050 199 310
KwaZulu-Natal	1 016	3 599 838	1 835	R5 336 128 274
Limpopo	3 487	1 768 499	1 043	R3 498 649 349
Mpumalanga	851	2 048 717	1 061	R3 026 832 424
North West	638	1 480 691	757	R2 208 608 192
Northern Cape	1 153	1 038 776	541	R1 663 504 824
Western Cape	1 047	6 201 256	3 141	R7 151 447 717
Grand Total	12491	29 529 100	15 191	R39 783 801 189

Reticulation			
Operating Area	Count of households	Reticulation pipe length (km)	Reticulation Capital Cost
Eastern Cape	1 687 385	19 700	R11 666 474 496
Free State	823 316	12 300	R7 284 143 975
Gauteng	3 909 022	57 300	R33 933 451 199
KwaZulu-Natal	2 539 429	31 000	R18 358 411 644
Limpopo	1 418 102	17 700	R10 482 060 842
Mpumalanga	1 075 488	13 900	R8 231 674 898
North West	1 062 015	14 300	R8 468 557 629
Northern Cape	301 405	5 400	R3 197 916 867
Western Cape	1 634 000	26 000	R15 397 377 508
Grand Total	14 450 161	197 600	R117 020 069 507

Reticulation costs have been calculated using the service level mix and the spatial supply areas per sub-place and small-areas of StatsSA. The age of the reticulation was derived from the date when the new suburb was registered as a General Plan with the Surveyor General.

ESTIMATED CAPITAL INVESTMENT NEEDS

Water is a critical requirement for development, as highlighted in the National Development Plan, the National Water Resource Strategy and related national strategies for the energy, agriculture and industrial sectors.

At the same time, it is important to note that South Africa is a water scarce country and that most of its water resources have already been developed. Future expansion will comparatively be much more costly than past projects and will involve complex technical, social, institutional and governance solutions to meet the growing water demands of our country.

The projected capital requirement for the next 10 years is summarized below. This includes refurbishment and renewal of ageing infrastructure, upgrades to serve increases in service levels and sustain effective service delivery, as well as new infrastructure to growing human settlements and new economic nodes.

10 Year Infrastructure Cost (R billion) as at Jan 2017	New	Upgrade	Rehab	Total
Internal	39	22	58	119
Connector: potable	22	13	56	91
Local bulk	25	14	29	68
Regional bulk	47	13	41	101
Connector: non-potable	14	3	53	70
Water resources	145	26	84	255
Total: Water	292	91	321	704
Sanitation	89	42	64	195
Total: Water Sector	381	133	385	899

The average investment requirement is thus R89,9 billion per annum over the next 10 years.

The actual expenditure pattern will however be influenced by specific development targets such as:

- Eradicate basic services backlogs by 2019
- Improve reliability of supply to 90% by 2019
- Next phase of Lesotho Highlands Water Project

Investment needs will furthermore be influenced by:

- Climate change
- Effective water resource management
- Impact of water conservation & demand management
- Rate of increasing basic service levels, etc.

FUNDING FOR GOOD GOVERNANCE

Government is the institution responsible for the enablement and effective execution of the National Water Investment Plan. This entails national leadership, planning, programme management, water conservation and demand management, performance monitoring, institutional arrangements, financing mechanisms and accountable financial management.

The following table summarizes the funding that is required for good governance:

Governance Actions	Annual Cost
Strategic planning & leadership	R20
Institutional arrangements & engagement	R44
Water planning	R50
Water security management (incl. WCDM)	R68
Infrastructure asset management	R65
Programme management	R19
Performance monitoring	R15
Regulation and control	R54
Emergency interventions	R55
Support systems & tools	R15
Total Annual Cost	R405

Above costs are critical success factors for the execution of the National Water and Sanitation Master Plan and the National Water Investment Framework. Good governance and accountable financial management are key.

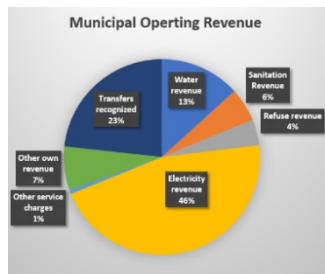
FINANCIAL PLAN FOR THE INVESTMENT FRAMEWORK

A Financing Plan must be compiled for at least the next three MTSF periods. The following contributions should be made by relevant institutions:

- Urgent reduction of physical water losses and non-revenue water to reduce and delay capital needs
- Water conservation, water use efficiency and related awareness programmes to reduce demand
- Additional Government grant funding to meet the 2019 targets for basic services and sustainable supply
- Special purpose funding to address the accumulated backlog in infrastructure refurbishment
- Additional loan funding by water boards, water service authorities and water user associations
- Water supply and sanitation tariff reviews and adjustment to establish affordable cost recovery
- Improved operation and maintenance to extent the expected useful life of existing infrastructure
- Reinstatement and effective management of the capital replacement reserve (CRR) in terms of the MFMA

The following table lists the financial position and contributions by the key sector role players in 2017:

Water Entity	Asset Book Value	Revenue	Operating Expend	Capital Expend	Loans (current)
	(R bil)	(R bil/a)	(R bil/a)	(R bil/a)	(R bil)
Municipal water supply	243	29	60	10	5
Water Boards	40	20	18	7	12
TCTA	47	12	10	11	35
DWS WTE	96	10	9	4	28
DWS water supply			2	10	
Total Water Supply	426	72	96	42	79
Municipal Sanitation	158	12	27	10	3
DWS & WB sanitation			1	3	
Total Sanitation	158	12	28	13	3
Total Water Sector	584	84	124	55	82



With the addition of operating subsidies (equitable share and WS operation subsidies) to the value of R52 billion in 2017, the total revenue is R136 billion and adequate for the operating expenditure. Only about R10 to R12 billion is left for capital funding and inadequate to address the capital shortfall of R33 billion.

A revision of water and sanitation tariffs will be required to fund the shortfall in capital requirements.

5.3.3 Tariffs

To sustain water and sanitation services it is essential to recover costs, thus cost reflective tariffs and payment for services are essential. Tariffs must however be affordable and cater for the indigent. The latter is achieved through the FBW and FBS policies. FBW is most often applied through the use of a rising block tariff, with the first block being set at a zero tariff. An effective payment mechanism must also ensure that water is used effectively and sparingly. Unfortunately, in most municipalities, water services tariffs are not cost reflective and the service runs at a loss.

DWS monitors all tariffs along the water provisioning cycle annually, including water management charges, raw water tariffs, water board tariffs and municipal tariffs for domestic, commercial and industrial users. This indicates that the real value of water is not fully reflected in the tariffs and that tariff adjustments will be required.

The following table lists the different water and sanitation tariffs and the institutional responsibility to set and collect these tariffs from water users:

Tariff/charge	Responsibility for setting tariff and source of authority
Water resource management charge.	CMA in terms of National Water Act. DWS if there is no CMA.
Raw water tariff (WR development charge- recovers infrastructure and operating costs of schemes).	DWS in terms of the Water Act and the National Raw Water Pricing Strategy and in consultation with water users including local government.
Bulk water and wastewater tariffs in order to recover cost of conveying and treating bulk water and wastewater.	Negotiation between WB and WSA or its appointed provider. WSA where it undertakes function itself. Consultation between WSA and external provider of service.
Retail water tariff and sanitation charge, (includes bulk water and wastewater tariff).	WSA in terms of the WS Act and Municipal Systems Act. Regulated by WSA (subject to DWA oversight). DWS sets national norms and standards for setting of retail tariffs.
Waste discharge tariff. (A water resource charge based on “polluter pays” principle).	CMA in terms of National Water Act, in consultation with water users including local government. DWS where there is no CMA.

Water Conservation & Demand Management

The upgrade cost of water infrastructure can be significantly reduced by addressing the water leaks in water distribution systems and by optimizing the operation of water infrastructure. Water user awareness and a concerted effort to reduce water demand must remain the priority intervention of the Water Investment Plan.

Good Financial Management

It is equally important to improve financial management and accountability. This will ensure that each available Rand of funding is stretched to an optimal return on investment.

CONCLUSION

This document presents the updated National Water Investment Framework (NWIF) based on the refined calculations using actual infrastructure footprints to calculate the current capital replacement values (CRC) of all water infrastructure in South Africa. The infrastructure age and condition is currently being used to confirm the refurbishment cost and the asset renewal needs at a more detailed infrastructure facility level. An asset life-cycle modeling will then be applied to calculate the annual financing amounts that South Africa requires for the next 20 years.

The enhanced Water Investment Framework is more than just infrastructure. It also includes investments for water resource management, water conservation and demand management, water quality management, institutional development and other enabling factors.

Implementation of the NWIF is likely to deviate from the plan and this will require active management by the DWS Project Management Unit which in turn will result in ongoing review and adjustment of development plans.

The NWIF will be the instrument to inform annual budget reviews by the National Treasury (e.g. MTEF) and will also report to the National Planning Commission on progress made with the strategic objectives of the MTSF rolling up to the overall outcomes and targets set in the National Development Plan.

Development of the Water Investment Framework is thus a complex and dynamic process and should not be a once-off “snap-shot” of what is required today. The future is in our hands and we must start to invest in the total water business including infrastructure and the various sustainability elements of water resources and water services to ensure that the limited resource “water” is stretched to serve a growing demand from people and industry in years to come.

