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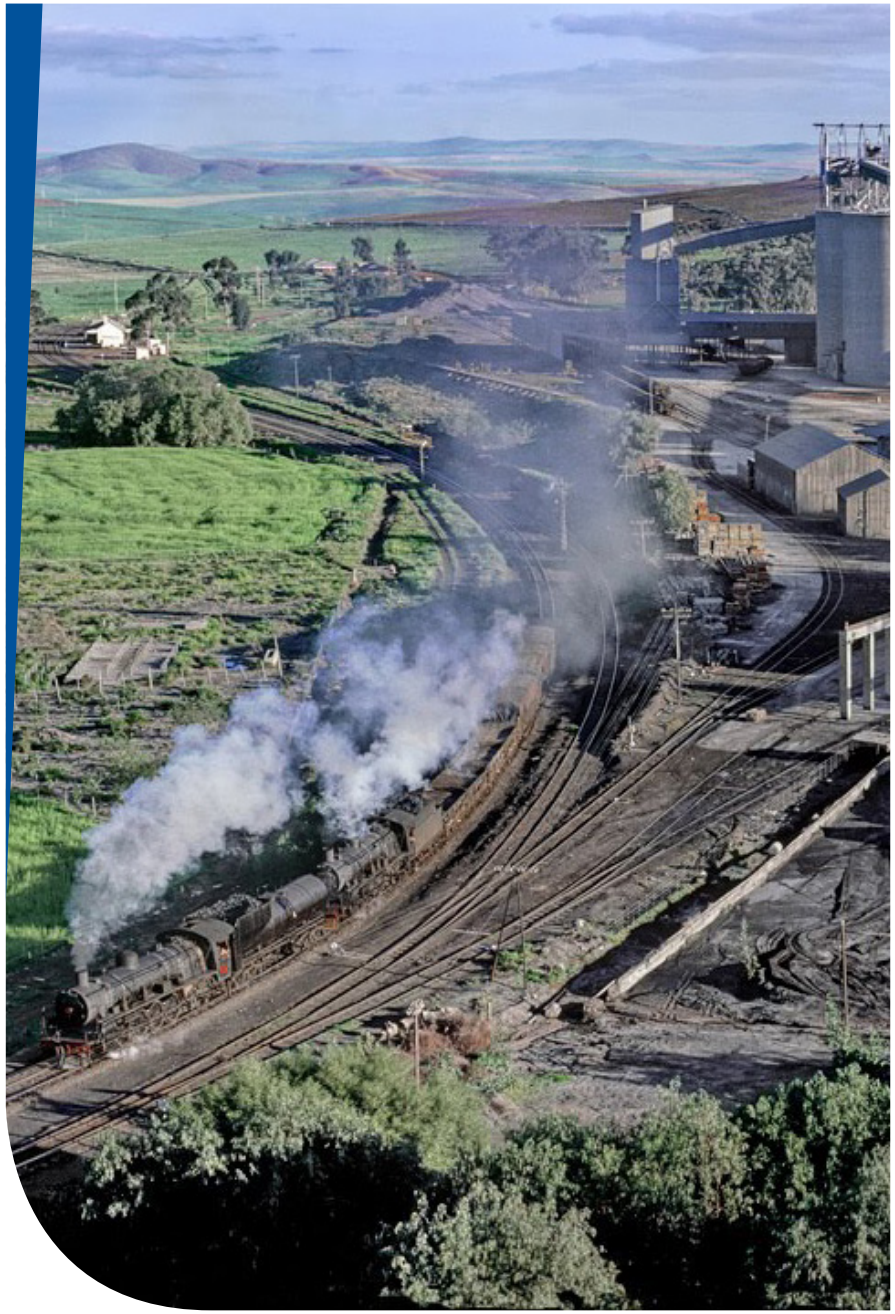
Greater Saldanha Regional Spatial Implementation Framework

Assessment of regional economic infrastructure in the Saldanha Bay, Bergrivier and Swartland Local Municipal areas

Final Report

March 2017



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1. Introduction

The WCG: Department of Environmental Affairs and Development Planning are developing a regional spatial implementation framework for the West Coast with a specific focus on the Saldanha/ Vredenburg growth centre as an emerging regional industrial complex as identified in the 2014 Provincial Spatial Development Framework (PSDF). The Greater Saldanha Regional Spatial Implementation Framework (GS RSIF) will inform the provincial planning and budgeting process and municipal IDPs and SDFs.

Following the completion of the GS RSIF Status Quo Assessment and consultation with the municipalities located within the West Coast, **additional analysis was requested on the capacity of regional bulk infrastructure in the region (this report).** The accessibility of social facilities and economic growth, amongst other issues, will be documented in separate reports. All of these reports will inform the final GS RSIF to be finalised by December 2017.

This report contains a high-level assessment of bulk infrastructure within the Bergrivier, Saldanha Bay and Swartland Local Municipalities, also referred to as the Greater Saldanha Region (GSR), in light of currently identified economic priorities and proposed projects. The purpose is to assess and identify regional bulk infrastructure capacity and constraints in relation to potential demands driven by new economic growth.

Economic infrastructure is defined here as bulk utility services. The utility sectors covered in this report are limited to water and wastewater, electricity distribution and solid waste management.

1.1. Background

In light of the current economic interest in the West Coast, which includes a number of high profile private sector investments, stakeholders have raised concerns regarding impacts on local bulk infrastructure requirements, and the availability of resources (such as water and electricity) which are needed to enable economic development in the region.

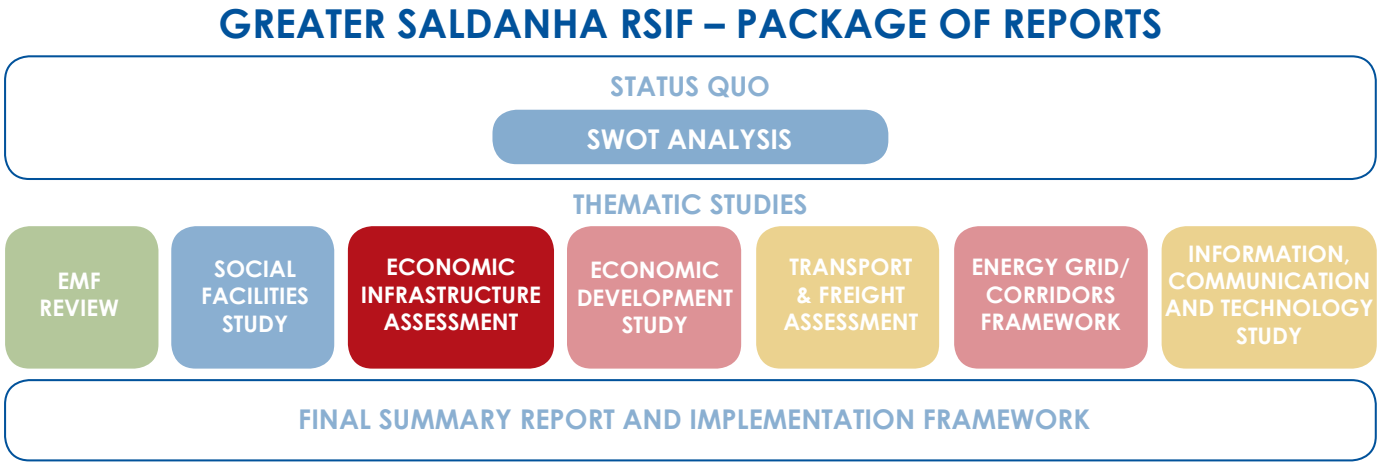
In addition to substantial private interest and the creation of a local IDZ, the West Coast region, centring on the Saldanha Bay Municipality, has been the subject of many recent economic initiatives from all spheres of government including:

- The Strategic Integration Project 5 (SIP5) under the National Infrastructure Plan, which links Saldanha and the Northern Cape Development Corridor and incorporates mining, industrial and energy projects;
- Operation Phakisa identified the Ocean Economy as one of 3 key focus areas, including aquaculture, support for the off-shore oil and gas industries, and marine transport and manufacturing; and
- The Western Cape Government's Project Khulisa, which has identified the region as a key opportunity for improving growth and creating jobs in tourism, agri-processing, and in support services for marine oil and gas industries.

The provision of bulk infrastructure services such as water and electricity is essential to support the achievement of these economic goals.

1.2. Report Structure

Each of the utility sectors (water, waste-water, electricity, and solid waste) is considered in turn, beginning with an overview of the current bulk infrastructure. This is followed by an estimate of the additional demand which anticipated projects are expected to place on bulk services. The additional demand is then contextualised within the capacity of the relevant bulk infrastructure, and the implications for regional bulk infrastructure.



2. Approach

2.1. Methodology for estimating service demand

In the case of the **Saldanha Bay Municipality**, the earlier West Coast Industrial Plan (WCIP) had identified the potential impacts on bulk infrastructure through a series of interviews with private sector project developers and the completion of a questionnaire regarding their anticipated needs in terms of water of different qualities (potable and non-potable), wastewater generation (destined for either the municipal treatment works or a proposed brine marine outfall), electricity needs, and the anticipated generation of municipal or hazardous waste.

The additional demands were modelled against planned or proposed capacity expansion requirements where these have already been identified (such as in the case of water where several options have already been considered). An important consideration was the timing of the proposed private sector projects, versus the timing of proposed public sector investments.

For the **Swartland and Bergrivier local municipalities** a different methodology was used. For these municipalities a scan of relevant municipal plans including Integrated Development Plan's (IDP), Spatial Development Frameworks (SDF), and local economic development (LED) plans were conducted in order to identify specific proposed developments of a scale significant enough to have regional bulk infrastructure impacts. This was supplemented by a review of the municipal planning authorisations and planning tribunal decisions made available to the public by the Swartland and Bergrivier Municipalities.

The identified projects and their respective impacts on bulk capacity were presented at a focus group on the 10th of March 2017. Further engagement with Swartland municipality was conducted and the municipality corroborated and updated the project list. The additional subsidised housing pipeline impacts, raised by the municipality, was subsequently added to this analysis. Bergrivier municipality did not comment on the project list provided to several officials.

The impact of the projects presented in the tables below, were modelled using the Western Cape Development Charges (DC) calculator. This calculator utilises the increase in land use rights required for a specific development, in terms of new units or gross lettable area (GLA) and standardised demand factors per unit in order to calculate the increased demand a development will place on municipal infrastructure. As the calculator was developed for use in the Western Cape, the unit demand factors have been specifically fine-tuned for the region.

For some of the projects considered, the DC calculator was easily applied, such as where the number and type of new residential units were provided. However in certain cases a number of assumptions had to be made, such as where the publicly available information was insufficient, or where a specific niche land use type was not represented in the DC calculator, such as tonnage output of aquaculture. In such instances international benchmarks were applied to ascertain specific demands for primary services, such as electricity in the case of on-land aquaculture projects.

Given the dynamics that drive private sector market demand, from international economic flows to interregional competition and sector specific changes, it is not possible to project with certainty whether these projects will inevitably be completed let alone the scale at which they will finally occur. The estimates are based on current available information and are indicative of the potential demand that could be placed on regional bulk infrastructure.

2.2. Projects considered

The research identified and considered 42 projects, across all three municipalities, which were thought possible of considered to have an impact on bulk infrastructure capacities at least at the municipal level. Of these identified projects, approximately 75% are proposed in the Saldanha Bay Municipality, and almost entirely focussed in Saldanha town. The remaining 25% consist of 6 in the Swartland municipal area, and 5 in the Bergrivier jurisdiction.

The projects range across numerous sectors and are located in at least 7 towns across the region. The project sectors identified include:

- Agricultural processing;
- Fish processing;
- Gas powered electricity generation;
- Mariculture operations;
- Mineral storage;
- Mining and quarrying;
- Minerals processing;
- Regional retail development;
- Large-scale residential development, or housing estates; and
- Wet and dry industrial production.

Primary sector agricultural expansion was not included in this assessment. This was largely due to a lack of available data, given that agricultural expansion does not require the same municipal application processes except in cases of rezoning or subdivision. Furthermore the service demand impacts of agricultural projects are far more difficult to project with certainty due to the varying levels of access, for example potable water, sanitation and solid waste are often decentralised and not connected to bulk infrastructure.

Project data for Saldanha was based on interviews with the project developers, collected through an earlier 2015 study conducted for WCG:DEDAT, the West Coast Industrial Plan (WCIP).

Additional information was collected for both Swartland and Bergrivier municipalities for the current project, but due to time and budget constraints it was not possible to replicate the full WCIP methodology. The projects identified in the Swartland municipal boundary are shown in Table 2. These were all sourced from municipal planning documents and the assumptions were based on desktop research of the private development projects. The identified projects and their respective impacts on bulk capacity were presented at a focus group on the 10th of March 2017. Further engagement with Swartland municipality was conducted and the municipality corroborated and updated the project list.

As can be seen, these projects are predominantly focussed in the town of Malmesbury. The PPC expansion located in Ongegund, near to Riebeek Wes, was originally proposed several years ago and is no longer in the planning pipeline due to changes in the cement industry and PPC's own business strategy[1] . However, it has been included in the assessment to model what such an expansion could potentially have on regional bulk infrastructure if cement demand in the Province were to continue its rapid increase trajectory.

The relative impact of projects in Swartland, by service demand, is shown in Figure 1. It is evident from this that the proposed projects have a large variation in scale of demand for the water, sanitation, solid waste, and electricity services. The regional shopping mall is projected to have the lowest impact for the water, sanitation and solid waste services while Fontein retirement village is

1 PPC De Hoek Site Visit Presentation, https://thevault.exchange/?get_group_doc=189/1459869380-DeHoekSiteVisitPresentation.pdf, accessed 5 April 2017.

Table 1. Saldanha projects included in the analysis

PROJECT TYPE IN SALDANHA	NOTES
Mining, quarrying and manufacturing	9 (7 involve processing of some kind
Mineral storage	5 projects
TNPA projects	5 projects
Oil & gas sector storage and/or distribution	3 projects
Oil & gas sector servicing	2 projects
Gas powered generation	6 proposed, max 1 expected to proceed
Fish processing	1 project
New residential/tourism development	Assumed at same scale as Jacobsbaai

Table 2. Identified Swartland projects and scale assumptions

PROJECT TYPE	TOWN	KEY ASSUMPTIONS
Creamery expansion	Darling	Modelled on expansion from 100 to 160 thousand litres of milk per day
Regional shopping centre	Malmesbury	Centralised retail of 22 000m² GLA
Schoonspruit Industrial development	Malmesbury	The development consists of 2 phases: 1. Currently online with 90 000m² GLA. 2. Future development of 37 000 m² GLA. Development assumed 50:50 wet and dry industry.
Retirement village	Malmesbury	Phase 1, 44 units already completed. The following 7 phases will cumulatively result in: • 212 single residential units – low/medium/high densities • 255 apartment units
Subsidised housing pipeline	Malmesbury	1 500 units planned for delivery in 2019/20
PPC expansion	Ongegund	Modelled on expansion from 0.55 to 1.3 million tons of clinker per annum

projected to have the lowest electricity demand of the projects. The two phases of the Schoonspruit industrial development, located in Malmesbury, will cumulatively have the largest impact on electricity service demand while the subsidised housing project planned in Malmesbury will account for the largest impact on the three other services.

The projects identified in Bergrivier Municipality are shown in Table 3. These projects are focused in the regional centres of Piketberg and Velddrif with one other project located in De Hoek, approximately 6km's south of Piketberg. The identified projects and their respective impacts on bulk capacity were presented at a focus group on the 10th of March 2017. The project list was provided to Bergrivier Municipality and no request for amendments to the project list were received.

The relative impact of projects in Bergrivier, by service demand, are shown in Figure 2. This data shows that Velddrif will host both the largest and smallest projects in terms of impact with the exception of solid waste generated.

Cumulatively it is projected that Velddrif will have the highest relative service demand increase through the identified projects. However, the impact of these increases on bulk services will be analysed by sector and available capacity in the following sections.

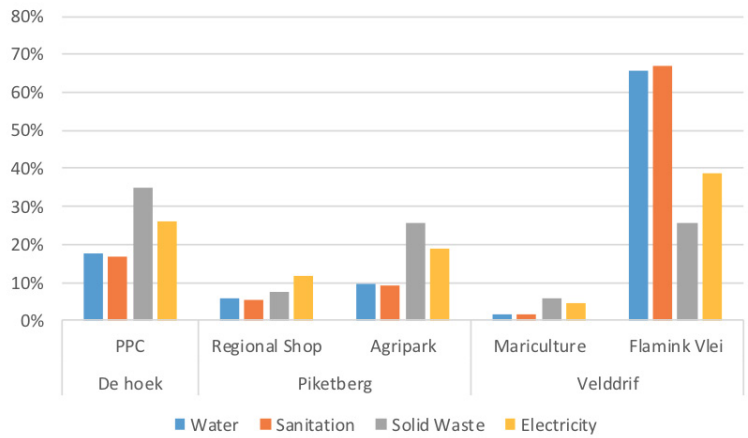


Figure 1. Bergrivier project impact relative to total municipal impact by service

Figure 2. Swartland project impact relative to total municipal impact by service

Table 3. Identified Bergrivier projects and scale assumptions

PROJECT TYPE	TOWN	KEY ASSUMPTIONS
PPC expansion	De Hoek	Modelled on a 50% expansion of operations
Regional shopping centre	Piketberg	Centralised retail of 13 000m² GLA. Moderated down from the Malmesbury mall based on regional population
Agri-hub	Piketberg	Modelled on 30 000m² under roof of wet and dry industry.
Flaminkvlei village	Velddrif	1 176 units comprising of medium and high density single residential as well as apartment units.
Mariculture	Velddrif	Modelled on a 310 tonnes per annum output based on original plans.

3. Water resources and bulk potable supply

3.1. Description of the current bulk water system

3.1.1. The Western Cape Water Supply system

The study area is served by the Western Cape Water Supply System (WCWSS), which includes the Berg Water Management Area (WMA) and associated urban areas (Cape Town, Stellenbosch, Paarl and Saldanha).

The supply of potable water from the Western Cape Water Supply System (WCWSS) to regional schemes is already highly constrained. As can be seen in the following table, other than the City of Cape Town, the other three main regional water users have reached their current respective allocations. Of these the West Coast District Municipality (WC DM) has been utilising resources above its formal allocation for the past few years.

The potential for economic growth in the region is thus inextricably linked to the ability of the WCDM to secure increased water allocations to meet not only current demand but accommodate future growth too. To achieve this several coordinated interventions must be simultaneously pursued. These include water demand management programmes for current users, water efficient systems for future developments, the investigation of new and alternative regional water sources, and the enhancement of current bulk supply infrastructure.

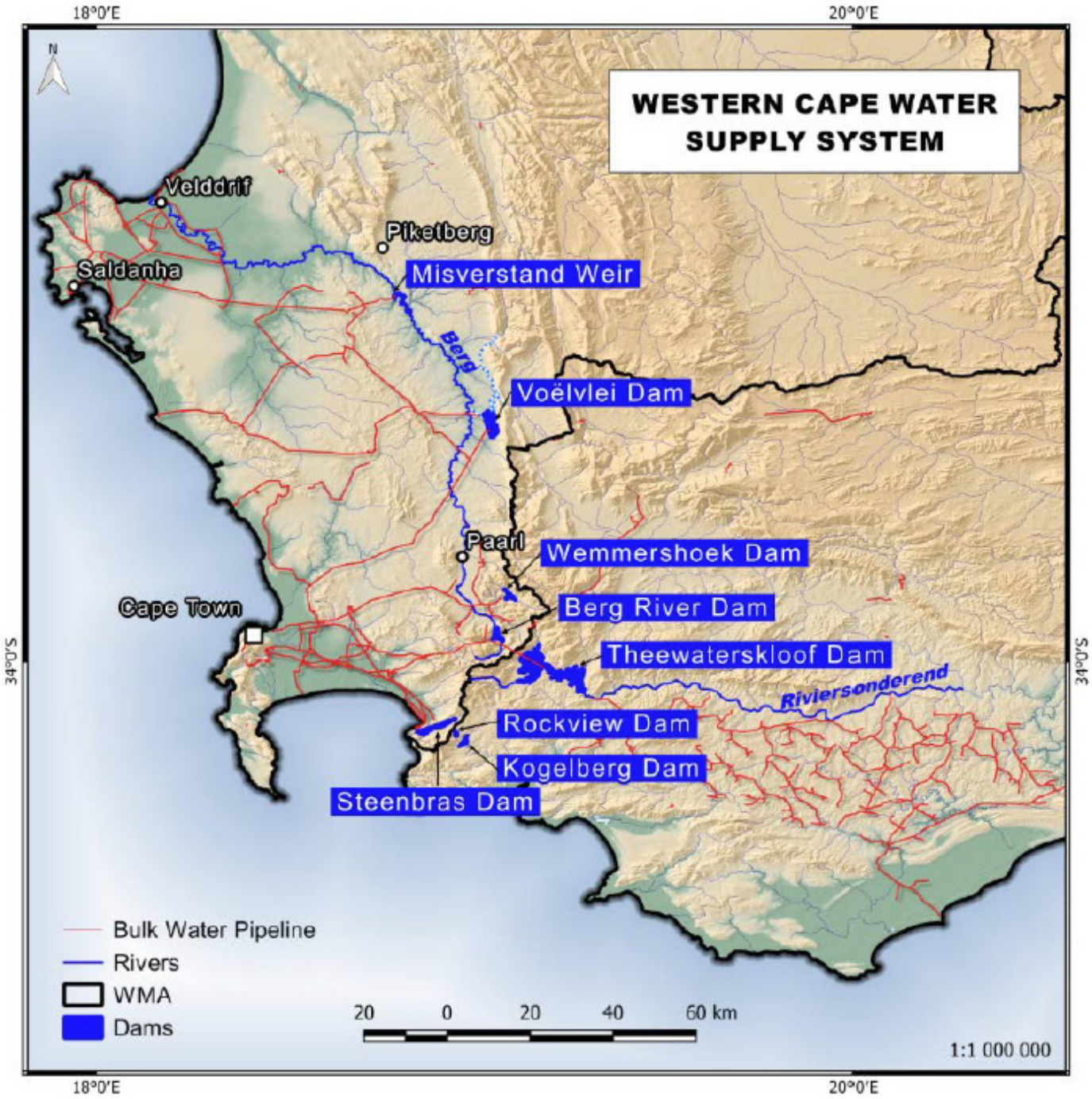


Figure 3. Overview of the Western Cape Water Supply Scheme

3.1.2. Water service areas

The main water service areas within the study area include the **Withoogte and Swartland Regional Water Supply Schemes**, both of which are fed by the Voëlvlei Dam.

The Voëlvlei Dam is under stress to meet the current and projected future water requirements. It has a full supply capacity of 158.6 million m3 and an estimated yield of 86 million m³/a at 98% assurance of supply. The allocation from the Voëlvlei dam to the Swartland Regional Water Supply Scheme is 4.2 million m3/a, and the current allocation from the Berg River to the Withoogte system is 17.4 million m3/a. The West Coast District Municipality has already exceeded their current allocation from the Berg River for the last number of years. They applied for an increase in the licensed volume to 30 million m3/a in 2011, but the awarding of this licence is still pending[2].

The **Withoogte Regional Scheme** provides water to the Saldanha Bay Local Municipality, Dwarskersbos and Velddrif in the Berg River Local Municipality, Koringberg and Moorreesburg in Swartland LM, and numerous farms for stock watering and human domestic requirements. A licence for a further 1.5 million m3/a from the groundwater scheme (Langebaan Road Aquifer near the Langebaanweg Air Force base) is also available for the Withoogte Regional Scheme. Water is released from the Voëlvlei Dam into a canal, which flows into the Berg River to the Misverstand Dam, which has a full storage supply capacity of 6.4 million m3. The dam is located 70 km from the mouth of the Berg River, and receives water from both the Berg River and the Voëlvlei Dam.

2 Situation unchanged as of March 2017, based on communications with the West Coast Water Monitoring Committee. Pers comm, 22 March 2017

Table 4. Comparison of water usage and allocations (million m3 per annum)

	Allocation	2012/13	2013/14
Cape Town	385	313	307
WCDM	21.6	25.3	27
Stellenbosch LM	3	3	4
Agriculture	173	169	170

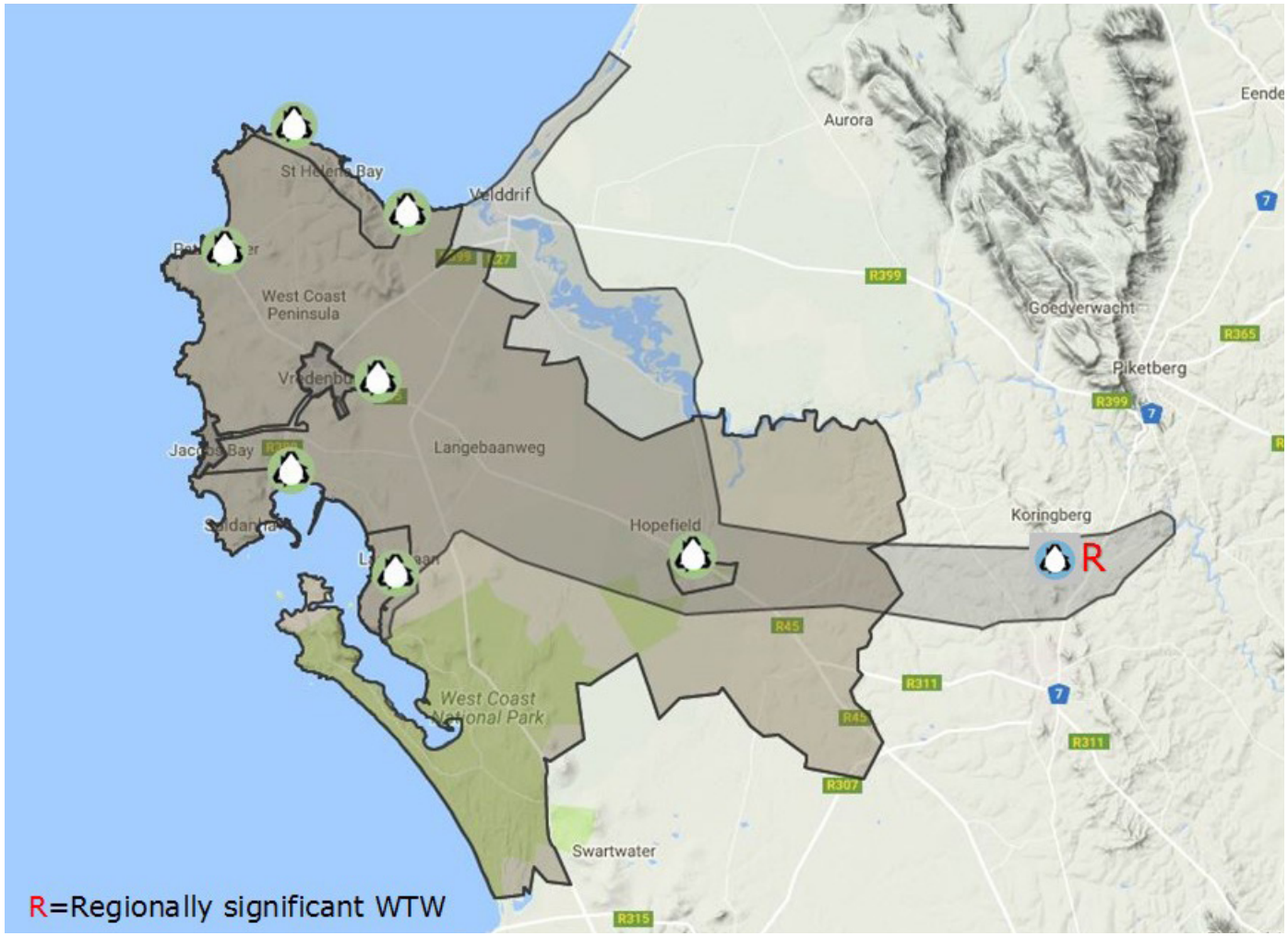


Figure 4. Withoogte water scheme (including water service area in dark grey and wastewater treatment works indicated with the green drops)

The **Swartland Regional Water Supply Scheme** is also dependent on Voëlvlei Dam, with water treated at the Swartland WTW. The scheme supplies water to Malmesbury, Yzerfontein, Riebeek West and Kasteel, Darling, Gouda and many farms along the route for household and stockwatering. The supply from the Swartland Regional Scheme to Malmesbury is supplemented by the Perdeberg Dam which has a capacity of 0.23 million m3.

Piketberg is also supplied with water from the Voëlvlei Dam, where it is released into the Berg River. The flow is balanced at the Misverstand Dam and released again into the Berg River for abstraction by agricultural, domestic and industrial users. Piketberg is allowed to abstract up to 0.704 million m³/a from the Berg River next to the town. Piketberg is also registered for the abstraction of 0.24 million m3/a from two nearby springs, the Voëlvleifontein and the Waboomskloof Spring.

Water is supplied to **Porterville** from a dam located on a small mountain stream, fed by two springs (South and North) and the Voorberg Stream. The dam is in a good condition. It is owned by the Berg River Local Municipality in conjunction with local farmers and the storage is divided between domestic consumption and agriculture. The Berg River Municipality's share from these sources is 48% and the registered abstraction for Porterville is 0.854 million m3/a.

Note that Eendekuil, Redelinghuys and Aurora in the Bergrivier LM have not been included in this summary, as they are served by localised water resources, and are not affected by the Voëlvlei dam, and have water resources which are not considered to be of regional significance. The west coast region under consideration is served by 3

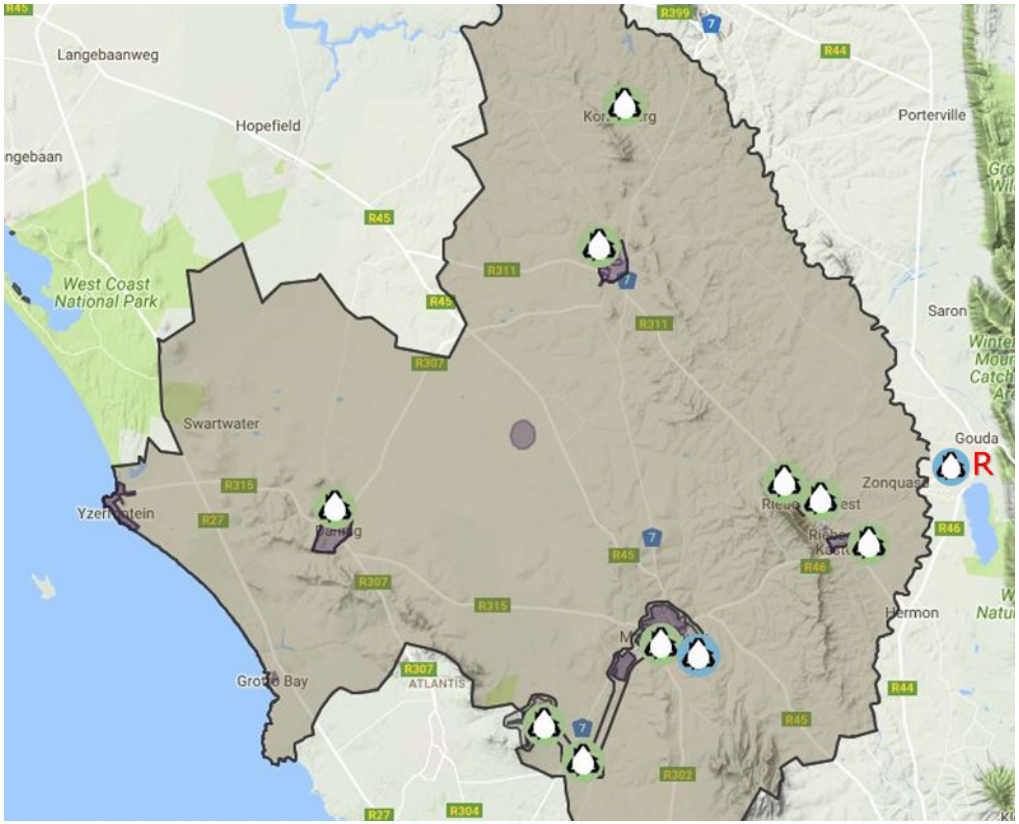


Figure 5. Swartland water scheme: water treatment (blue drop) and wastewater plants (green drop)

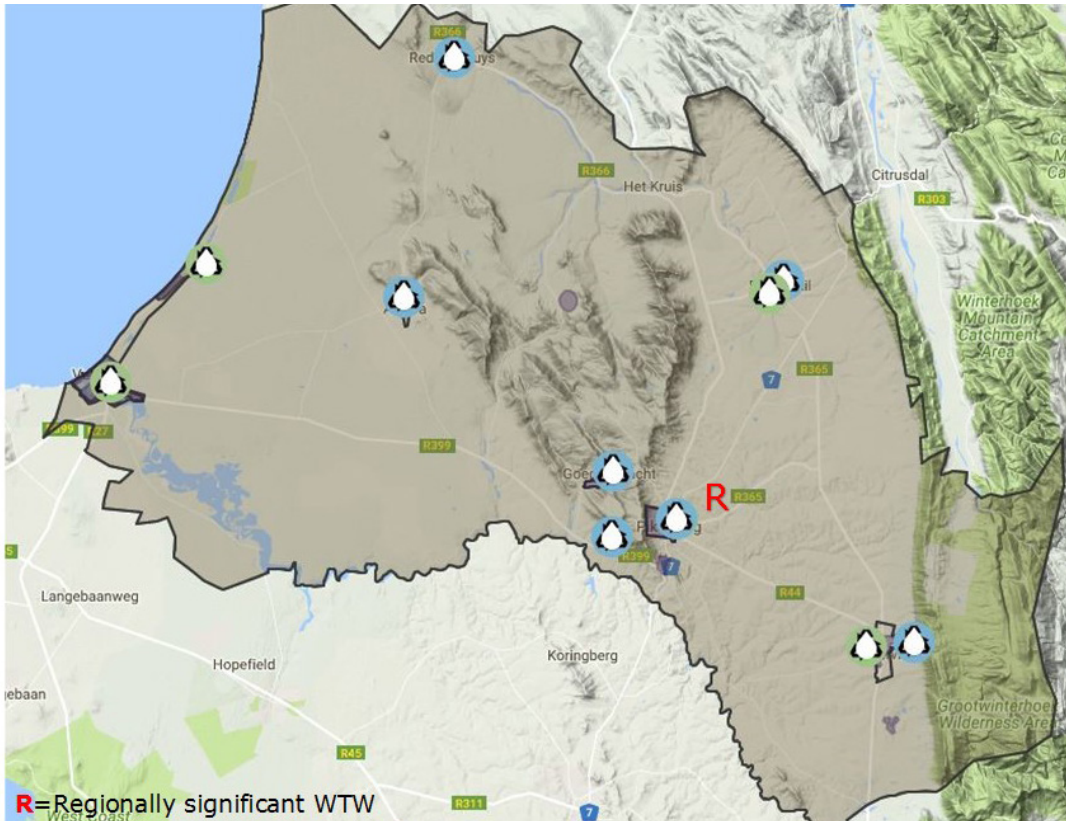


Figure 6. Bergrivier water scheme (including water (blue drop) and wastewater (green drop) treatment plants)

primary water treatment works (WTW) relevant to the economic development of the region, namely the Withoogte, Swartland, and Piketberg WTWs. The current condition of these treatment plants is summarised below, based on recent water reconciliation studies published by DSW.

Of the regional wastewater treatment works, the Swartland WTW has the shortest remaining useful life. This poses a threat to regional bulk infrastructure and potable supply in the medium term if refurbishment and replacement costs are not adequately financed and planned for. It was further raised as a major concern by the Swartland municipality which estimated the required funding within the range of approximately R160 million.

3.2. Current Supply options

The Withoogte Scheme currently abstracts more raw water from the Berg River system than it is licensed to, but with the implicit permission of the Department of Water and Sanitation (DWS). Given the current water supply constraints, there has been an assessment of current water requirements and scenarios which have been used to inform the WCWSS Intervention Implementation Programme, with a time-frame of 7-13 years[3] . These interventions are in different stages of development, but the ones most relevant to the GSR include:

- Berg River-Voëlvlei Augmentation Scheme (phase 1)
- desalination of seawater
- large-scale water reclamation
- other possible interventions to be considered for implementation at a later stage include:
  - large-scale Table Mountain Group (TMG) aquifer development
  - Langebaan Road Aquifer Artificial Recharge Scheme.

3 It should be noted that give the current drought (as of May 2015) and rapid developments in infrastructure planning for potable water, much of this section is probably already out of date.

Table 5. WTW Blue Drop Score and State of Infrastructure (Estimated remaining useful life information data was accessed from the National Department of Water and Sanitations (DWS) development portal and supplemented by municipal input. No data for the Withoogte WTW was recorded in the database)

WTW	2013 Blue Drop Score / Trend	State of infrastructure	Estimated remaining useful life
Withoogte WTW	95%	Good, but inadequate capacity. Upgrade capacity of Withoogte WTW if additional bulk water is allocated to the WC DM from the WC WSS	No data
Swartland WTW	95%	Good	Medium (10 -20 years)
Piketberg	87,5% / increasing	Good	Long (Greater than 20 years)

The recently competed Green Cape research (2017) notes that **Voëlvlei would be the only additional bulk water supply which can potentially benefit the study area**, with the other proposed schemes all targeted at meeting the needs of the City of Cape Town. No decisions have yet been taken regarding the allocation of the additional water. Green Cape concluded that it highlights the importance of local resource development such as groundwater abstraction, reuse and desalination for, amongst others, Saldanha, Swartland and Berg-Rivier.

Desalination might be located in Saldanha and feed the immediate vicinity. It would reduce demand on Withoogte and is therefore a supplementary supply option for the Withoogte scheme. However, **this option is very energy intensive, and the local substation would require significant upgrading before this option is possible**.

Of the supply options under consideration to meet the current and projected increase in demand in the entire WCWSS (outlined above), the furthest along currently is the transfer of approximately 23 million m3 per annum from the Berg River to the existing Voëlvlei Dam. This would include the following:

- A crump weir, abstraction works and 4 m3/s raw water pump station on the Berg River;
- A rising main pipeline from the Berg River to Voëlvlei Dam;
- A new summer release connection at the existing Swartland Water Treatment Works to facilitate summer releases; and
- A new connection to existing outlet infrastructure so that water can be released to the Berg River during the summer months under gravity, thus eliminating the need to utilize the existing canal from which water losses occur.

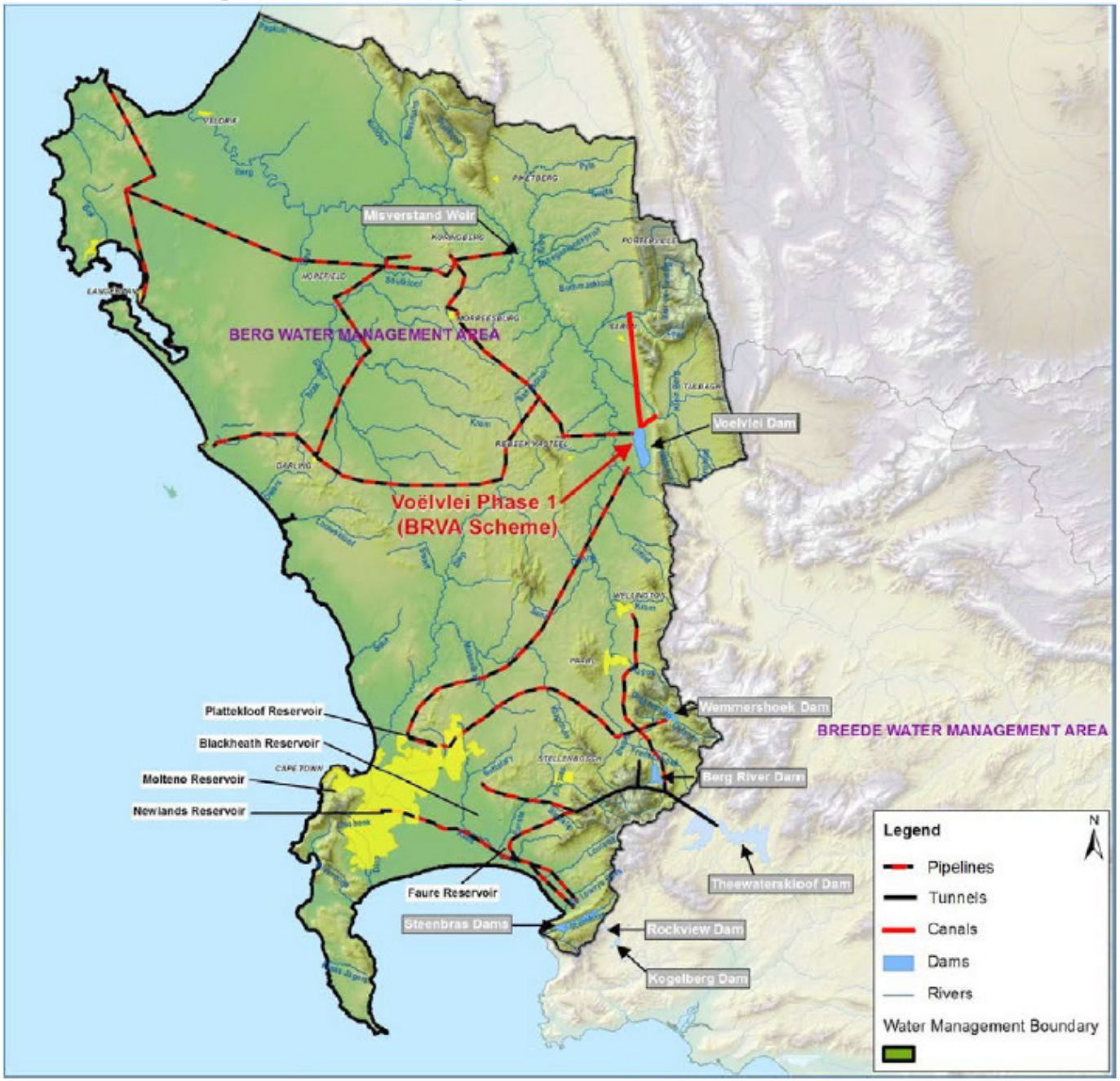


Figure 7. Berg River-Voëlvlei Augmentation Scheme (Source: DWA, 2016)

3.3. Development demand projections

Given the water scarcity the impact of the proposed projects, particularly given the industrial nature of many, is a critical aspect. However this does not necessarily indicate that the regional level infrastructure, downstream from the catchment scale, is inadequate.

Figure 8 reflects the projected annual increase in demand for water from the identified projects in Bergrivier and Swartland. The bulk of this demand will emanate from Swartland municipality, in particular from the projects located in Malmesbury.

It is projected that total additional water demand in Swartland will be approximately 880 thousand m3 (500 megalitres) per annum. The additional demand in Bergrivier is projected to be 170 thousand m3 of water per annum.

However, as can be seen in Figure 9 the additional water demand generated by the identified projects in these two municipalities is dwarfed by the projection for Saldanha Bay Municipality which is 18 times greater than Swartland and Bergrivier projects combined.

However, one of these projects, the Elandsfontein Phase 2 back of port limestone processing, represents 57% of the increased water demand in Saldanha. Including this project the anticipated annual increase in water demand for Saldanha is 11.5 million m3. If excluded, the increased industrial demand is estimated at 5 million m3 per annum.

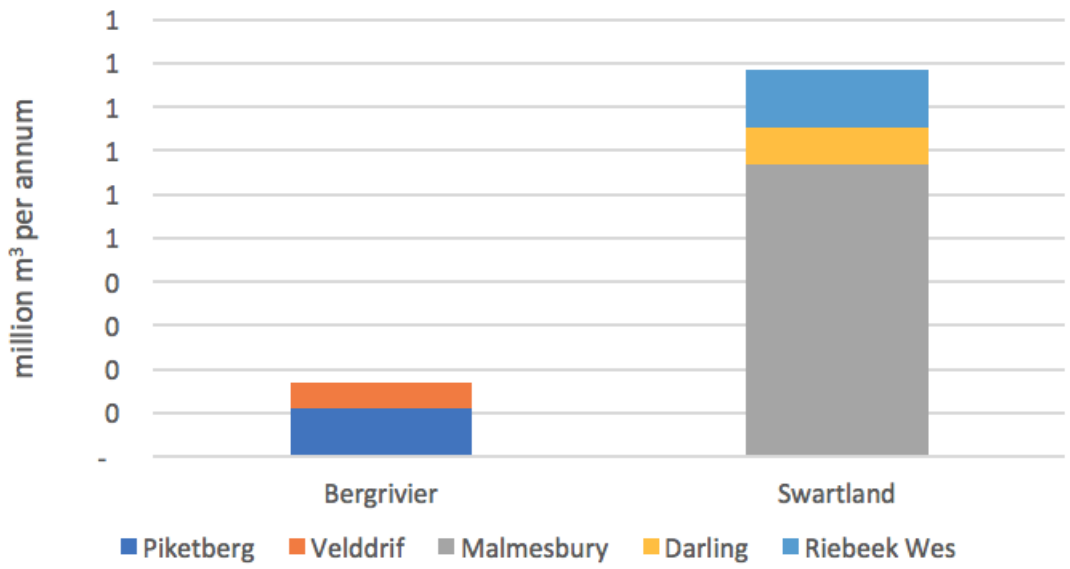


Figure 8. Project water demand: Bergrivier and Swartland

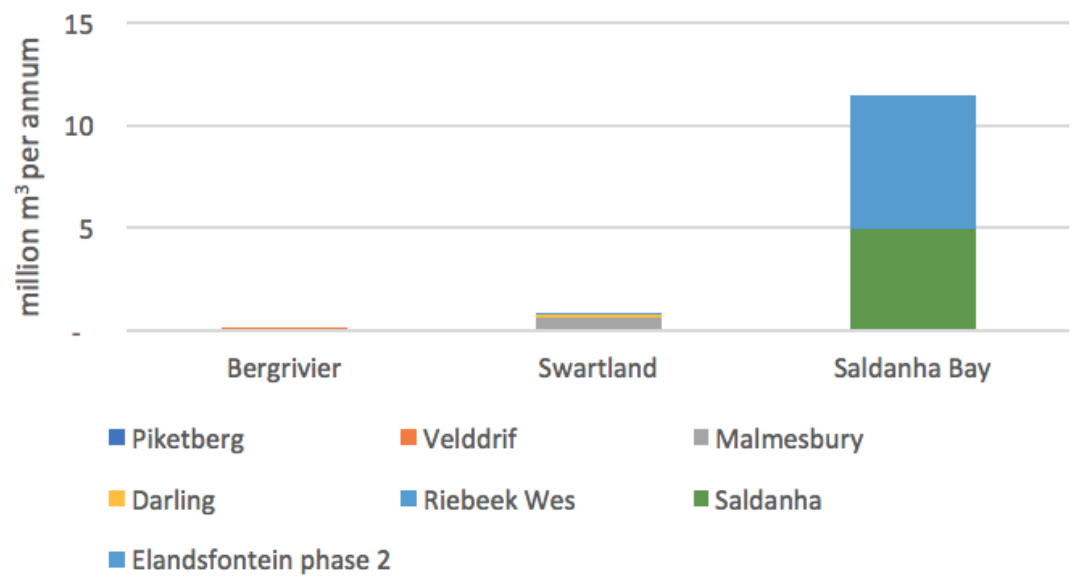


Figure 9. Project water demand: Bergrivier, Swartland and Saldanha

3.4. Capacity impacts

3.4.1. Regional resource allocation

In terms of regional water allocations, there are two major schemes servicing the three municipalities covered in this analysis, namely the Withoogte scheme supplied from Misverstand dam and the Swartland scheme supplied from the Voëlvlei Dam. The system is already overallocated, and the additional water demand will only exacerbate the underlying trend.

As can be seen in Figure 10, based on the 2013/14 allocations and demands the projected impacts on the Withoogte Scheme, which serves Saldanha Bay and Velddrif in Bergrivier, will result in a 24% increase on system bulk water utilisation. The outcome of this is an increase from 17% above allocation in 2013/14 to 45% above the current allocation in future (87% above if the Elandsfontein project were to proceed). This increased demand is almost entirely attributable to the identified projects in Saldanha Bay and includes the Elandsfontein project.

The impacts on the Swartland scheme are relatively smaller than the Withoogte scheme, however the identified project demand is estimated to equal 21% of the current allocation. Considering that the scheme demand already exceeds the allocation this represents a significant increase.

3.4.2. Water treatment works

At a more localised scale water treatment works capacity represent the major bulk infrastructure capacity determinant. Figure 11 indicates the relative current utilisation of water treatment works (WTW) capacity by regional scheme as well as the additional utilisation projected.

Currently the Withoogte WTW, serving Saldanha and Velddrif is at 80% capacity utilisation while the Swartland and Piketberg WTW's are at 66% and 62% respectively. The projected increased water demand on the Withoogte WTW will result in a 104% utilisation of design capacity. However, if the

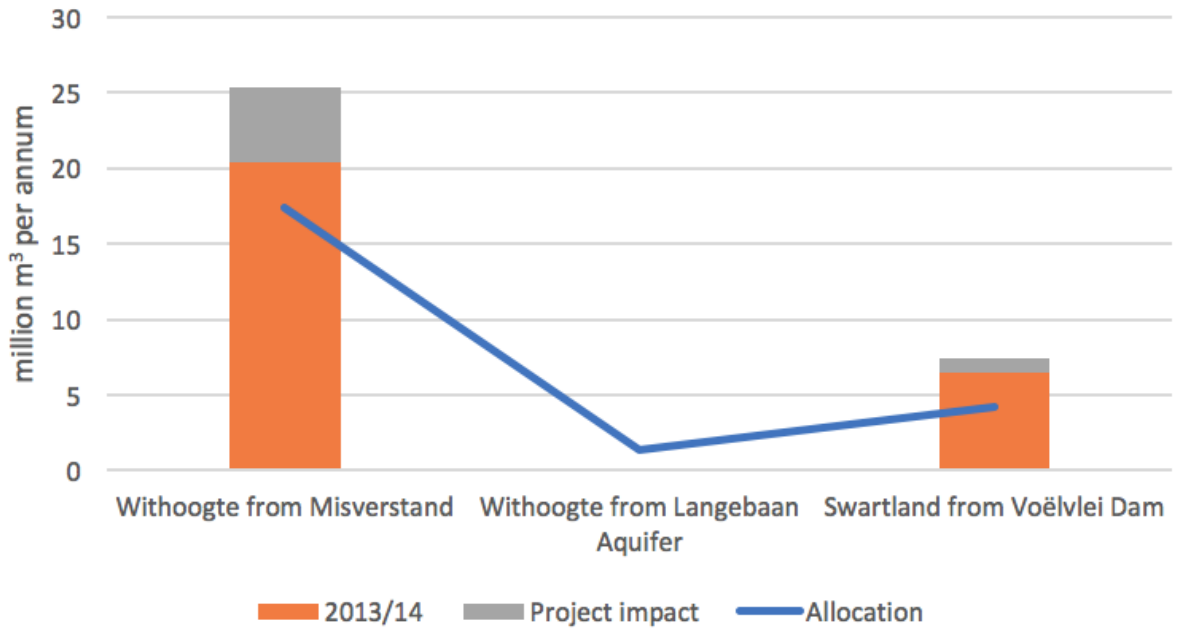


Figure 10. WCDM scheme utilisation and allocations 2013/14

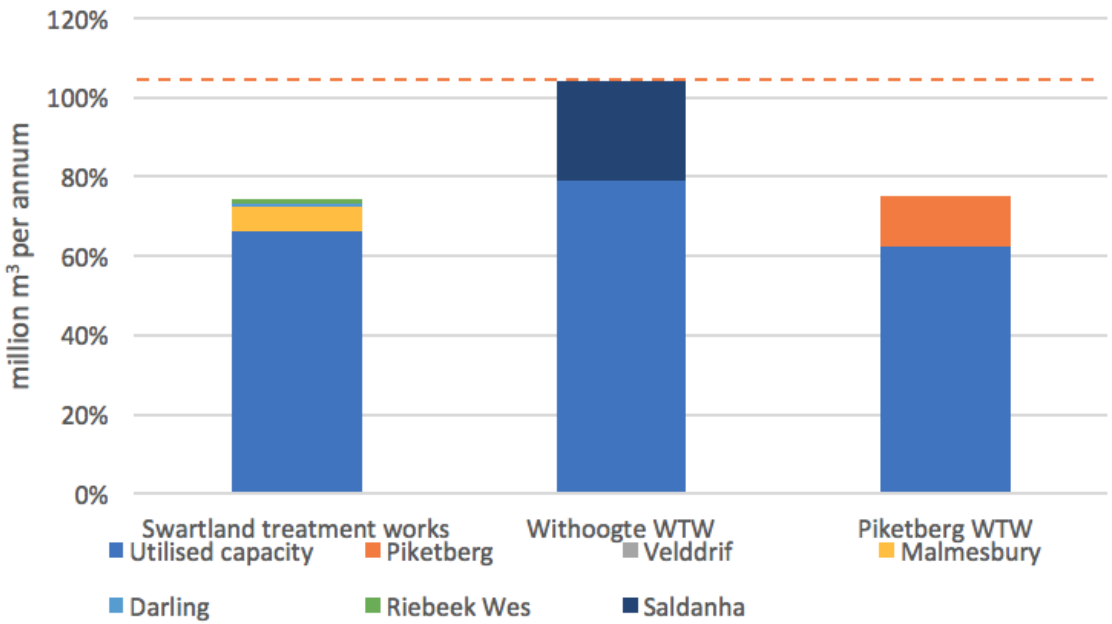


Figure 11. WTW capacity and projected demand (Data source: Water reconciliation studies, 2015)

Elandsfontein project is not included the projected demand can be just accommodated within the current capacity envelope. This does not however take into account other growth in the Withoogte service region and thus an expansion of treatment capacity will likely be required in future.

The Swartland WTW appears to have adequate capacity to accommodate the projected growth in Swartland. Although the Piketberg WTW is currently operating at the lowest relative utilisation rate, given the design capacity of 2.4 Ml/day compared to 29 and 72 Ml/day for Swartland and Withoogte respectively, the Piketberg projects will utilise 13% of the WTW design capacity. This demonstrates the impact that a single project can have on a town's infrastructural capacity.

3.5. Implications for regional bulk infrastructure

The largest constraint on regional bulk water infrastructure is the current water allocation available from WCWSS in order to provide for future expansion. Water supply is the largest constraint within the area.

The recent West Coast Industrial Plan investigated the sensitivities of the future supply options at Saldanha, and found that they are dependent on a determination of the WCWSS system yield and the water rights allocation from the Berg River System to the Withoogte system. This is a process being undertaken by the DWS and has not been concluded. Green Cape reports that the West Coast DM has requested an additional allocation of 12.9 million kl/annum[4]. If this increase in rights were granted, then the Withoogte WTW would need to be upgraded to treat an additional 35 Ml/day. If the additional allocation is not granted and water conservation and demand management cannot reduce existing demand to cover any additional demand, then various options exist, such as increased groundwater use, large scale treated effluent, and a water exchange network. The reuse of second class water could reduce the demand for potable water, but only to the extent of available effluent from the Saldanha WWTW.

The only supply option currently on the table which benefits the entire WCWSS is the Voëlvlei augmentation scheme. Allocation remains a crucial issue as decisions have not yet been made regarding the allocation of the additional water. Green Cape concluded that it highlights the importance of local resource development such as groundwater abstraction, reuse and desalination for the region.

Within the WC DM scheme the Withoogte WTW is currently the closest to utilising its design capacity and the projected increase from the identified projects alone will exceed the current available capacity. This will not only have implications for Saldanha Municipality but also Velddrif which is serviced by the Withoogte scheme.

The projected water demand increase accruing to the Piketberg and Swartland WTW's can be accommodated within the current capacity envelope in the short to medium term.

In terms of alternative supply options, desalination would most likely be located in Saldanha and feed the immediate vicinity. It would reduce demand on Withoogte and is therefore a supplementary supply option for the Withoogte scheme. However, this option is very energy intensive, and the local substation would require significant upgrading before this option is possible.

4 From the WCWSS Oct 2015 report. Based on a follow-up conversation with the WCDM, this request is still pending as of March 2017.

4. Wastewater treatment

4.1. Description of regional wastewater treatment

Wastewater treatment is traditionally a more localised service, with each municipality served by multiple wastewater treatment works.

The 2013 Green drop score and condition of each wastewater treatment works (WWTW) is summarized in Table 6.

The WWTWs for Riebeek West, Riebeek Kasteel and Ongegund have recently been replaced by a regional Riebeek Valley WWTW to cater for the current and projected future requirements. New WWTWs are required at Jacobs Bay and Britannia Bay as an immediate priority.

4.2. Development demand projections

Figure 12 indicates the estimated wastewater generation incurred by the identified projects in each town per municipality. Despite Saldanha's higher projected water demand, Swartland projects are anticipated to have the largest resulting wastewater generation. The reason for this is the proportion of wastewater generated in Saldanha relative to the other municipalities is significantly lower than in the case of water demand, largely due to industrial effluent, brine discharge using the proposed marine outfall and wastewater recycling.

The wastewater generation in Swartland is predominantly attributable to new residential development which has higher return flows of water than large scale industry. Of the approximately 580 thousand m3 per annum of additional wastewater generated in Swartland, 74% will originate in Malmesbury. Of the Malmesbury projected growth

Table 6. WWTW Green Drop Score and State of Infrastructure

WWTW	2013 Green Drop Score / Trend	State of infrastructure
Langebaan	79.6% / increasing	Good condition, but inadequate sludge drying capacity
Vredenburg	83.7% / increasing	Good, but requires expansion
Paternoster	59.4% / increasing	Very good
Saldanha	80.2% / increasing	Good, but inadequate capacity
Velddrif	40.9% / decreasing	Good
Dwarskersbos	32.5% / decreasing	Average, urgent need to address rapid decline in Green Drop score
Shelley Point	74.85%	Average to good
Laingville	76.3% / increasing	Average to good, required immediate expansion
Hopefield	80.9% / increasing	Good
Malmesbury	75.5% / increasing	Excellent
Chatsworth	60.3% / declining	Average
Kalbaskraal	68.4% / steady	Average
Koringberg	64.9% / declining	Poor, and urgent need to upgrade capacity
Riebeek West	62.4% / declining	Poor
Ongegund	62.8% / declining	Good
Riebeek Kasteel	64.5% / slight decline	Poor
Moorreesburg	69% / declining	Average
Darling	70.7% / declining	Good. Upgraded in 2008
Piketberg	48.9% / declining	Average
Porterville	62.6% / declining	Good

57% is projected to be generated by the new subsidised housing project[5].

It is estimated that in total Saldanha may have to treat an additional 550 thousand m3 of wastewater per annum at the Saldanha WWTW. Bergrivier will cumulatively generate an additional 120 thousand m3 per annum, with Piketberg accounting for approximately 66% of this additional demand.

4.3. Capacity impacts

The bulk capacity available for wastewater generation is largely determined by the capacity of wastewater treatment works (WWTW's) available. WWTW's compared to WTW's tend to service a more localised region and there are individual WWTW's servicing each town in which a development project was identified.

4.3.1. Wastewater treatment works

Figure 13 shows the current design capacity and utilisation of WWTW's serving the identified project locations as well as the additional demand that will be place on these WWTW's by the projects. It shows that in absolute terms most of the wastewater generated will be in the towns of Saldanha and Malmesbury. In both cases the WWTW's will be able to accommodate the increase.

It should be noted that at the time of the 2015 water reconciliation studies the Ongegund and Riebeek Wes WWTW's were under severe pressure (see Figure 13) Subsequently a new regional WWTW has come online which services both the town of Riebeek Wes as well as Ongegund.

5 It is important to note that not all demand created by subsidised housing is always additional demand as typically these new units are occupied residents of the municipality which would already account for a portion of that demand dependant on their access to services – very few urban households have zero current service demand.

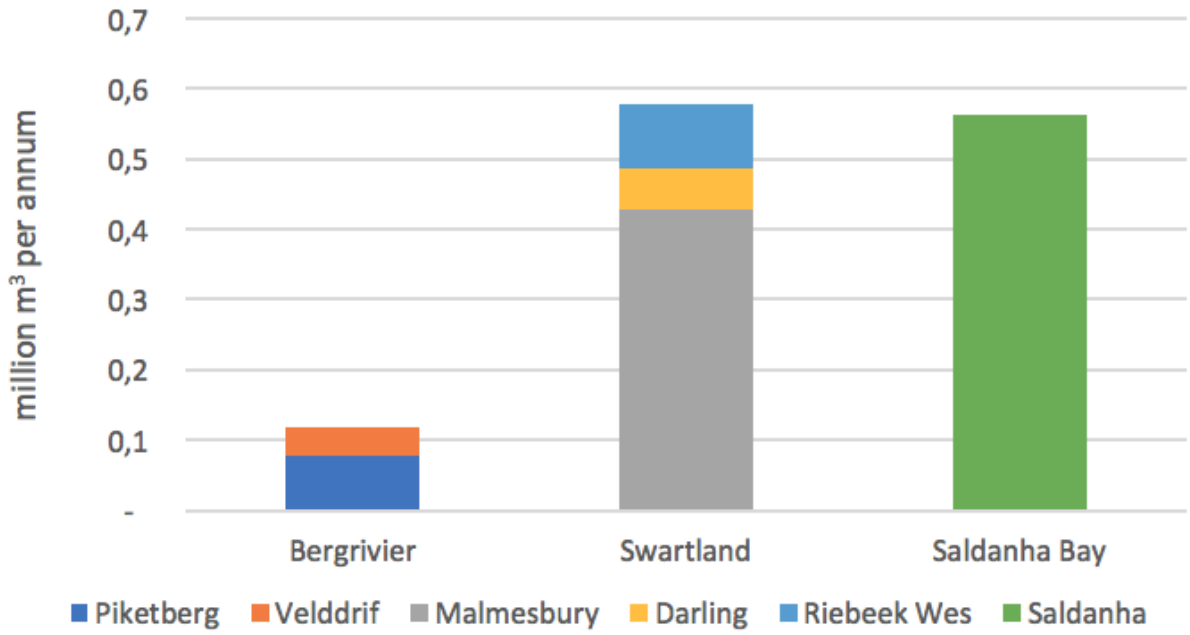


Figure 12. Projected wastewater generation

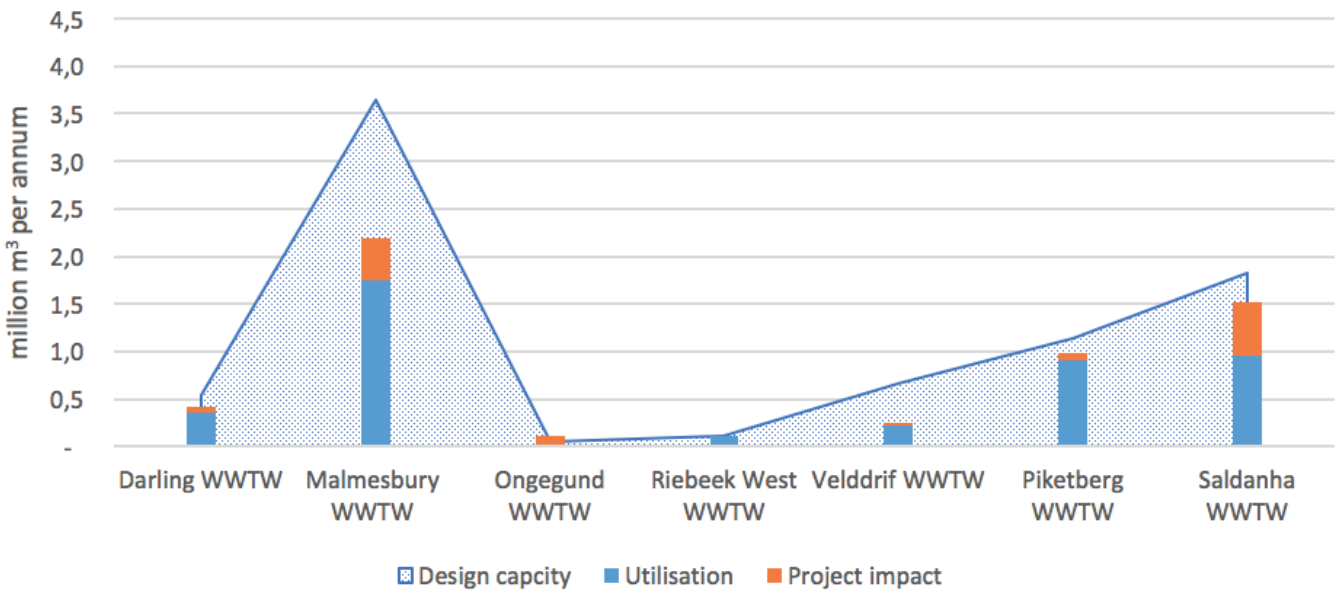


Figure 13. WWTW design capacity, utilisation and projected demand (Data source: Water reconciliation studies, 2015)

Figure 14 indicates the projected wastewater generation relative to the currently available capacity. As can be seen it is projected that Saldanha will utilise the highest proportion of its available capacity. However none of the WWTW's are expected to require expansion to accommodate the identified projects.

4.4. Regional wastewater implications

Wastewater treatment in the WC DM is largely a localised infrastructure system. However, the impacts of inadequate treatment can have regional environmental and thereby economic implications. Despite this there is adequate bulk capacity to accommodate the identified projects in the three municipalities, particularly in light of the new Riebeek Valley WWTW.

Piketberg WWTW has adequate capacity, but the poor Green Drop scores (48.9% with declining trend in 2013) may require regional intervention.

The capacity of the Saldanha WWTW is currently being upgraded from 2.5 Ml/day to 5 Ml/day in response to anticipated IDZ demand. With the upgrading of Langebaan Wastewater Treatment Works (WWTWs) constrained due to lack of space, and upgrading required at the Vredenburg WWTWs, the possibility of a centralised wastewater treatment facility that is capable of handling industrial waste has been discussed. A feasibility study in this regard is to be undertaken by SBM. This study should also investigate the options for re-use of effluent for supply to industry, particularly as the current demand appears to outstrip the available supply of wastewater for re-use.

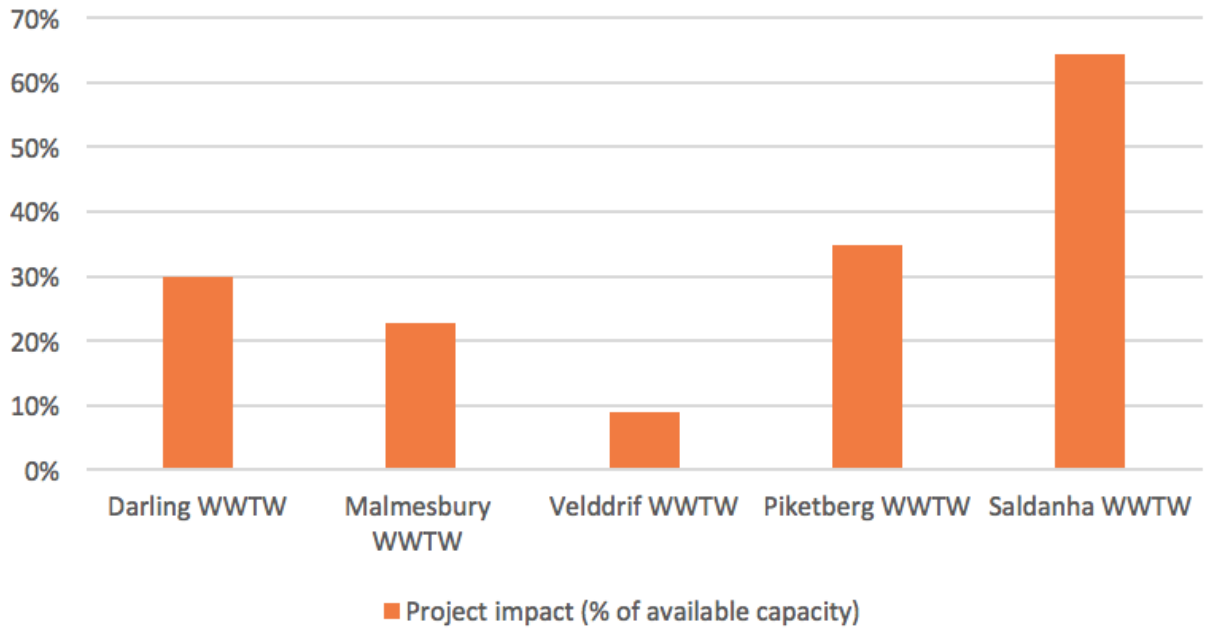


Figure 14. WWTW projected demand relative to available capacity

A significant wastewater issue in Saldanha Bay is the need to dispose of industrial effluent that is not suitable for treatment at the Saldanha WWTW, specifically brine. The proposal is that industrial brine be discharged at sea through the same marine outfall that will be constructed to discharge brine from either new industrial projects or the proposed desalination plant. The need for the Saldanha Regional Marine Outfall Pipeline (SRMOP) is therefore widely accepted, and is likely to involve some form of public-private partnership.

Environmental regulations require that there is only one outfall of effluent into the sea. This shall require coordination of the plans for construction of the desalination plants, the wastewater treatment plants and the interventions planned by the private sector, particularly the rare earth mineral beneficiation project which will generated large volumes of brine/saline effluent.

Potential synergies for re-use of industrial effluent may exist between industries. This will require more detailed information around the temperature and chemical properties of the wastewater streams, and is understood to be the subject of a proposed study by Green Cape, under the auspices of WC:DEDAT.

5. Electricity

5.1. Broader energy context

The Western Cape Infrastructure Framework (2013) identified certain energy transition strategies, which included the following. Subsequent developments are indicated in italics:

- Introduce infrastructure so that natural gas can be used as a transition fuel.
  - LNG import sites have been proposed at Coega and Richards Bay, LPG terminal facilities are still proposed within Saldanha. LNG is most likely to be trucked to secondary use or distribution points, including Saldanha.
- Align energy generation infrastructure with a point of gas import (e.g. Saldanha Bay).
  - Gas powered electrical generation is now likely to shift closer to the 2 proposed import sites of Richards Bay and Coega. At most 1 gas fired generation facility is now anticipated within the Saldanha area, with LNG to be trucked or shipped in to port.
- Develop the renewable energy sector.
  - The proposed Atlantis SEZ to the south of the study area is the new regional focus for the renewable energy sector.

Shift transport patterns to reduce reliance on liquid fuel.

Liquid fuel issues are not addressed within the focus, and the focus is on the regional electricity distribution system.

5.2. Current bulk electrical infrastructure

Eksom's Western Cape transmission network stretches over a distance of about 550 km from Gamma substation (near Victoria West) to Philippi substation (near Cape Town). Koeberg Power Station is the only baseload power station situated locally. There are also four peaking plants in the Western Cape, consisting of pumped-storage and gas turbine generation, which help to meet the demand in the region.

The deficit between Koeberg generation and the Greater Cape load is offset by the generation pool in the Highveld via Eskom's Cape Corridor. The first 765 kV line connecting the Kappa substation to Sterrekus was completed in late 2016, increasing the Cape Corridor's power transfer capability by approximately 1 500 MW[6].

The West Coast region's bulk supply of electricity is provided by Eskom, while the municipalities provide reticulation and distribution within most their respective urban centres. This assessment is thus concerned with the bulk capacity available in the regional Eskom distribution network. Based on Eskom's 2011 West Coast Master Planning investigation, the regional electrical network is ageing, and in need of a number of strengthening, upgrading and rehabilitation projects.

The main transmission stations (MTS) in the area are situated at Muldersvlei to the south, and the Aurora MTS between Saldanha and Hopefield. Upgrades to the Muldersvlei MTS were completed in 2015.

Figure 15. Close-up of Western Cape provincial transmission network (Source: extract from Figure 6.29 of Eskom's 2016-2025 TDP)

6 http://www.engineeringnews.co.za/article/eskom-commissions-765-kv-transmission-line-in-western-cape-2016-12-01/rep_id:4136

5.2.1. Current upgrade proposals to the West Coast regional bulk infrastructure

Most of the future industrial users will receive electricity supply through a high voltage connection directly from Eskom. The Saldanha Bay area is fed from the 400MVA Aurora substation via a 132kV line to the Blouwater substation. This substation is already constrained on transmission capacity and will require an upgrade to be able to distribute electricity from power generators in the area. There is a 132 kV substation in Blouwater Bay that distributes electricity to the industrial areas. The towns of Vredenburg, Saldanha, St Helena Bay and Velddrif are supplied through 66kV networks while Langebaan, Jacobsbaai and Paternoster are supplied through 11 kV networks. There is currently 66MVA available capacity at the substation in Blouwater which has been allocated to the proposed rare earth mineral beneficiation project.

Eskom's 2011 load forecasting exercise took numerous development proposals into account, many of which are included in the project list of this study. Based on their load forecasts overload was predicted at the Aurora, Hopefield and Yzerfontein sub-stations without system improvement.

Capacity constraints were identified at Blouwater, Darling, Langebaan, Velddrif, De Hoek and Mooreesburg substations, and upgrades were planned. Based on the latest available Transmission Development Plan from Eskom, the Aurora substation upgrades have been delayed, but are still a priority in the region. The transmission capacity of the Aurora substation is 450 MVA, and the baseline electricity notified maximum demand at the Aurora substation is about 447 MVA[7], although there is uncertainty as to how much of this notified demand is currently used.

Eskom's Transmission Ten-Year Development Plan for 2013-2022 indicates that the next project to augment transmission capacity at Saldanha will be

7 Monique Le Roux, Eskom Transmission planning, personal communication, May 2015.

Figure 16. Eskom's West Coast South distribution system

the upgrading of the Blouwater substation, which will be supplied by two 400kV transmission lines from Aurora in two phases. This is assumed to increase the capacity at Blouwater by 500MVA.

According to the EIA[8], the scope of the Saldanha Bay network strengthening project as of 2016 includes the following:

- Construction of a new 400/132kV Transmission Substation in the Saldanha Bay area with a planned capacity of 3 x 500 MVA transformers. The transmission substation footprint will be 600m x 600m
- Construction of a new 132/66kV Distribution Substation near the current Blouwater Substation in the Saldanha Bay area. The distribution substation footprint will be 120m x 120m.
- The construction of two 400kV power lines (approximately 35 - 40 km) from the Aurora Substation to the new proposed distribution and transmission substations. A servitude of 55m is required for each power line
- Construction of 3 x double circuit 132kV power lines to connect the new distribution substation to the new transmission substation.

8 Invitation to a public meeting for an EIA Process for the proposed Saldanha Bay Network Strengthening Project, October 2016, http://www.savannahsa.com/documents/9513/Appendix%20C5%20-%20Stakeholder%20Correspondence.pdf

- Replacing two of the four existing 250 MVA 400/132kV transformers with 2 x 500 MVA transformers at Aurora Substation.
- Establishing 2 x 132 kV feeder bays around Aurora Substation."

While phase 1 of the SB network strengthening project is planned for 2022, phase 2 which involves the actual upgrading of the Blouwater substation in Saldanha has been deferred to a later date (no year given)[9].

5.3. Development demand projections

The identified industrial and mining activities proposed in Saldanha result in a substantially higher demand for electricity, relative to Bergrivier and Swartland. As shown in Figure 17, it is estimated that the Saldanha projects will result in an additional 140 MVA load demand on the distribution network. The Swartland projects are estimated to increase the load demand by an additional 25 MVA and Bergrivier 9 MVA.

In Swartland the majority of the increased demand is driven by the projects located in Malmesbury, while Bergrivier is approximately equally distributed between Piketberg and Velddrif.

9 Table 6.23 of the latest available transmission development plan (as of May 2015), http://www.eskom.co.za/Whatweredoing/TransmissionDevelopmentPlan/Documents/TransDevPlan2016-2025Brochure.pdf

Figure 17. Zones served by individual substations

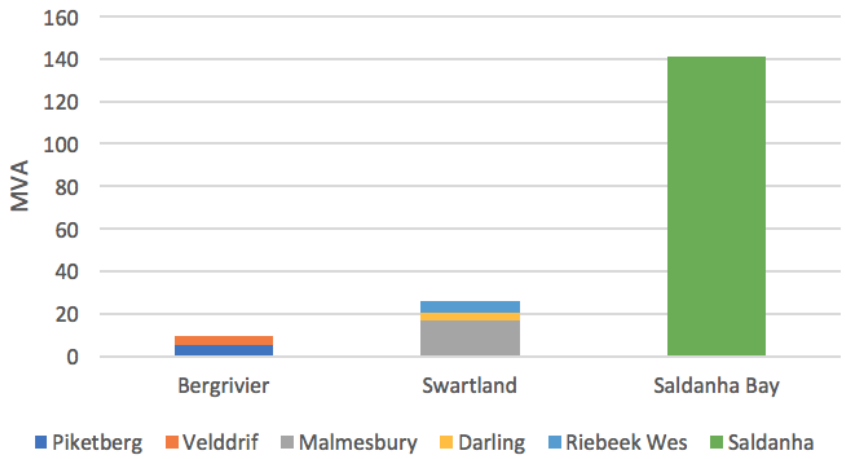


Figure 18. Projected electricity load demand

5.4. Capacity impacts

The Eskom distribution network capacity was assessed in terms of the installed and firm capacity of regional substations servicing the development locations.

Figure 18 indicates the projected 2017 load capacity available at each major substation servicing the towns in which the identified projects are located. As three of these towns have two separate substations serving the town demand these have been shown separately.

Three of the substation service areas in the study area were projected by Eskom to have reached load capacity by 2017 namely, Velddrif, Darling and Ongegund. On the other end of the spectrum the more recently installed Aurora substation serving a regional service area is projected to have over 450 MVA capacity available for future development.

By comparing the available capacity to the estimated additional demand required by the identified projects in Figure 19 it is evident which of the substation's will be most severely impacted by the development projects.

Patently the substation's which are assumed to already be at capacity will be unable to service the new developments without additional capacity upgrades. Piketberg and Malmesbury substations are projected to have adequate capacity available to accommodate the developments through at least one substation. It is estimated that the Blouwater substation will be inadequate to accommodate the Saldanha developments within the available capacity. Aurora substation is however projected to have more than adequate capacity to accommodate the regional load demands driven by the projects located in its extended service area.

5.5. Regional electricity implications

An initial analysis of the proposed industrial developments investigated under the WCIP process suggests that the upgrade of the Blouwater substation and the installation of a single 400kV transmission line should be sufficient to satisfy the projected demand to the Saldanha Bay area. Given the assumption that Blouwater substation is nearing capacity, **any increase in demand** (irrespective of if the proposed industrial developments proceed) would require the immediate upgrading of Blouwater substation and the transmission line. However, Eskom's Ten-Year Plan indicates that this upgrade is only planned for 2022 or later.

The largest bulk regional infrastructural component relating to the capacity of the region, the Aurora substation, is estimated to have surplus capacity to accommodate the load demands of the identified projects. However, at the local scale, according to the Eskom West Coast Masterplan projections, the projects located in three of the towns could not be accommodated in the immediate term. Furthermore, the projected Blouwater substation capacity deficit could impede a number of projects in Saldanha Bay and therefore negatively impact on economic development in the region.

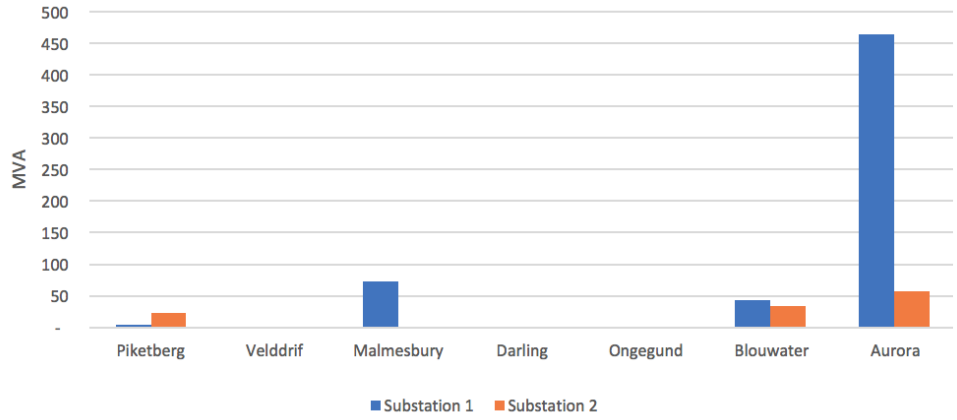


Figure 19. Substation capacity available (Data source: Eskom Western Cape West Coast Master Plan: load forecasting, 2011)

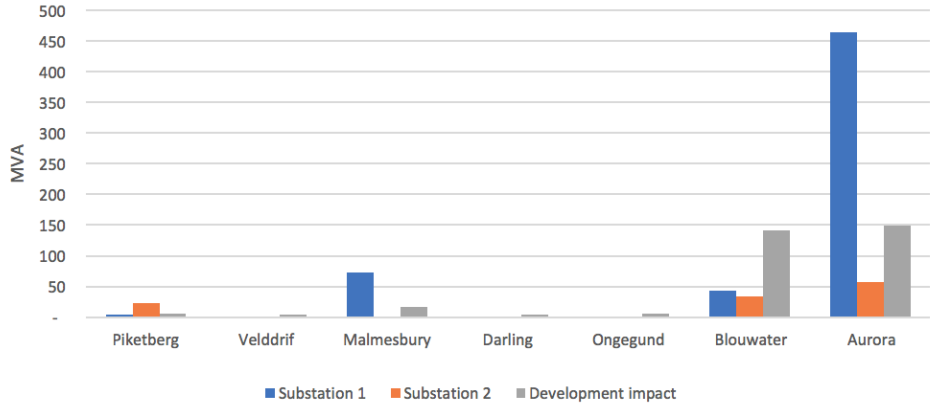


Figure 20. Substation load capacity and estimated additional demand (Data source: Eskom Western Cape West Coast Master Plan: load forecasting, 2011)

6. Solid waste

6.1. Current solid waste disposal infrastructure

Solid waste can be broadly characterised as general municipal/domestic waste and/or hazardous waste. It is generally true that all municipal waste would be transferred to a facility where it can be separated, recovered, treated or disposed of at the municipal waste disposal facility whilst the hazardous waste would be transferred to an appropriate authorised hazardous waste management facility where it will be recycled, treated or disposed of appropriately. The registration and certification of hazardous waste transporters, and the establishment and control of hazardous waste collection facilities is a provincial responsibility.

The approach to municipal solid waste has changed significantly over the past 3 decades, with an increasing shift from disposal, to a waste minimisation approach. Waste minimisation is to be achieved through a combination of reduced waste production at source, re-use, recycling, composting, with disposal into a landfill as the option of last resort. **The current policy target within the province is to divert 20% of waste from landfills by 2019.**

Many of the current waste disposal facilities are currently at or nearing capacity, and several regional waste disposal facilities are under investigation, particularly in Saldanha/Vredenburg, and the Riebeek Valley. Bergrivier LM is currently transporting their waste to transfer stations from where it is transported to authorised waste disposal facilities in the Swartland and Saldanha Bay Municipalities in accordance with agreement concluded with these Municipalities. Bergrivier is therefore concerned with the reduction of waste transportation costs, which is being done through the minimisation of waste to be transported be separating waste at source and the recovery of waste material for recycling. Previous waste disposal facilities associated with their smaller town have now been closed, and have been granted closure authorisations by the Department of Environmental Affairs and Development Planning (DEADP), but the rehabilitation costs of these sites remain a challenge.

Consideration is being given to establishing regional site/s adjacent to rail infrastructure to reduce operational costs and energy requirements associated with the need for road freight (e.g. at Kalbaskraal).

Waste received at the transfer stations at Piketberg, Aurora, Velddrif and Porterville in the **Berg River LM**, is transported to authorised waste disposal facilities in the Swartland and Saldanha Bay Municipality in accordance with agreements concluded with these Municipalities.

Table 7. Current list of municipal waste disposal facilities (WDF) in the GSR (WCG:DEADP, 2016)

Municipality	Facility
	Operating Landfills
Saldanha Bay	Vredenburg (also receives waste from Velddrif in Bergrivier LM)
Swartland	Darling
	Highlands. WDF operated by Swartland LM has a 30 year life-span (near Malmesbury, receives waste from Piketberg, Porterville and Aurora in Bergrivier LM). In 2016 it was estimated to have available airspace to 2048.
	Moorreesburg
	Landfills to be Decommissioned
Bergrivier	Aurora, Piketberg, Porterville, Velddrif
Saldanha Bay	Hopefield 1&2, Kalkrug, Langebaan
Swartland	Koringberg, Riebeeck Kasteel, Riebeeck West, Yzerfontein
	Storage Facilities
Bergrivier	Aurora and Porterville Drop-off facilities
	Piketberg and Velddrif RTS
Saldanha Bay	Diasville, Hopefield and Laingville drop-off facilities
Swartland	Chatsworth, Kalbaskraal, Riebeek Kasteel Drop-off facilities
	Moorreesburg RTS
	Diversion Facilities
Bergrivier	Piketberg and Velddrif Materials Recovery Facility (MRF)
Saldanha	Vredenburg MRF

In 2012 the Vredenburg WDF was expected to reach maximum capacity in four to five years, or approximately 2016/17.

All **hazardous waste** generated in the GSR is currently transported by road to the Vissershok regional hazardous waste facility to the south. The additional quantities of hazardous waste expected to be generated by the proposed developments amounts to approximately an additional 10,000 tons per annum, assuming all of the proposed projects proceed. Most of the hazardous waste (70%) is anticipated to come from the IDZ and back-of port area, so the total potential future hazardous waste volumes are very sensitive to the rollout and success of the IDZ. The current assumption is that the privately managed hazardous waste site at Vissershok will be able to expand to accommodate the projected increase in hazardous waste volumes (equivalent to approximately 15% of volumes in 2007). It is recommended that a pre-feasibility analysis be conducted of the desirability of constructing a local hazardous waste facility within the SBM, versus trucking of hazardous waste to the private facility at Vissershok.

6.2. Development demand projections

The estimated additional solid waste generated by the identified projects is roughly similar in proportional profile between the municipalities as for the other services assessed, as shown in Figure 21.

In terms of municipal solid waste, none of the proposed industrial projects appear to generate significantly more waste than any other, and thus the waste infrastructure is not sensitive to the timing of industrial development. **The municipal waste minimisation strategy will be of great significance in determining the need for future waste handling facilities.**

The Saldanha projects will have the largest impact with an additional 22 700 tons of solid waste generated per annum, which is approximately 50% of the total waste disposed of in 2012.

The projects in Swartland are estimated to generate an additional 3 800 tons per annum, with 58% of this originating from the projects located in Malmesbury.

The Bergrivier projects are projected to generate an additional 1 400 tons of solid waste per annum.

6.2.1. Current landfill utilisation

As stated, Bergrivier Municipality disposes its general solid waste at the Highlands and Vredenburg WDFs via the transfer stations at Piketberg and Velddrif respectively.

Saldanha Bay Municipality disposes general solid waste at the Vredenburg and Langebaan WDFs however the municipality is planning to close the Langebaan site and the Vredenburg site is approaching capacity. The Vredenburg WDF is currently planned to be extended with the construction of a new cell.

Swartland Municipality disposes of its general solid waste at the Highlands landfill near Malmesbury which is expected to have sufficient airspace capacity to accommodate solid waste disposal until 2048.

Figure 22 shows the annual tonnage disposal by each municipality to the Highlands and Vredenburg landfills. Currently Bergrivier transfers 3 900 tons to the Highlands WDF per annum and 2 700 tons to the Vredenburg site. Swartland disposes of 3 1 00 tons per annum at the Highlands WDF and Saldanha Bay disposes 22 700 tons per annum at Vredenburg.

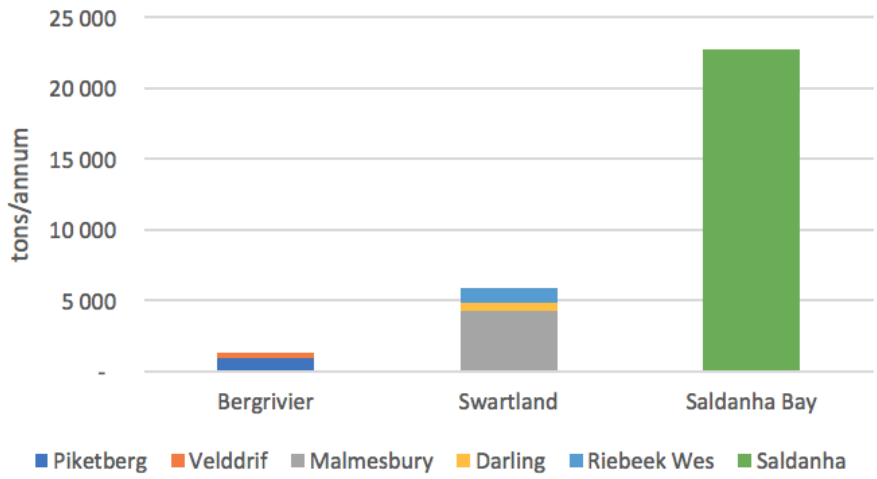


Figure 21. Projected solid waste generation

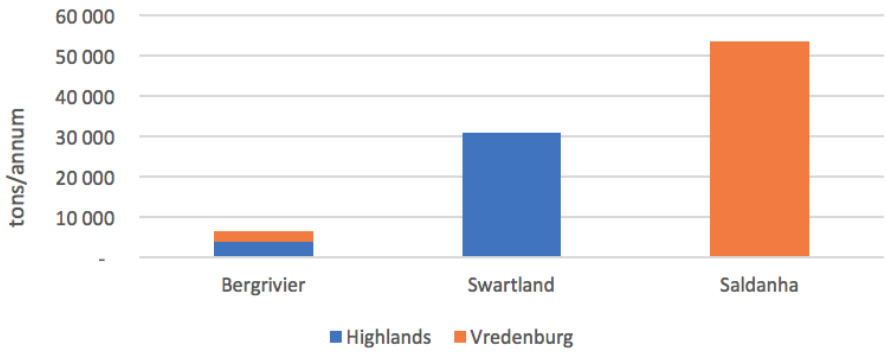


Figure 22. Destination of current landfill waste by municipality (Department of Environmental Affairs and Development Planning, 2016)

Saldanha Bay Municipality generated 1,111 tons per week of general domestic waste in 2012(Saldanha Bay Municipality, 2012), or approximately 57,000 tons per annum. However, this figure now appears to be substantially lower, around 22,000 tons per annum. The SBM has overseen a 2% decrease in the amount of waste disposed of annually at the Vredenburg WDF site under their waste minimisation plan (Saldanha Bay Municipality, 2013).

6.3. Capacity impacts

Given the current status of the Langebaan WDF closure and the extension of the Vredenburg site it was assumed that all additional solid waste generated by the identified projects located in Saldanha will be disposed at the Vredenburg site. Additionally, it was assumed that Bergrivier solid waste generated through the identified projects will be transferred to the Highlands and Vredenburg WDF proportionately to the current distribution of 59% and 41% respectively. All additional waste generated by the Swartland projects is assumed to be disposed of at the Highlands WDF.

The impacts of the additional solid waste generation can be seen Figure 23 which indicates the additional solid waste each WDF will receive per annum. Highlands is projected to need to accommodate an additional 6 669 tons per annum, equivalent to 19% of current annual transfers. Vredenburg is estimated to require additional capacity of 23 311 tons per annum to accommodate the identified projects. This is equivalent to an additional 41% per annum solid waste disposal to the site.

6.4. Regional solid waste implications

Given the regional nature of this analysis, the focus has been on regional level waste infrastructure. This has been defined as activities which require transport across a municipal boundary and regional cooperation. For this reason, the solid waste handling activities discussed in this report do not address the full range of waste activities which individual municipalities are responsible for, or the upgrade requirements at the level of each individual facilities identified in the WCG assessment of municipal waste infrastructure released in 2016. However, it is important to note that the success of local (and national) waste minimisation strategies and activities will affect the volumes of waste which need to be dealt with on a regional basis.

Table 8. Current waste volumes (WCG:DEADP, 2016)

Municipality	Waste quantities handled at municipal facilities (tons/annum)
Bergrivier	11,696 (2014 data)
Saldanha Bay	53,552 (2011 data)
Swartland	31,010 (2016 data)

The Vredenburg landfill has been identified as a potential district solid WDF, but this will require upgrading to meet environmental requirements. The only other current alternative for conventional disposal is for municipal solid waste to be trucked to the potential new regional landfill at Kalbaskraal (this is a City of Cape Town project that is about 115 km south-east of Saldanha). The need for a solid waste transfer station has been identified. However, other waste disposal and minimisation strategies are still in consideration[10].

Regional solutions are already employed to service the solid waste generated by Bergrivier Municipality demonstrating that such an inter-municipal operation is feasible. However, the landfills currently servicing Saldanha Bay are inadequate for current waste generations levels let alone for additional growth, unless swift expansion of the Vredenburg site occurs.

Additional regional utilisation could potentially be a solution to this however the impact on current waste handling practices would be significant. As a demonstration, if it is assumed that all additional solid waste generated by the identified projects was diverted to the Highlands landfill, it would represent an 80% increase in solid waste received at the site relative to current disposal. This would significantly shorten the currently expected 2048 capacity of the site. Therefore, in the medium to long term it is likely necessary that an alternative solution is identified.

The challenge for the establishment of thermal energy facilities and introduction of waste-to-energy technologies is securing enough waste, which suggests that municipalities should seek regional economies of scale through collaboration. The proposed Cape Town and Drakenstein waste to energy facilities both provide opportunities in this regard.

It is recommended that a **pre-feasibility analysis be conducted of the desirability of constructing a local hazardous waste facility** within the SBM, versus trucking of hazardous waste to the private facility at Vissershok.

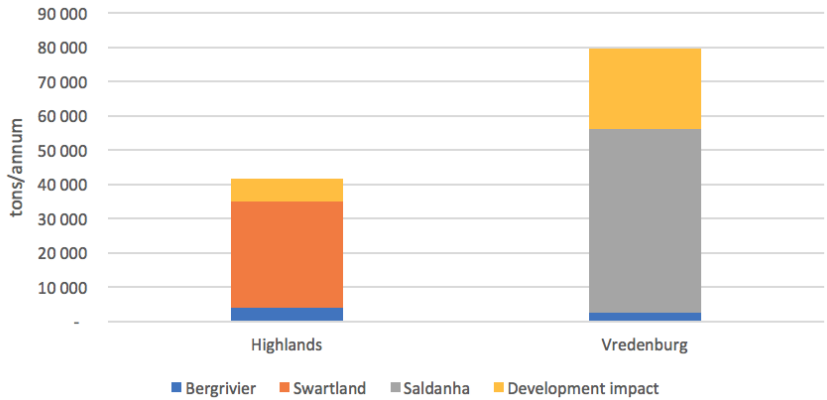


Figure 23. Development impact relative to current WDF utilisation

10 Personal communication, E. Hanekom, 30 March 2017

7. Regional summary and implications

Overview

The intention of this exercise was to identify potential limitations or delays which individual projects might face in the region as a result of cumulative impacts on bulk infrastructure in the areas. The potential new developments identified in the West Coast region of Bergrivier, Swartland and Saldanha Bay represent significant infrastructural demand relative to the current baseline. Accommodating growth of this relative magnitude will require astute forward financial and civil planning, investment in bulk services and integrated implementation by all spheres of government operating in the region.

Most expected growth is primarily centred around the town of Saldanha however the research conducted shows that Bergrivier and Swartland municipalities are expected to have relatively significant infrastructural demand growth locally too. In the context of already constrained local bulk infrastructure systems at the municipal level, spill over effects of rapid growth in urban centres may impact on regional bulk infrastructure systems. As such if the expected exponential growth of Saldanha Bay is not adequately and timeously accommodated by bulk systems capacity growth it could potentially curtail growth or have wider bulk impacts which negatively effect surrounding municipalities.

Given the dynamics that drive private sector market demand, from international economic flows to interregional competition and sector specific changes, it is not possible to project with certainty whether these projects will inevitably be completed let alone the scale at which they will finally occur. The estimates are based on current available information and are indicative of the potential demand that could be placed on regional bulk infrastructure.

Water Resource Demand

Currently the most regionally constrained bulk service in the West Coast region is the availability of water resources. The region has already exceeded its resource allocation from the WCWSS and increased allocation applications are currently being assessed. This issue goes beyond the boundaries of this study though and requires a broad assessment of the entire Berg Water Management Area. However, the future projects considered in this report will place substantial additional pressure on regional water systems with the total additional quantum representing 27% of the current Withoogte and Swartland cumulative system allocations. This does not currently include the Elandsfontein phase 2 back-of-port limestone processing project due to its unknown status, however this project would represent a 29% of the current cumulative allocation alone. This shows that large high intensity singular projects can have significant ramifications for regional bulk demand and in the currently constrained environment must be viewed from a regional perspective.

It must be stressed that the greatest challenge to development and even the current baseline in the region is the significant current water supply deficit. To address this several coordinated interventions must be pursued. These include water demand management programmes for current users, water efficient systems for future developments, the investigation of new and alternative regional water sources, and the enhancement of current bulk supply infrastructure. Such interventions are required to meet a business as usual baseline development scenario, let alone the additional demand forecast in this report.

Bulk water infrastructure

Beyond the constraints of resource allocation, treatment capacity appears to be a relatively smaller concern at the regional scale. Despite this, it is projected that the Withoogte treatment works demand will exceed available capacity if all the considered projects (excluding Elandsfontein phase 2) were to be implemented. Therefore, assuming the issue of system water allocation is addressed, **additional bulk capacity at Withoogte WTW would be required**. Both the Swartland and Piketberg treatment works are projected to have sufficient treatment capacity to accommodate the anticipated additional demand.

In terms of alternative supply options, given the current drought affecting the entire WCWSS and rapidly developing policy it is difficult to predict what the ultimate supply solutions will be. However, **desalination** has been proposed as an option within Saldanha. While this would reduce demand on Withoogte, it is important to note that this option is very energy intensive, and the local Blouwater substation would require significant upgrading before this option is possible within the region.

Wastewater treatment

Impacts of inadequate treatment can have regional environmental and thereby economic implications. However, **there is adequate bulk wastewater treatment capacity to accommodate the identified projects in the three municipalities,** particularly considering the new Riebeek Valley WWTW which has accommodated the capacity deficit in Ongegund and Riebeek West. The volume of wastewater generated, and thereby necessary treatment capacity, is also contingent on the allocations of water from the WCWSS being increased in the future.

Bulk Electrical Infrastructure

The largest bulk regional electrical infrastructural component relating to the distribution capacity of the region, the Aurora substation, is estimated to have surplus capacity to accommodate the load demands of the identified projects. However, at the local scale, according to the Eskom West Coast Masterplan projections, the projects located in three of the towns could not be accommodated in the immediate term.

The greatest current obstacle to growth within the Saldanha region is the planned upgrading of the Blouwater substation, which is only planned for 2022 and beyond. While the immediate effects of this delayed system strengthening will be to impede development at the local level, it could have negative regional growth impacts through the reduction in spillover effects. Further, if the Aurora MTS were to become constrained, due to demand or supply changes, this would certainly have a wide reaching regional impact on development and economic growth.

Solid waste management infrastructure

The identified projects represent a 33% increase in current cumulative waste transferred to the Highlands and Vredenburg landfills. This significant increase will have large impacts on the already constrained landfills and additional capacity will be required to accommodate these. Although solid waste is a local government mandate and commonly conceived of as a localised infrastructure without regional implications, it is in fact possibly the best contender for regional shared services model in the West Coast. This solution is already being employed in Bergrivier municipality, which transfers its waste to both the Highlands and Vredenburg sites, therefore the potential for broadening such a model to accommodate future demand is evident and likely necessary.

The municipal and broader national waste minimisation strategies will be of great significance in determining the need for future waste handling facilities in the region.

The challenge for the establishment of thermal energy facilities and introduction of waste-to-energy technologies is securing enough waste, which suggests that municipalities should seek regional economies of scale through collaboration. The proposed Cape Town and Drakenstein waste to energy facilities both provide opportunities in this regard.

It is recommended that a pre-feasibility analysis be conducted of the desirability of constructing a local hazardous waste facility within the SBM, versus trucking of hazardous waste to the private facility at Vissershok.

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