

## **Makana Municipality**

*Alicedale 338 Housing Project*

### **CIVIL SERVICES FEASIBILITY REPORT**

**21 September 2012**



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## 1. INTRODUCTION

### 1.1 Executive Summary

The Makana Municipality intends to develop 338 houses in Alicedale in order to address the current housing shortage in that town. The Municipality intends to apply for funding from the Department of Housing and has appointed Settlement Planning Services, (Setplan), to prepare the township establishment up to General Plan stage.

Setplan has appointed MBB Consulting Services (EC) Inc, (MBB), to investigate and report on the availability and adequacy of civil services to enable the proposed development to proceed. This report presents the findings of the investigations and discusses the current availability of the services, whether or not their current capacity is sufficient and if there are shortfalls in capacity what plans or proposals are in place to address these shortfalls, complete with broad cost estimates to upgrade the services to create the required capacity.

This report was compiled following desktop studies, interviews with the Makana Municipality officials responsible for the various services as well as site inspections at Alicedale.

The services investigated include the access road, stormwater, water, sewerage, electricity, and solid waste. A statement on the geotechnical suitability of the selected housing site is also included in the report.

Included as **Annexures** are the documents demonstrating the availability of the services as per the utility responsible for the provision of the services.

### 1.2 Location of the Site

Alicedale is a small rural town located approximately 50km to the west of Grahamstown. The main access to Alicedale is via the N2 national road linking Grahamstown to Port Elizabeth. Alicedale falls under the jurisdiction of the Makana Local Municipality under the Cacadu District Municipality. Refer to locality map below.



The site selected for the proposed 338 new housing scheme lies to the south of the existing Transvrie and Mandela Park townships of Alicedale. It is anticipated that the services to this new housing development will be linked or connected to those serving the existing townships.



## 2. SERVICES FEASIBILITY REPORT

### 2.1 WATER

The source of raw water supply to Alicedale is the New Yearsday dam built on the New Yearsday River. The raw water is gravity fed from the dam to the water treatment plant located to the west of the town where it is treated and pumped to various storage reservoirs located at various sites within the town from where it is then reticulated to the different supply zones. The new 338 houses have an average annual daily water demand of 205m<sup>3</sup>/day. The Department of Water Affairs has established that the raw water source is adequate to meet the water demand exerted by the new housing project, refer to **Annexure A**.

The Makana Municipality has confirmed that the existing water treatment plant with a design capacity of 2Ml/day and has a current throughput of 1Ml/day has enough capacity to meet the water demand expected to be generated by the new housing scheme without any upgrading being required.

Due to the elevation of the new housing site in relation to the existing water storage reservoirs it will be necessary to construct a new water storage reservoir at an elevation that is high enough to gravity feed all the areas of the new housing site. Water will be pumped to the the new reservoir from the pumping station on the banks of the Bushman's River adjacent to the road M367.

A site for the new reservoir was identified in 2008 but is located on state land that needs to be transferred to the Makana Municipality prior to the construction of the reservoir. The capacity of the reservoir will be 750Kl to allow for current water demand, growth in water demand as well as for fire fighting. The cost of the new reservoir, pumping plant and pumping mains is estimated at R1.5m. This proposed upgrade is not yet on the Municipality's IDP.

The schematic layout of the new water pumping main and reservoir is as shown on the sketch drawing below.



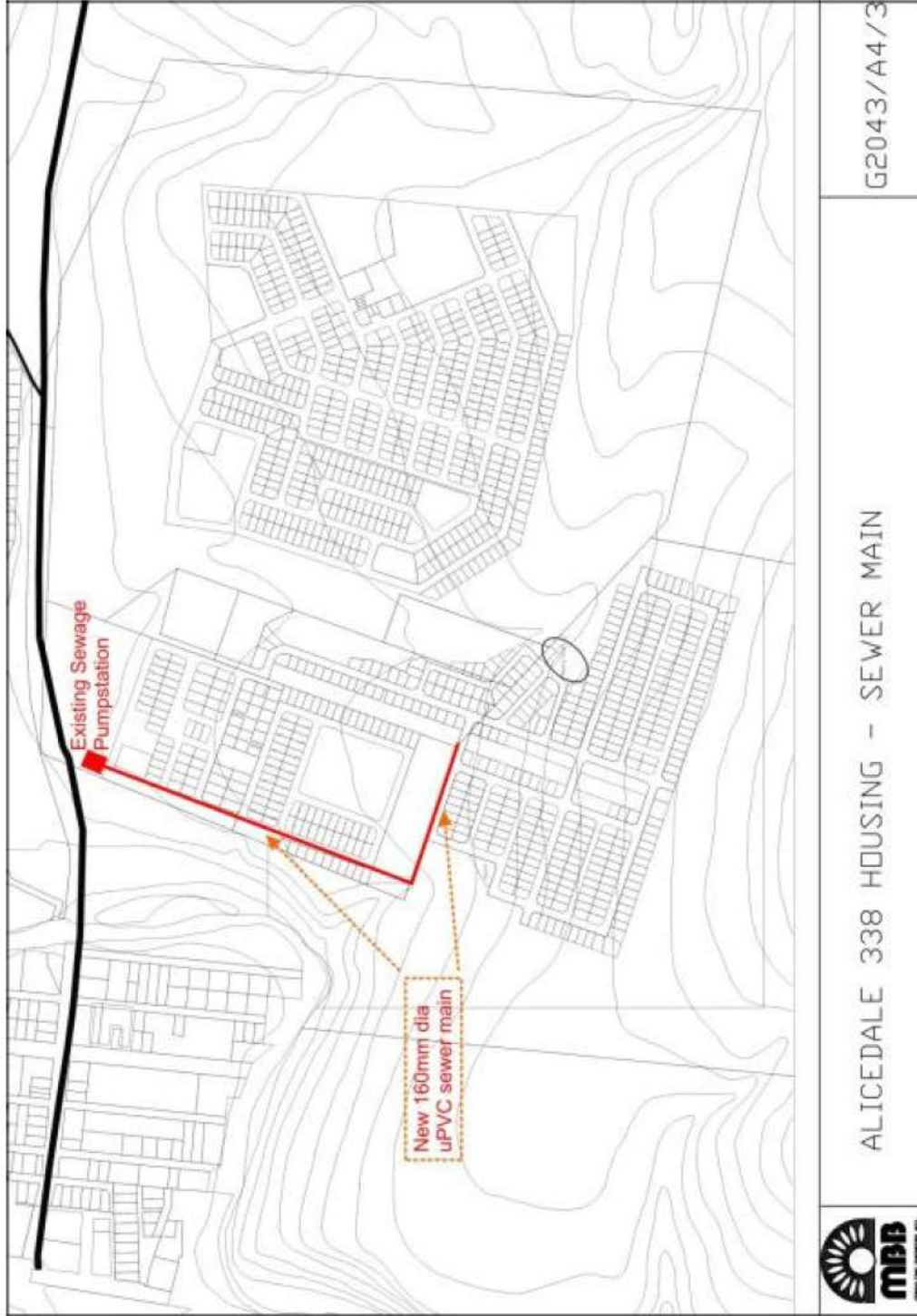
Layout 1 - Sketch drawing showing the location of the new water main and reservoir.

## 2.2 SEWERAGE

The average dry weather sewage expected to be generated by the new housing scheme is estimated at 205 cubic metres per day (or 2.4 litres per second). This sewage will collect from the erven to a 160mm diameter sewer main and gravity fed to the existing sewage pump station located immediately to the north of Transriviere township from which it will be pumped through an existing 160mm diameter sewage pumping main to the town's sewage treatment works located to the east of the Kwanonzwakazi township.

The ponding system currently used to treat the sewage is presently being upgraded to the extended aeration system. The upgraded works were designed and built to accommodate the sewage from the new housing scheme, Refer to Worley Parsons Technical Report, **Annexure B**. It is expected that the upgrading of the sewage treatment works will be completed and commissioned by the end of November 2012.

Refer to sketch drawing below showing the schematic layout of the proposed sewer outfall.



*Layout 2* - Sketch drawing showing the location of the sewer main from the development to the pumpstation



### 2.3 SOLID WASTE

The domestic solid waste generated from the new housing scheme is estimated at 7m<sup>3</sup> per day. Currently the domestic solid waste from Alicedale is collected by the Makana Municipality for disposal at the solid waste facility located at an old disused quarry situated about 1km to the west of Alicedale. The waste disposal site is licenced as a Class G:C:B and has an estimated life of 30years left. The domestic waste generated in the new housing scheme will be easily accommodated at the existing waste disposal facility.

Refer below to the photograph of the Alicedale solid waste disposal site.



**Photo 1** - Photograph of the existing Alicedale Solid Waste disposal site.

## 2.4 ELECTRICITY

The electricity demand for the new housing scheme is estimated at 600kVA.

Eskom, who currently supply electricity to Alicedale, were approached for information regarding the adequacy of the existing electricity network to meet the electricity demand generated by the new housing scheme and have confirmed that there is enough electricity to supply the new 338 houses. Refer to **Annexure C**.

However during the inspection of the site it was noticed that electricity is already being provided to the informal dwellings that have been erected over half of the proposed 338 housing scheme site. Refer to photographs below.



**Photo 2a** - Electricity infrastructure supplying informal dwellings erected on the site of the proposed 338 houses

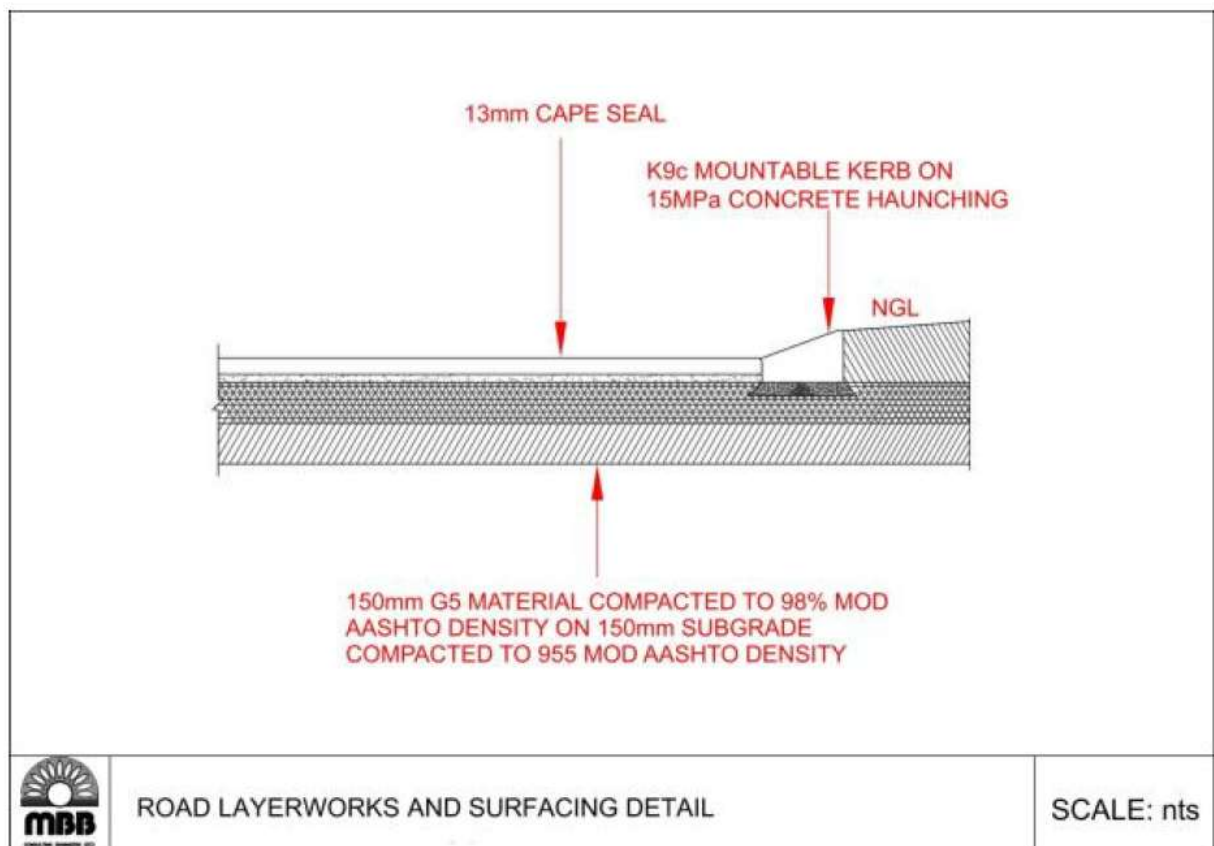


**Photo 2b** - Electricity infrastructure supplying informal dwellings erected on the site of the proposed 338 houses

## **2.5 ACCESS ROAD AND STORMWATER MANAGEMENT**

The access to the new housing scheme will be an extension of the existing bitumen surfaced 5m wide road linking the Mandela Park and Transriviere townships to the R346 road. The existing road will be adequate to service the expected vehicular traffic to the new housing scheme.

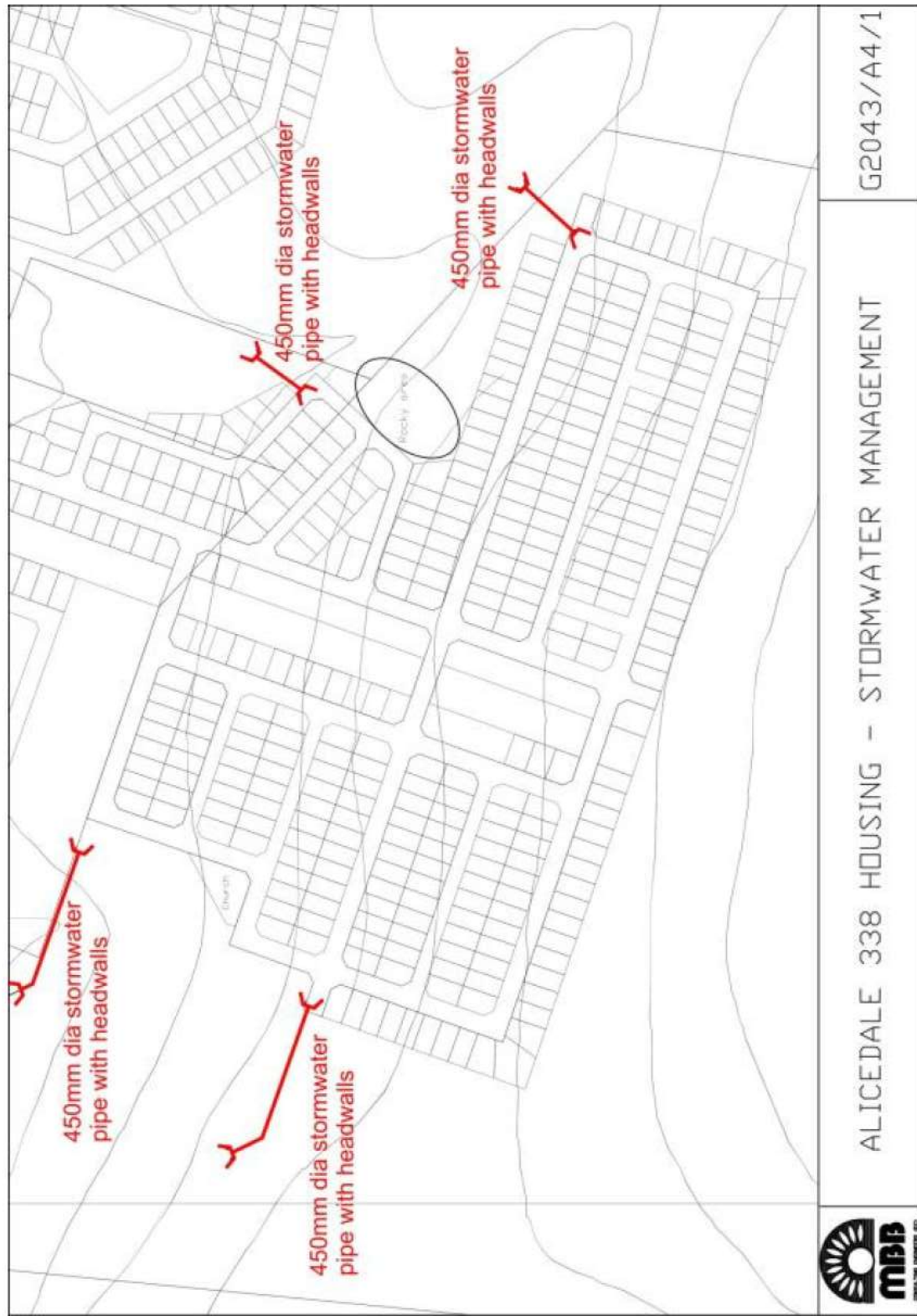
The housing scheme's internal roads will be 4.5m wide, bitumen surfaced on designed and constructed layerworks, as shown on the sketch drawing below.



**Detail 1** - Preliminary Sketch Drawing of the Internal Roads

The stormwater emanating from the scheme will collect into stormwater channels constructed along the roads and will be piped and discharged into a watercourse flowing to the west of the scheme into the Bushmans River. Refer to sketch drawing on the following page for the stormwater disposal.





Layout 3 – Stormwater Management

## 2.6 GEOTECHNICAL REPORT

The Geological Map (3326 Grahamstown 1:250 000 Geological Series) shows that most of Alicedale, including the site of the proposed housing scheme, is underlain by quartzitic sandstones and hence the geological make up of the site does not pose a fatal flaw that might militate against the building of the houses on the site. However a more detailed geotechnical investigation will need to be carried out in order to inform the foundation designs. A visual inspection of the site revealed the housing site is stone littered with weathered rock near the surface. Refer to Photographs below.



**Photo 3a** - Proposed Housing Site showing rock close to the ground surface



**Photo 3b** - Proposed Housing Site showing rock close to the ground surface

### 3. CONCLUSION

The capacity of the existing civil services is adequate, with minimal upgrading, to accommodate the development of the proposed 338 low cost houses in Alicedale.

*L Mafuma*

21 September 2012

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L Mafuma.



ANNEXURE A – DWAF Letter

7. OCT. 2005 (FRI) 12:24 DEPT. WATER AFFAIRS

048 861 3545

PAGE: 2

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DEPARTMENT: WATER AFFAIRS AND FORESTRY: EASTERN CAPE  
Private Bag X 7455, King William's Town

7 October 2005

Environmental Officer: EIM  
Department of Economic Affairs, Environment and Tourism  
Chief Directorate: Environmental Affairs  
Private Bag X5001  
GREENACRES  
6057

Attention: Funeka Nxesi

**CHANGE OF LAND USE: LOW COST HOUSING DEVELOPMENT IN  
ALICEDALE**

Please refer to your letter dated 27 September 2005, Ref. EC04/2c/63-04, to ACER (Africa) in Grahamstown. In the letter you question the sufficiency of the water resource to supply the proposed development.

According to information available to this Department, Alicedale is supplied by the New Years Dam, which has a storage capacity of 4,5 million cubic meters of water and a yield of 3,28 cubic meters per annum. If the water requirement by the year 2021 is 0,542 million cubic meters per annum, according to information supplied, it is evident that there should be enough water to sustain the proposed development.

Yours faithfully,



CLUSTER MANAGER: SOUTHERN CLUSTER

cc. MBB Consulting Services (EC) INC, P.O. Box 509, Grahamstown, 6140  
(Attention: Mr. Luke Mafuma)

Viva water pure and clean! - Viva forests rich and green!



ANNEXURE B – WORLEY PARSONS REPORT



**WorleyParsons**

resources & energy

EcoNomics

MAKANA MUNICIPALITY



**TECHNICAL REPORT FOR THE  
UPGRADING OF ALICEDALE  
WASTEWATER TREATMENT WORKS  
PHASE 2**

17/2010

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**Incorporating KV3 ENGINEERS**



## MAKANA MUNICIPALITY

### TECHNICAL REPORT FOR THE UPGRADING OF ALICEDALE WASTEWATER TREATMENT WORKS PHASE 2

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**MAKANA MUNICIPALITY  
TECHNICAL REPORT FOR THE UPGRADING OF ALICEDALE WASTEWATER TREATMENT WORKS  
PHASE 2**

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## 1. INTRODUCTION

The Makana Municipality appointed WorleyParsons RSA to investigate the Alicedale Wastewater Treatment Works (WWTW) in terms of capacity and ability to treat the sewage demands of Alicedale, Transriviere and Kwanonzwakazi in the long term (15 year horizon). A report was compiled in November 2004 in support of a MIG application for funds to upgrade the WWTW.

Due to insufficient MIG funds to complete the project, the Makana Municipality used counter funding to the value of R5,000,000.00 to complete the project. The main purpose of Phase 2 of the Alicedale WWTW is to re-claim the R5,000,000.00 from MIG, as well as to apply for R2,500,000.00 for the lining of the existing ponds and the sinking of a groundwater monitoring borehole, both of which are requirements of the RoD.

## 2. PROJECT LOCATION

The town of Alicedale, as well as the nearby neighbourhoods of Transriviere and Kwanonzwakazi, is situated at the confluence of the New Years and Bushmans Rivers approximately 110km from Port Elizabeth in the Eastern Cape. Access to the area is via a gravel road from the N10 national highway between Paterson and the Olifantskop Pass. The gravel road (Main Road 476) runs through Alicedale, past Transriviere and Kwanonzwakazi and joins the national N2 highway to Grahamstown.

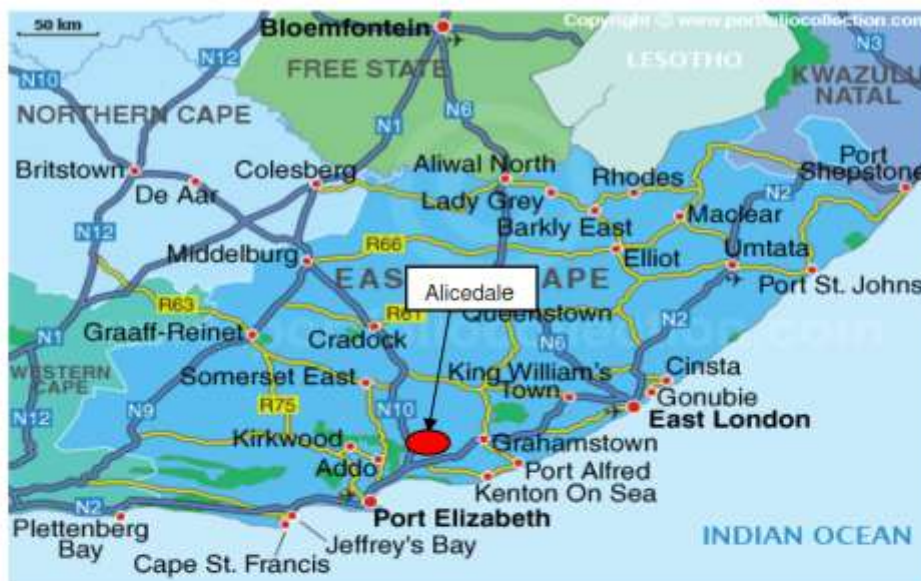


Figure 1: Locality Plan.

The Alicedale Wastewater Treatment Works (WWTW) is located north east of Kwanonzwakazi between the MR 476 gravel road and the adjacent New Years River as shown in **Figure 2**.





### 3. PURPOSE

The purpose of this technical report is to provide details of the existing pond system, to calculate the estimated future sewage flow and organic loads to the works and to suggest a proposed upgrade strategy in line with the long term expected population growth of the area draining to this facility. A preliminary process design, followed by conceptual civil, mechanical and electrical design defined the proposed scope of the upgrading work, complete with cost estimates.

The Makana Municipality previously used top-up funding to the value of R5 million to ensure sufficient funding for the project. Phase 2 of the project is to claim back the R5 million from MIG, as well as to line the ponds and to sink a monitoring borehole.

### 4. AIMS AND OBJECTIVES

The aims and objectives of the proposed upgrading of the Alicedale WWTW are:

- To provide an adequate wastewater treatment facility for Alicedale, Transriviere and Kwanonzwakazi within the context of long term population growth and expected future housing schemes.
- To create job opportunities:
  - during construction, training in labour based construction techniques will assist emerging contractors.

- after completion, staffing will be required for efficient operation and maintenance of the upgraded facility.
- To promote a culture of reconstruction and development through community participation in the planning and implementation of the project.

## 5. EXISTING WASTEWATER TREATMENT WORKS

The existing WWTW serving the area is an oxidation pond system comprising of a wash through facility where vacuum tankers can discharge their loads, a venturi flow meter at the inlet and 2 no. ponds. The first pond has an approximate surface area of 5300m<sup>2</sup> and the second pond an area of 9600m<sup>2</sup>.

There is a hand sluice at the inlet to the ponds that allows flows to be diverted to either of the ponds. Currently sewage enters the first pond and overflows into the second pond which has an overflow to a low-lying area south of the N12 road.

The facility receives raw sewage via a gravity outfall sewer and tanker content from various conservancy tanks as well as septic tank/french drain on site systems in the town.

## 6. POPULATION

### 6.1 EXISTING POPULATION

The current population of the area draining to the existing Alicedale pond system was calculated by identifying different income groups and types of accommodation within the area as per the existing erven layout. It is estimated that there are currently 5453 permanent residents (see Table 1) in Alicedale, Transriviere and Kwanonzwakazi.

The area comprises of low density housing in Alicedale, with medium and low income housing in Transriviere and Kwanonzwakazi. The low income areas consist mostly of RDP houses, many of which currently accommodates backyard dwelling.

Except for 85 erven in Alicedale (which are served by conservancy tanks or septic tank/french drain systems), all houses in the area, including the golf estate, are connected to the sewerage network. The distribution of the estimated existing population is shown in Table 1 below:

**Table 1: Estimated Existing Population**

Description of Area	Income Group	No. of erven	people/erf	Population
Alicedale (connected)	High	130	4	520
Transriviere North	Med	73	5	365
Transriviere Central	Low	81	6	486

Kwanonzwakazi East	Low	367	6	2202
Transriviere RDP houses*	Low*	60	7	420
Kwanonzwakazi RDP houses*	Low*	160	7	1120
Alicedale (not connected)	High	85	4	340
<b>Total:</b>		<b>956</b>		<b>5453</b>

\* assume backyard dwelling at RDP houses

## 6.2 PROPOSED DEVELOPMENTS

A proposed low income housing scheme comprising of 216 RDP houses (confirmed by Makana Municipality, fax dating 24<sup>th</sup> July 2007) are planned as part of an initiative to provide housing and eradicate backyard dwelling in the areas of Transriviere and Kwanonzwakazi. There are also 20 plots available in Alicedale for the development of high income houses.

The estimated capacity of the proposed developments mentioned above is shown in Table 2 below:

**Table 2: Capacity of Proposed Developments**

Description of Area	Income Group	No. of erven	people/erf	Capacity
RDP houses	Low	216	6	1296
Alicedale	High	20	4	80
<b>Total:</b>		<b>236</b>		<b>1376</b>

## 6.3 TOURIST ACCOMMODATION

The recently built Bushman Sands Country Estate is situated to the north of Alicedale and comprises of an 18-hole golf course and 198 residential units. Associated infrastructure includes the Bushman Sands Hotel and staff quarters (or student housing). By all indications, this estate is very popular tourist destination and seems to be fully occupied during holidays, long weekends and the festive season.

The capacities of the above mentioned accommodation is shown in Table 3 below:

**Table 3: Capacity of Tourist Accommodation**

Description	No. of units	people/unit	Capacity
Golf Estate residential units	198	4	792
Bushman Sands Hotel	42	2	84
Student housing	3	10	30
<b>Total Capacity:</b>	<b>243</b>		<b>906</b>



## 6.4 FULLY DEVELOPED POPULATION

The capacity of currently proposed developments calculated in Table 2 (1376 people) can be added to the existing population calculated in Table 1 (5453 people) to give a future permanent population of 6829. Assuming a conservative occupation rate of the proposed development (1.5% per annum), this permanent population will be reached in 2022 which equates to a 15 year design horizon.

The total capacity of tourist accommodation in the area calculated in Table 3 (906 people) can be added to the future permanent population (6829 people) which gives an ultimate population figure of 7735 people. The proposed upgrading of the Alicedale WWTW will therefore be based on this population figure, but the approach to achieve the capacity will allow for a modular upgrade approach that may be suited for a shorter design horizon if so required by planning and budgetary constraints.

## 7. SEWAGE FLOW

No accurate flow measurements for the WWTW could be obtained and therefore sewage flows were calculated as a percentage of the estimated daily water demand per person for each income group.

### 7.1 PRESENT HYDRAULIC LOAD

The present sewage flows are estimated as shown in Table 4 below:

**Table 4: Estimated Present Hydraulic Load (m<sup>3</sup>/day)**

Income Group	Population	Water demand (ℓ/p/d)	% of water demand as sewage	Sewage flow (ℓ/p/d)	Total sewage flow (m <sup>3</sup> /d)
High Income	520	200	80	160	83.2
Medium Income	365	150	80	120	43.8
Low Income	2688	100	85	85	228.5
Low Income*	1540	80	90	72	110.9
High Income**	340	200	50	120	34.0
<b>Total:</b>	<b>5453</b>				<b>500.4</b>

\* RDP houses with backyard dwellers

\*\* served by septic tanks and french drains



## 7.2 HYDRAULIC LOAD OF PROPOSED DEVELOPMENTS

It is anticipated that any new developments will be served by a full waterborne sanitation system. The estimated sewage flow from proposed developments and housing schemes in the area is shown in **Table 5** below:

**Table 5: Estimated Hydraulic Load of Proposed Developments (m<sup>3</sup>/day)**

Income Group	Capacity	Water demand (ℓ/p/d)	% of water demand as sewage	Sewage flow (ℓ/p/d)	Total sewage flow (m <sup>3</sup> /d)
Low Income	1296	100	90	90	116.6
High Income	80	200	80	160	12.8
<b>Total:</b>	<b>1376</b>				<b>129.4</b>

## 7.3 HYDRAULIC LOAD OF TOURIST ACCOMMODATION

The sewage flow from tourist accommodation within Alicedale is estimated as shown in Table 6 below:

**Table 6: Estimated Hydraulic Load of Tourist Accommodation (m<sup>3</sup>/day)**

Description	Capacity	Water demand (ℓ/p/d)	% of water demand as sewage	Sewage flow (ℓ/p/d)	Total sewage flow (m <sup>3</sup> /d)
Golf Estate units	792	250	90	225	178.2
Bushman Sands Hotel	84	220	100	220	18.5
Student housing	30	150	90	135	4.1
<b>Total:</b>	<b>906</b>				<b>200.7</b>

## 7.4 ULTIMATE HYDRAULIC LOAD

The total sewage flow when Alicedale, Transriviere and Kwanonzwakazi are fully developed is shown in Table 7 below by summation of the hydraulic loads calculated for existing population (Table 4), proposed developments (Table 5) and tourist accommodation (Table 6):

**Table 7: Ultimate Hydraulic Load (m<sup>3</sup>/day)**

Description	Hydraulic Load (m <sup>3</sup> /d)
Existing Population	500.4
Proposed Developments	129.4
Tourist Accommodation	200.7
<b>Total:</b>	<b>830.5</b>

## 8. ORGANIC LOADS

In the absence of reliable data from the WWTW, the organic loadings are based on the generally accepted estimate of 110 g COD/p/d and 12 g TKN/p/d. All sewage treated at the Alicedale WWTW is of domestic origin.

### 8.1 EXISTING ORGANIC LOADS

The present organic loads are estimated as shown in **Table 8** below:

**Table 8: Estimated Present Organic Loads (kg/day)**

Income Group	Population	Contribution (g/p/d)		Organic load (kg/day)	
		COD	TKN	COD	TKN
High Income	860	110	12	94.5	10.3
Medium Income	365	110	12	40.2	4.4
Low Income	2688	110	12	295.7	32.3
Low Income*	1540	110	12	169.4	18.5
<b>Total:</b>	<b>5453</b>			<b>599.8</b>	<b>65.5</b>

\* RDP houses with backyard dwellers

### 8.2 ORGANIC LOADS OF PROPOSED DEVELOPMENTS

The estimated organic loads from proposed developments and housing schemes in the area are shown in Table 9 below:

**Table 9: Estimated Organic Loads of Proposed Developments (kg/day)**

Income Group	Capacity	Contribution (g/p/d)		Organic load (kg/day)	
		COD	TKN	COD	TKN
Low Income	1296	110	12	142.6	15.6
High Income	80	110	12	8.8	1.0
<b>Total:</b>	<b>1376</b>			<b>151.4</b>	<b>16.5</b>

### 8.3 ORGANIC LOADS OF TOURIST ACCOMMODATION

The organic loads from tourist accommodation within Alicedale are estimated as shown in **Table 10** below:

**Table 10: Estimated Hydraulic Load of Tourist Accommodation (kg/day)**

Description	Capacity	Contribution (g/p/d)		Organic load (kg/day)	
		COD	TKN	COD	TKN
Golf Estate units	792	110	12	87.1	9.5
Bushman Sands Hotel	84	110	12	9.3	1.0
Student housing	30	110	12	3.3	0.4
<b>Total:</b>	<b>906</b>			<b>99.7</b>	<b>10.9</b>

### 8.4 ULTIMATE ORGANIC LOADS

The organic loads when Alicedale, Transriviere and Kwanonzwakazi are fully developed are shown in Table 11 below by summation of the hydraulic loads calculated for existing population (Table 8), proposed developments (Table 9) and tourist accommodation (Table 10):

**Table 11: Ultimate Organic Loads (kg/day)**

Description	COD (kg/day)	TKN (kg/day)
Existing Population	599.8	65.5
Proposed Developments	151.4	16.5
Tourist Accommodation	99.7	10.9
<b>Total:</b>	<b>850.9</b>	<b>92.9</b>

## 9. DESIGN CRITERIA

One of the major considerations that must be taken into account during the design or upgrading of a WWTW is the required quality of the final effluent.

According to the provisions of the National Water Act (Act 36 of 1998) (the Act), treated sewage effluent may be returned to a water resource, used for irrigation purposes or recycled, provided that certain minimum quality standards are adhered to.

Authorisation may be granted for the irrigation of between 500 m<sup>3</sup>/day and 2000 m<sup>3</sup>/day provided that the effluent complies with the standards set out in Section 21 (e) of the Act. Effluent up to a maximum of 2000 m<sup>3</sup>/day that is returned to a water resource must comply with the standards set out in Sections 21 (f) and 21 (h) of the Act. The standards for effluent returned to a water resource will either be the General Limit for a non-listed resource or the Special Limit for a listed resource.

It is expected that a licence for the irrigation of between 500 m<sup>3</sup>/day and 2000 m<sup>3</sup>/day (i.e. on the Bushman Sands Golf Course) or for the return of up to 2000 m<sup>3</sup>/day of treated effluent to a water resource (i.e. New Years River) will be granted to the Alicedale WWTW. The default application for the purposes of this report is for discharge to the water course. Potential irrigation will be part of a separate license by Bushmans Sands Golf Course.

## 10. PROPOSED UPGRADING

The estimated future sewage flow ( $\pm 830$  m<sup>3</sup>/day) to the Alicedale WWTW is greater than 500m<sup>3</sup>/day (see **Table 7**). Due to the scarcity of land for pasture irrigation, flood risk to the previously proposed pond system and the quantity of water to be released, it is recommended that the facility be upgraded to an activated sludge system situated east of the existing ponds.

This location is subject to whether the upgrade can be protected, or is above the 1:100 year floodline. The proposed upgrade will consist of an extended aeration system, pumping stations and a chlorine contact channel. The existing ponds will be used as a dedicated sludge holding facility and supernatant will be returned to the extended aeration system. A schematic layout of the proposed design is shown in **Annexure B**.

Due to the relatively small scale of the upgrade, a conventional approach consisting of a Civil Contract and separate Mechanical/Electrical Contract on an Employer supplied design will not be cost effective.

It was therefore proposed that a single contractor be appointed in terms of the FIDIC contract for "Plant and Design-Build" as approved by the CIDB to provide a full scope of services on an Employer designed process, the general layout and a full set of prescriptive engineering specifications.



This approach minimises overhead costs and therefore provide a more cost effective solution for the Employer. As such, an activated sludge treatment system will be implemented (see Annexure C) according to the following main parameters:

The various portions of the proposed works are described below:

#### 10.1 GENERAL LAYOUT AND PROCESS

The general layout, process, access and infrastructure will be according to the Engineering design. A very prescriptive and strict set of specifications will ensure a robust, yet optimised treatment system that is easily maintained and operated with adequate redundancy in critical equipment. Refer to Annexure C for the site layout of the works.

#### 10.2 INLET WORKS

A new inlet works with a handscreen and one ultrasonic flowmeter will be installed. The old inlet works will remain but will not be used. Refer to Annexure D for the inlet works construction detail.

#### 10.3 REACTOR MODULE COMPLETE WITH CLARIFICATION

Reactor volume of 1840 m<sup>3</sup> will be required to provide capacity for the short term. It was envisaged that the oxygen demand will be supplied by 4 no. aerators, each 15kW. The reactor will facilitate aerobic and anoxic conditions in order to achieve COD removal, nitrification and denitrification.

The expected average dry weather flow (ADWF) is roughly 9.6 l/s. The estimated Harmon peak factor is 3.06 which results in a peak dry weather flow (PDWF) of 29.4 l/s. Assuming 50% infiltration, the peak wet weather flow (PWWF) should be roughly 44.1 l/s.

The treatment module will also facilitate adequate clarification by means of settlement of biomass and release of final effluent under all design flows. Refer to Annexure E for the construction detail of the clarifier. Refer to Annexure F for the construction detail of the reactor.

#### 10.4 PUMP STATIONS

Pump stations is required for supernatant, waste activated sludge and possibly for return activated sludge depending on the process configuration accepted after tender.

#### 10.5 SLUDGE HANDLING

It was originally proposed to utilize the existing pond system by incorporating it entirely into the new process to achieve maximum utilisation of existing infrastructure by serving as sludge holding/handling ponds in the proposed upgrade. In that configuration, waste sludge would have been pumped to the sludge ponds for

stabilisation and further future treatment and the supernatant drawn off from the last sludge pond would have been pumped back to the reactor module from where it could be treated and discharged.

Should lining of these ponds however be required (likely in light of new information), sludge drying beds would be a more cost effective solution. As such, the original report allowed for 1100 m<sup>2</sup> of sludge drying beds. Supernatant would be returned to the inlet for further treatment, similar to supernatant from sludge ponds as described above. During the construction stage, a sludge dehydrator was installed instead of sludge drying beds. The dehydrator is situated on top of the control room (refer to Annexure G for the construction drawing of the control building layout).

#### 10.6 DISINFECTION

Disinfection by gaseous chlorine has proven to be the most effective means of eliminating harmful bacteria and pathogens found in wastewater effluent. A chlorine contact channel is proposed to disinfect effluent from the clarifier before it can be discharged or returned to a natural water resource. A sodium hypochloride dosing system will also be considered as an alternative.



*The inlet works*



*The Clarifier*



*The reactor*





*The control building with de-hydrator on the first floor (refer Annexure G for the construction layout of the control building)*

## 11. ESTIMATED COSTS

### 11.1 COST OF WORKS

Preliminary, General, Health and Safety Requirements	R1,722,889.69
Inlet Works and splitter boxes	R182,164.55
Sedimentation tanks	R1,162,199.18
Complete Mixed Biological Reactor	R2,279,210.04
Pump Stations	R0.00
Chlorine contact channel and dosing equipment	R70,719.66
Sludge handling facilities	R1,486,422.29
Ablution, control and admin building	R177,600.00
Electrical switchgear and control equipment	R280,000.00
Miscellaneous structures, pipework, etc	<u>R400,000.00</u>
<b>SUBTOTAL</b>	<b>R7,761,205.41</b>
Add Escalation	R350,877.19
Add Eskom connection	R310,266.67
Add addition to contract, including skip	R327,187.73
<b>ESTIMATED TOTAL FOR WORKS</b>	<b><u>R8,749,537.00</u></b>



## 11.2 PROFESSIONAL COSTS

Professional fees	R902,828.00
Accredited training	25,000.00
Site survey	25,000.00
ECO and OH&S costs	R117,000.00
EIA costs	R60,000.00
Floodline study	R60,000.00
Construction monitoring (4 x R15 000)	R100,000.00
Recoverable disbursements	<u>R100,000.00</u>
<b>ESTIMATED TOTAL FOR PROFESSIONAL COST</b>	<b><u>R1,389,828.00</u></b>
<b>ADDITIONAL FOR HDPE LINER AND MONITORING BOREHOLE</b>	<b>R2,192,982.00</b>

## 11.3 ESTIMATED TOTAL COST

Estimated cost for Upgrade of WWTW	R12,332,347.00
Add 14% VAT	R1,726,529.00
<b>TOTAL ESTIMATED COST FOR UPGRADE OF WWTW</b>	<b>R14,058,876.00</b>
Original MIG allocation	R5,465,958.00
Budget Maintenance 2012	R1,092,918.00
Previous MIG allocation sub total:	<b><u>R6,558,876.00</u></b>
Amount now required	R7,500,000.00

Of the above R7.5 million, R5 million is for the top-up funding supplied by Makana Municipality to the value of R5 million. R2.5 million is for the cleaning and lining of the existing dams, as well as the installation of a groundwater monitoring borehole.

## 12. PROGRAM

The suggested program for this project is given below:

• Report, approach and tender approved	05 January 2011
• Tender advertised	15 January 2011
• EIA complete and ROD issued	21 December 2007
• Tenders awarded	14 February 2011
• Contractor commences	03 March 2011
• Construction completed	30 August 2012
• End of defects liability period	30 August 2013

### 13. CONCLUSION

The upgrading of the Alicedale WWTW has become of critical importance to ensure that the works does not pose an unacceptable health risk and complies with the requirements of the National Water Act. No further development should take place until the capacity of the WWTW has been upgraded to accommodate the expected flows and loads.

### 14. LIST OF REFERENCES

Kwezi V3 Engineers, November 2004: *Alicedale Civil Services Evaluation Report, Revision A (Ref No. ALICE/194310QQ/R002)*

We trust that this report meets with your approval. We will gladly provide any further information that may be required.

Yours faithfully

**J DU TOIT**  
p.p.: WORLEYPARSONS RSA

**FEBRUARY 2012**

ANNEXURE C – ESKOM RESONSE

**Luke Mafuma**

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**From:** Dumisani Deliwe <DeliweD@eskom.co.za>  
**Sent:** 15 June 2012 02:16 PM  
**To:** Luke Mafuma (mbblm@imagnet.co.za)  
**Subject:** FW: Capacity check for 216 RDP houses in Alicedale  
**Attachments:** Alicedale Proposed Development June 2012.pdf

Luke,

See response from our Network Planning Department to your request below.

Regards

Dumisani Deliwe  
Area Electrification Coordinator

Programme Management  
Eastern Cape Operating Unit

Eskom Holdings SOC Limited / Distribution Division  
Beacon Bay Crossing

Tel.: + 27 43 703 5753  
Fax.: + 27 86 537 5112  
Cell.: 083-6304831  
e-mail.: [DeliweD@eskom.co.za](mailto:DeliweD@eskom.co.za)



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**From:** Muzi Nombembe  
**Sent:** 15 June 2012 11:02 AM  
**To:** Dumisani Deliwe  
**Cc:** Simphiwe Dlulane; Chris Altenkirch  
**Subject:** RE: Capacity check for 216 RDP houses in Alicedale

Mr Deliwe,

Upon doing my analysis I have found that there is available capacity for the 216 RDP houses planned in Alicedale.

Regards

Muzi Nombembe  
Tel: 043 703 2009

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**From:** Simphiwe Dlulane  
**Sent:** 14 June 2012 10:27 AM  
**To:** Dumisani Deliwe  
**Cc:** Muzi Nombembe; Chris Altenkirch  
**Subject:** RE: Capacity check for 216 RDP houses in Alicedale

Mr Deliwe,

We will do the capacity check and will respond by Monday 18/06/2012.

Regards

Simphiwe Dlulane  
Tel: 043 – 703 2750  
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**From:** Chris Altenkirch  
**Sent:** 14 June 2012 09:17 AM  
**To:** Dumisani Deliwe; Simphiwe Dlulane  
**Subject:** RE: Capacity check for 216 RDP houses in Alicedale

Colleagues,

Attached is the pdf file showing the proposed development at Alicedale. The line crossing the proposed development is the Mimosa/Paterson 1 22kV line. Mimosa substation can be seen in the top right corner.  
Regards

Christopher Altenkirch S(SA) G(SA)  
Senior Supervisor : Geographic Information  
Land Development  
Eastern Cape Operating Unit  
Sunilaws Office Park - Beacon Bay – East London – RSA  
Tel +27 43 7032333  
Fax +27 43 7032392  
E-mail [Chris.Altенkirch@eskom.co.za](mailto:Chris.Altенkirch@eskom.co.za)



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**From:** Dumisani Deliwe  
**Sent:** 13 June 2012 11:32 AM  
**To:** Simphiwe Dlulane; Chris Altenkirch  
**Subject:** Capacity check for 216 RDP houses in Alicedale

Colleagues,

Makana municipality has intentions to build 216 RDP houses in Alicedale (see attached layout). They have appointed consultants to undertake some studies in regard to this development, including the checking of capacity for the connection of these houses to the grid.

Chris, could you super-impose our networks on the attached locality plan, and indicate the names of nearest networks we can feed from, and then send us a PDF.

Simphiwe, I'll send you the PDF once I receive it from Chris, could you indicate how long it will take you to do this check for us, once you receive the PDF ?

Regards

Dumisani Deliwe  
Area Electrification Coordinator

Programme Management  
Eastern Cape Operating Unit



Eskom Holdings SOC Limited / Distribution Division  
Beach Bay Crossing

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