REPORT

For

Savannah Environmental (Pty) Ltd

by the

INSTITUTE FOR SOIL CLIMATE AND WATER

AGRICULTURAL RESEARCH COUNCIL

SOILS and AGRICULTURAL POTENTIAL STUDY FOR THE PROPOSED SALDANHA BAY NETWORK STRENGTHENING PROJECT, WESTERN CAPE PROVINCE

By

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Declaration of Independence

I, D.G. Paterson, hereby state that I am a registered Practicing Natural Scientist (*Soil Science* – Registration No. 400463/04) was responsible for supervising the compilation of this report in an impartial manner to acceptable scientific norms and standards.

Furthermore, I state that both myself and ARC-Institute for Soil, Climate and Water are independent of any of the parties involved in this study.

September 2016

1. TERMS OF REFERENCE

1.1 Background

The ARC-Institute for Soil, Climate and Water (ARC-ISCW) was contracted by Savannah Environmental (Pty) Ltd to undertake an investigation into the soils and associated agricultural potential aspects for the Saldanha Bay Network Strengthening Project, Western Cape Province.

Project description:

- Construction of a new 400/132kV Transmission Substation in the Saldanha Bayarea
- Construction of a new 132/66/11kV Distribution Substation near the current Blouwater Substation
- Construction of two 400kV power lines from the Aurora substation in the east to the new proposed substation in the west.

1.2 Objectives of the report

A previous report (Paterson & Oosthuizen, 2015) dealt with soil-related aspects for the project at a scoping level, using mainly 1:250 000 scale land type information. This report deals with the results of the field study that was carried out to look at soils occurring in the project area in a greater level of detail.

Thus, the purpose of the investigation is to contribute to the Environmental Impact Assessment (EIA) process. The objectives of the study are:

- To classify the soils in the specified areas.
- To assess broad agricultural potential.
- To determine the prevailing land use.
- To determine the relevant soil-related impacts and their significance.

2. STUDY AREA CHARACTERISTICS

The study area is located approximately 10 km north-east of the town of Langebaan. The land use within the study area varies from natural vegetation to some cultivated lands. The main agricultural activities noted included livestock- and/or game farming. Only one piece of land in the study area was planted with barley and oats (See photo 7 – obs AA3). This is on the boundary of the farms Uyekraal 189 and Langeberg 187, at the proposed Substation Site A.

2.1 Terrain

The study area consists of a flat to slightly undulating topography derived from sandy sediments overlying various types of bedrock (see Section 2.4).

Altitude is between 20 and 80 m above sea level.

2.2 Photos

The general landscape and topographical features are shown in photos 1-10 below. The locations correspond to the list of observation numbers in **Table 5** in the Appendix to this report, along with the direction of each photograph from the specific observation.

Photo 1 Observation A46 (south)

Photo 2 Observation A47 (east)

Photo 3 Observation A49 (west – s west)

Photo 4 Observation A62 (south)

Photo 5 Observation ATF11 (west)

Photo 6 Observation AD6 (west)

Photo 7 Observation AA3 (South-west)

Photo 8 Observation A28 (east)

Photo 9 Observation A36 (west)

Photo 10 Observation A40 (east)

2.3 Climate

The long-term average annual rainfall in the area is low, at 279 mm, falling throughout the year with a maximum in the winter months **(Table 1)**. The P60Rm and P80Rm figures show the rainfall that may be expected in 6 out of 10 years and 8 out of 10 years, respectively.

Temperatures are high in summer (>30°C), with cooler winter temperatures.

Table 1 Climate Data

Month	Rainfall (mm)	P60Rm	P80Rm
Jan	5.4	3.6	0.0
Feb	4.4	2.6	0.0
Mar	6.8	3.6	0.0
Apr	16.5	13.2	5.6
May	35.1	28.7	13.7
Jun	56.2	47.0	25.6
Jul	48.6	41.9	26.4
Aug	52.8	42.8	19.6
Sep	18.0	14.8	7.5
Oct	18.7	13.5	1.5
Nov	10.1	7.0	0.0
Dec	6.6	4.5	0.0
Year	**279.2 mm**		

2.4 Parent Material

The area comprises aeolian sands of the Springfontyn Formation, underlain by limestone and calcrete of the Langebaan Formation with occasional outcrops of granite of the Vredenburg and Langebaaan-Saldanha Plutons, Cape Granite Suite (Geological Survey, 1990).

3. METHODOLOGY

Randomly placed soil observations (108 in total, see **Table 5** in Appendix) were made throughout the study area with a hand-held soil auger to verify the dominant soil forms and effective soil depth. A broad soil map was compiled and the specific map units are shown on the soil map in the Appendix. The soils were classified according to the South African soil classification system (Soil Classification Working Group, 1991). Soil samples were collected and chemically analysed in order to assist in determining the morphological, chemical and physical properties of the soils. With this supporting information, a class of general agricultural potential could then be established.

4. SOILS

The area consists mainly of shallow to deep, greyish-brown, fine to medium-grained, non-calcareous to calcareous, sandy soils, dominantly of the ***Coega*** (Cg), ***Namib*** (Nb) and ***Fernwood*** (Fw) soil forms, often underlain by limestone/calcrete.

Termite mounds (see Photo 6, Obs. AD6), occur sporadically throughout the area and the dominant soils on these mounds are classified as ***Prieska*** (Pr) and ***Addo*** (Ad) soil forms. Moderately deep sandy soils, dominantly of the ***Kroonstad*** (Kd) and ***Vilafontes*** (Vf) soil forms, underlain by slightly hydromorphic clay, occur in some depressions where water activity is more prominent. When vegetation is disturbed, all these soils are susceptible to wind erosion due to the low clay content of the soils.

A general soil description of the map units is given in **Table 2.**

The list of soil observations is also included in the Appendix as **Table 5**.

Table 2 Soil Legend

Map unit	Dominant Soil form/family > 80%	Subdominant Soil form/family < 20%	Effective depth* (mm)	General Soil Description
Cg1	Cg1000, Cg2000	Nb1100	200 – 450	Very shallow to shallow, dark yellowish-brown, non-calcareous to calcareous, fine- to medium-grained sandy soils, underlain by calcrete/ limestone.
Cg2	Cg1000, Cg2000	Nb1100, Pr1120	200 – 600	Shallow, light yellowish-brown to brown, non-calcareous to calcareous, medium-grained sandy soils with underlying calcrete/ limestone. Termite mounds occur throughout the area and were classified under the Prieska (Pr) soil form with a slight increase in clay in the neocarbonate subsoil horizon, underlain by calcrete that varies in depth from 800 – 1 100 mm.
Cg3	Cg1000	Nb1100	300 – 600	Shallow (with sporadic moderately deep to deep patches), grayish-brown to pale brown, non-calcareous, fine- to medium-grained, aeolian sands underlain by calcrete/limestone.
Fw1	Fw1110, Nb1100	Kd1000	1200 – 1500	Deep, pale brown to light yellowish-brown, non-calcareous, fine- to medium-grained aeolian sands underlain by clay and calcrete.
Fw2	Fw1110, Fw1120	Nb1100	1500+	Very deep, brown to yellowish brown, non-calcareous, fine- to medium-grained aeolian sands.
Fw3	Fw1110, Fw1210, Ct1100	Nb1100	1500+	Very deep, pale brown to yellowish brown, non-calcareous, fine-grained aeolian sands with stabilized dunes in the vicinity.
Kd1	Kd1000, Vf1120	Nb1100, Cg1000	600 – 900	Moderately deep, brown to pale brown, non-calcareous, medium-grained aeolian sands underlain by slightly hydromorphic clay and calcrete.
Kd2	Kd1000, Vf1120	Fw1110, Fw1210, Fw1120	1100 – 1200	Deep, pale brown, non-calcareous, fine- to medium-grained aeolian sands overlying gleycutanic to neocutanic clay, most probably derived from underlying weathering granite.
Nb1	Nb1100	Cg1000	600 - 900	Moderately deep, pale brown, non-calcareous, fine-to medium-grained aeolian sands underlain by calcrete/limestone. Sporadic patches of shallow Coega (Cg) soils occur throughout the area.
Nb2	Nb1100	Pr1120	600 – 1200	Moderately deep, pale brown, non-calcareous, medium-grained, aeolian sands underlain by calcrete/limestone. Sporadic occurrences of termite mounds.

***This refers to the depth to a subsoil horizon that is significantly limiting for water and/or root penetration**

4.1 Soil Analysis Results

A total of 6 soil samples were collected from four locations within the study area on the soil map. The samples represent either the A horizon topsoil (eg AA3_A) or, where present, the B horizon subsoil (e.g. AD8_B).

The samples were analyzed and the analysis results are given in **Table 3** below.

Table 3 Soil analysis results

Sample No.	**AA3_A**	**AD4_A**	**AD4_C**	**AD8_A**	**AD8_B**	**ATF11_A**
Depth (mm)	0 - 400	0 – 300	300 – 600	0 – 300	300 – 600	0 - 300
Soil Form	Coega	Namib		Prieska		Coega
Sand (%)	88	92	94	90	88	94
Silt (%)	4	2	1	2	2	1
Clay (%)	8	6	5	8	10	5
Org. Carbon (%)	0.52	0.38	0.14	0.59	0.42	0.44
pH (H_2O)	8.15	7.99	7.58	7.49	8.86	8.13
P (Bray 1) mg kg^{-1}	20.32	25.94	16.59	20.66	12.62	40.70
Na (cmol(+)kg^{-1})	0.118	0.222	0.098	0.154	0.377	0.025
K (cmol(+) kg^{-1})	0.138	0.190	0.158	0.248	0.202	0.134
Ca (cmol(+) kg^{-1})	4.254	1.055	0.903	1.758	13.858	1.528
Mg (cmol(+) kg^{-1})	0.828	0.348	0.243	0.571	1.097	0.308
S-Value	5.338	1.816	1.402	2.731	15.534	1.994
CEC*	5.883	5.372	8.144	3.220	2.984	5.518

* - Cation Exchange Capacity (cmol (+) kg^{-1})

The analysis results show the sandy nature of the soils, with clay contents below 10%, which leads in turn to low organic carbon levels. The CEC values are also low, although Ca values are higher in some calcareous soils (AA3_A and AD8_B).

P levels are moderate, while pH (H2O) values are slightly to strongly alkaline, reflecting the alkaline nature of the parent materials (Section 2.4), as well as the low annual rainfall (Section 2.3), which is not enough to leach out most of the cations in the soil.

4.3 Soil limitations

The suitability of soils for the production of crops in a specific locality depends mainly on the inherent chemical, physical and morphological properties of the soils, combined with prevailing climate and crop requirements.

The soil limitations that were noted within the study area are mainly:

- ***Restricted soil depth*** to hardpan carbonate horizon or clay
- ***Low clay content*** of top- and upper subsoils giving rise to low water-holding capacity, wind erosion susceptibility
- ***Presence of free carbonates*** indicates a low degree of leaching, giving rise to relatively high pH values and low trace element status, associated with low levels of natural fertility.

4.4 Agricultural potential

Annual crops such as small grain (wheat, barley and oats), medics and lupine with lucerne as a perennial pasture were taken into consideration (Jacobs, 1999). The average annual rainfall for this area is around 280 mm, giving rise to a low production potential (rainfall 200 – 300 mm/year, if <20% in summer) according to the annual rainfall criteria (Jacobs, 1999). The main limiting factor that influences the agricultural potential rating is the soil with above-mentioned limitations.

Taking all the above-mentioned factors into account, a general agricultural potential rating for the study area varies from low to medium–low as noted in **Table 4** below.

Table 4 Agricultural potential

Map unit	Agricultural potential	
	Annual crop	Perennial crop
Cg1	L	L
Cg2	L	L
Cg3	L	L
Fw1	L - ML	ML - L
Fw2	L - ML	ML - L
Fw3	L - ML	ML - L
Kd1	M - L	ML- L
Kd2	M - L	ML - L
Nb1	L-ML	ML - L
Nb2	L-ML	ML - L

Potential classes: High – H; Medium – M; Low – L

5. IMPACTS

5.1 Transmission and Distribution Substations

The main potential impact involved in the construction of the substations and associated infrastructure would be the loss of agriculturally productive soil due to the development. If a development, such as a substation, is established, then that area is no longer available for cultivation or other forms of agriculture.

The second, associated impact, involves the possible increased wind erosion risk due to the removal of surface vegetation associated with the construction activities. Without plant roots to bind the sandy topsoil together, the action of the wind could have the effect of removing valuable top soil from the site.

5.2 Transmission Lines

Due to the reduced footprint, the impacts will be smaller for any transmission lines than for the substations. However, if access roads are constructed, the wind erosion risk may also be applicable.

5.3 Assessment of Impacts

The soils in the area are generally sandy, with excessive drainage and limited natural fertility (Table 2). Coupled with the low prevailing annual rainfall (Table 1), the potential for agriculture in this area is relatively low. Most of the cultivation activities are limited by the general shallow soil depth. Due to the low agricultural potential the impact is not considered to be significant. However, the potential wind erosion threat is probably more significant, if specific mitigation measures are not implemented.

The two major potential impacts on the natural resources of the study area would be: 1) the loss of arable land due to the construction of the various types of infrastructure and 2) potential increased risk of soil erosion. However, these impacts (if properly mitigated) would in all probability be of limited significance and would be local in extent. At the end of the project life, it is anticipated that removal of the structures would enable the land to be returned to more or less a natural state following rehabilitation, with little residual impact, especially given the low prevailing agricultural potential.

The impacts can be summarized as follows:

Table 5 Impact significance

Nature of impact	**Loss of agricultural land**	Land that is no longer able to be utilized due to construction of infrastructure
Extent of impact	Site only	Confined to areas within the site where infrastructure will be located
Duration of impact	Long-term	Will cease if operation of activity ceases
Probability of impact	Highly probable	
Severity of impact	Low	
Significance of impact	Low	Mainly due to low potential of area, as well as nature of infrastructure
Mitigation factors	The main mitigation would be to ensure that as little pollution or other non-physical disturbance occurs.	

The very low rainfall in the area, coupled with the generally sandy soils, means that the prevailing agricultural potential is very low, so any impacts on this will be minimal.

Table 6 Impact significance

Nature of impact	**Increased risk of soil erosion by wind**	Removal of topsoil by the action of wind due to removal of vegetation
Extent of impact	Local	Possibly occurring on areas around project site
Duration of impact	Long-term	Will cease if operation of activity ceases
Probability of impact	Highly probable	Especially if vegetation is removed over a wide area
Severity of impact	Low	Especially if mitigation measures are put in place and applied
Significance of impact	Low	Mainly due to low potential of area, as well as nature of infrastructure
Mitigation factors	The main mitigation would be to ensure that the footprint for vegetation removal is as restricted as possible. In addition, appropriate soil conservation measures to combat wind erosion (windbreaks, geotextiles on the soil surface and immediate re-establishment of vegetation, under the supervision of a qualified vegetation specialist) should be implemented and monitored on at least a six-monthly basis	

Due to the predominance of very sandy soils, often with a fine grade of sand, the hazard of ***wind erosion*** when the topsoil is disturbed may be significant, as these areas are mapped as "highly susceptible" (ARC-ISCW, 2004).

Table 7 Impact significance

Nature of impact	**Cumulative impacts**	Impacts that may be exacerbated due to adjacent or nearby developments, or due to other facets of proposed development on site
Extent of impact	Local	Possibly occurring on areas around project site
Duration of impact	Long-term	Will cease if operation of activity ceases
Probability of impact	Highly probable	Especially if vegetation is removed over a wider area than the proposed project site
Severity of impact	Low	Especially if mitigation measures are put in place and applied
Significance of impact	Low	Mainly due to low potential of area, as well as nature of infrastructure
Mitigation factors	The main mitigation would be to ensure that the footprint for vegetation removal is as restricted as possible. In addition, appropriate soil conservation measures to combat wind erosion (windbreaks, geotextiles on the soil surface and immediate re-establishment of vegetation) should be implemented and monitored on at least a six-monthly basis	

The main potential cumulative impact would be soil removal due to wind erosion caused by developments off site. Due to the nature of the soil removal process, once topsoil is taken up into the atmosphere, wind action can deposit it over a large area and at a considerable distance, depending on the strength and duration of the wind acting upon the soils. Where a large number of developments occur in close proximity to one another, some sort of co-ordinated mitigation plan would be required to ensure that poor soil management procedures on one site do not lead to impacts on another site that actually has implemented mitigation measures correctly.

6. CONCLUSIONS

Most of the study area consists mainly of sandy soils underlain by calcrete/limestone at varying depths ranging from <300 mm to >1 200 mm. According to the average annual rainfall for this area (280 mm), the dryland crop production potential is low, combined with the marginal crop production potential of the soil, due to the low moisture-holding capacity of the sandy soils and soil depth. The overall agricultural potential is therefore low to medium-low.

It is concluded that the proposed development will not have a large impact due to the overall low agricultural potential of the areas where the construction of the transmission and distribution stations are planned. The main aspect that will have to be managed in this area if vegetation is removed will involve an increased wind erosion susceptibility due to the sandy nature of the soils.

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APPENDIX

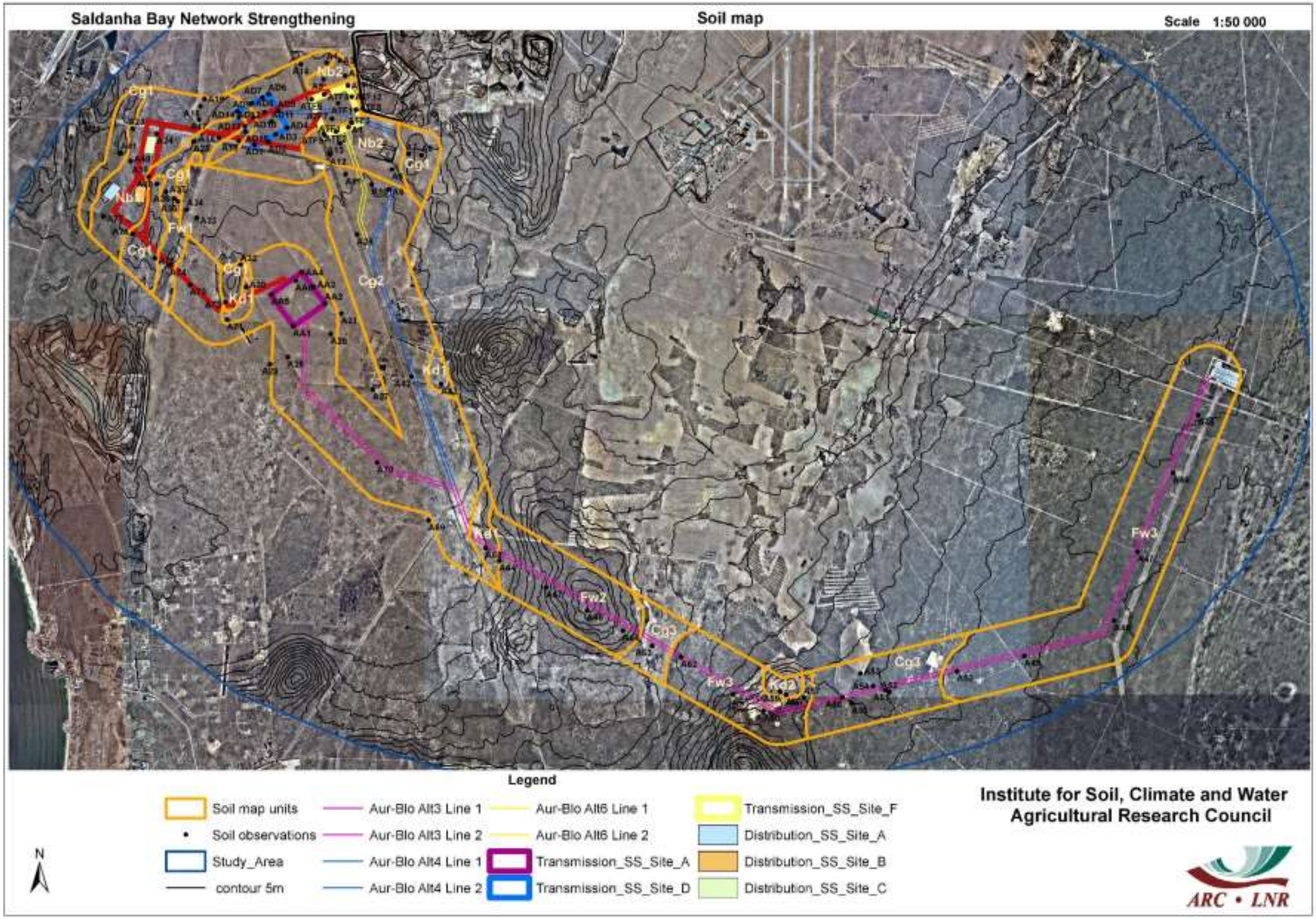
- **Table 5: Soil observations** *(sampling sites highlighted)*
- **Soil map**

Table 5 Soil observations

Obs No.	Soil form	Soil depth (mm)	Depth limiting material	Latitude	Longitude
A1	Nb1200	700	ka	-32,97092565000	18,09029281000
A10	Pr1110	600	ka	-32,97955164000	18,09353292000
A11	Cg1000	300	ka	-32,97810861000	18,08920920000
A12	Nb1100	900	ka	-32,97532448000	18,08669865000
A13	Nb1100	700	ka	-32,97374197000	18,08830798000
A14	Cg1000	300	ka	-32,96271809000	18,08195114000
A15	Nb1100	800	ka	-32,97331818000	18,07156026000
A16	Nb1100	1500		-32,97287830000	18,06833088000
A17	Nb1100	700	ka	-32,97030338000	18,06504250000
A18	Cg1000	300	ka	-32,96847411000	18,06527317000
A19	Nb1100	1000	ka	-32,96744415000	18,06599736000
A2	Nb1100	800	ka	-32,96435424000	18,08931112000
A20	Cg1000	200	ka	-33,00030657000	18,08650553000
A21	Nb1200	550	ka	-32,99780139000	18,08814704000
A22	Nb1200	600	ka	-32,97008880000	18,04601490000
A23	Nb1100	900	ka	-32,97145137000	18,05401862000
A24	Nb1100	750	ka	-32,97220775000	18,05807412000
A25	Nb1100	1200	ka	-32,97335573000	18,06412518000
A26	Cg2000	300	ka	-32,98648247000	18,09102774000
A27	Kd1000	1100	gc	-33,00815463000	18,09342563000
A28	Cg2000	200	ka	-33,00349840000	18,07936549000
A29	Nb1100	600	ka	-33,00445863000	18,07646871000
A3	Nb1100	900	ca	-32,96221920000	18,08839917000
A30	Kd1000	900	gc/ne	-32,99318262000	18,07290137000
A32	Cg1000	300	ka	-32,99058088000	18,07169974000
A33	Cg1000	250	ka	-32,98398801000	18,06454897000
A34	Nb1100	1200		-32,98279711000	18,06290209000
A35	Cg1000	450	ka	-32,98168668000	18,06141615000
A36	Nb1100	1200		-32,98123606000	18,06078851000
A37	Nb1100	1500		-32,98027583000	18,05945814000
A38	Cg1000	300	ka	-32,97919222000	18,05799365000
A39	Nb1100	1200		-32,97818908000	18,05664182000
A4	Cg1000	350	ka	-32,96255180000	18,08621049000
A40	Nb1100	600	ka	-32,97598966000	18,05366457000
A41	Cg1000	200	ka	-32,97480413000	18,05206052000
A42	Nb1100	750	ka	-33,00636300000	18,09980929000
A43	Kd1000	700	gc/ne	-33,00746270000	18,10475528000
A44	Nb1100	1500		-33,03212830000	18,11409473000
A45	Fw1210	1500		-33,01260182000	18,23002517000
A46	Fw1110	1500		-33,02062162000	18,22576582000
A47	Fw1110	1500		-33,03159722000	18,21985424000

A48	Nb1100	1500		-33,04114052000	18,21586311000
A49	Nb1100	1500		-33,04598995000	18,20092857000
A5	Nb1100	1200		-32,96483167000	18,08571696000
A50	Nb1100	1500		-33,04867753000	18,18978131000
A51	Cg1000	400	ka	-33,05058726000	18,17794204000
A52	Nb1100	800	ka	-33,05082866000	18,17854822000
A53	Nb1100	500	ka	-33,04825910000	18,17378461000
A54	Nb1100	600	ka	-33,05001327000	18,17583382000
A55	Nb1100	1100	ka	-33,05237889000	18,17227185000
A56	Cg2000	300	ka	-33,05154749000	18,17075908000
A57	Fw1210	1500		-33,05154749000	18,16437542000
A58	Vf1120	1100	ne	-33,05112370000	18,16139817000
A59	Kd1000	1300	gc/ne	-33,05068919000	18,16042185000
A6	Cg1000	250	ka	-32,97551223000	18,10181022000
A60	Fw1110	1500		-33,05338212000	18,15768063000
A61	Fw1110	1500		-33,05103251000	18,15263808000
A62	Fw1110	1500		-33,04576465000	18,14406574000
A63	Cg1000	400	ka	-33,04413923000	18,13931286000
A64	Fw1120	1500		-33,04201492000	18,13448489000
A66	Fw1110	1500		-33,03910204000	18,12857330000
A67	Fw1110	1500		-33,03588876000	18,12188387000
A68	Vf1220	750	ne/gc	-33,03033658000	18,11185777000
A69	Cg1000	250	ka	-33,02639910000	18,10246468000
A7	Cg1000	350	ka	-32,97532984000	18,09968054000
A70	Cg2000	300	ka	-33,01828274000	18,09401572000
A71	Vf1120	700	ne/gc	-32,99818763000	18,06940913000
A72	Cg1000	200	ka	-32,99580046000	18,06912482000
A73	Nb1100	600	ka	-32,99329528000	18,06329370000
A74	Fw1210	1500		-32,99054333000	18,06001604000
A75	Cg1000	200	ka	-32,98955628000	18,05753767000
A76	Cg1000	300	ka	-32,98614451000	18,05392742000
A77	Cg1000	300	ka	-32,98363396000	18,04907262000
A8	Nb1100	1200	ka	-32,97747024000	18,09691787000
A9	Cg2000	400	ka	-32,98024365000	18,09635460000
AA1	Cg2000	450	ka	-32,99916931000	18,08031499000
AA2	Cg2000	200	ka	-32,99602040000	18,08570087000
AA3	Cg1000	400	ka	-32,99373516000	18,08380187000
AA4	Cg1000	200	ka	-32,99172350000	18,08182776000
AA5	Nb1100	600	ka	-32,99474367000	18,07678521000
AA6	Cg1000	300	ka	-32,99285539000	18,08077633000
AD1	Cg1000	400	ka	-32,97388681000	18,07422101000
AD10	Nb1100	600	ka	-32,97007808000	18,07404399000
AD11	Cg1000	300	ka	-32,97063597000	18,07704806000
AD12	Nb1100	600	ka	-32,96935388000	18,07588398000

AD13	Kd1000	1400	gc	-32,97126898000	18,07260096000
AD14	Kd1000	1500	gc	-32,97000297000	18,07160854000
AD15	Nb1100	800	ka	-32,97204145000	18,07274580000
AD2	Pr1120	800	ka	-32,97351667000	18,07650626000
AD3	Nb1100	600	ka	-32,97244378000	18,07769179000
AD4	Nb1100	600	ka	-32,97154793000	18,07954788000
AD5	Cg1000	450	ka	-32,96916076000	18,07808340000
AD6	Cg1000	400	ka	-32,96682187000	18,07656527000
AD7	Pr1120	1000	ka/ca	-32,96729931000	18,07553530000
AD8	Pr1120	800	ka	-32,96805033000	18,07383478000
AD9	Nb1100	700	ka	-32,96920904000	18,07139933000
ATF1	Nb1100	1100	ka	-32,97265836000	18,08579743000
ATF10	Cg1000	150	ka	-32,96635517000	18,08788419000
ATF11	Cg1000	300	ka	-32,96821126000	18,08805048000
ATF12	Cg1000	100	ka	-32,96732076000	18,09032500000
ATF2	Nb1100	650	ka	-32,97212728000	18,08769107000
ATF3	Nb1100	600	ka	-32,97155865000	18,08976173000
ATF5	Cg1000	250	ka	-32,96911248000	18,09104383000
ATF6	Cg1000	300	ka	-32,96761044000	18,08369458000
ATF7	Cg1000	350	ka	-32,97033557000	18,08707416000
ATF8	Cg1000	300	ka	-32,96693453000	18,08577061000
ATF9	Pr1120	1100	ka	-32,97268518000	18,08581352000


Saldanha Bay Network Strengthening
Soil map
Scale 1:50 000
Cg1
Nb2
Cg4
Nb1
Fw1
Cg2
Kd1
Fw2
Cg3
Fw3
Kd2
Legend
Soil map units
Soil observations
Study_Area
contour 5m
Aur-Blo Alt3 Line 1
Aur-Blo Alt3 Line 2
Aur-Blo Alt4 Line 1
Aur-Blo Alt4 Line 2
Aur-Blo Alt6 Line 1
Aur-Blo Alt6 Line 2
Transmission_SS_Site_A
Transmission_SS_Site_D
Transmission_SS_Site_F
Distribution_SS_Site_A
Distribution_SS_Site_B
Distribution_SS_Site_C
N
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