



# INFORMAL SETTLEMENT VULNERABILITY INDEX

## FINAL REPORT

<p><b>PREPARED BY:</b> AURECON (PTY) LTD P O Box 494 CAPE TOWN 8001</p> <p><b>CONTACT PERSON:</b> Name: Dr Elretha Louw Tel No.: 021 481 2400 E-mail: <a href="mailto:elretha.louw@af.aurecongroup.com">elretha.louw@af.aurecongroup.com</a></p>	<p><b>PREPARED FOR:</b> Strategic Support and Research Dept. of Local Government and Housing Provincial Government of the Western Cape</p> <p><b>CONTACT PERSON:</b> Name: Ms Cassandra Visser Tel No.: 021 483 8420 <a href="mailto:casvisse@pgwc.gov.za">casvisse@pgwc.gov.za</a></p>
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 **aurecon**



# INFORMAL SETTLEMENT VULNERABILITY INDEX REPORT

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# **Executive Summary**

## **English**

AURECON (previously AFRICON) has been appointed by the Western Cape Department of Local Government and Housing (DPLG&H) to develop a vulnerability index for informal settlements in the province. The study was based on the National Housing Demand (NHD) database compiled for the Western Cape Province in 2007/08 and the Directorate: Disaster Management and Fire Brigade Services's Disaster Risk (flood and fires) Analysis for informal settlements. The NHD database contained the coordinates and socio-economic data of all informal settlement dwellings in the Western Cape Province. Risk-variables, such as water and sanitation services, electricity access, density, fire and flood, were used to determine the living conditions and disaster risk, respectively.

## **Afrikaans**

AURECON (voorheen AFRICON) was aangestel deur die Wes Kaapse Departement van Plaaslike Regering en Behuising om 'n kwesbaarheid indeks te bepaal vir all informele nedersettings in die provinsie. In die studie moes daar gebruik maak word van die Nasionale Behuisings Behoefte (NBB) databasis vir die Wes Kaap Provinsie soos saamgestel in 2007/08 en die Informele Nedersetting Ramp Risiko Waardering. Die NBB databasis bevat koordinaat data sowel as sosio-ekonomiese data wat gebruik is om die risiko weens lewenstoestande te bepaal ten opsigte van sanitasie, water- en elektrisiteitsvoorsiening. In die Ramp Risiko Waardering is die 100 mees kwesbare informele nedersettings ten opsigte van vloede en vure bepaal. Die risiko faktore is bereken en geklassifiseer om die kwesbaarste informele nedersettings in die provinsie te identifiseer.

# 1 Background

AURECON was appointed to develop a vulnerability index allowing for the prioritisation of all informal settlements in the Western Cape. This index was developed from existing data which forms part of the Housing Demand Database. The prioritisation of informal settlements based on fire and flood risk completed by the Directorate: Disaster Management and Fire Brigade Services in April 2008 were also included in this index.

## 2 Project Scope

The project scope entails the development of a vulnerability index for informal settlements in the Western Cape based on the calculation of a risk-factor for each. Risk-variables were identified by the DPLG&H as risk indicators. The variables are:

- Risk-factor 1: Risk due to living conditions

The following parameters would be used to determine the risk due to living conditions:

- Density (number of dwelling units per hectare);
- Water availability (number of standpipes per number of dwelling units);
- Sanitation availability (number of toilets per number of dwelling units);
- Access to electricity;
- Health conditions (TB prevalence of clinics as proxy for TB prevalence of informal settlement that fall within the “catchment area” of a specific clinic).

- Risk-factor 2: Disaster Risk

A disaster risk analysis was completed for the Directorate: Disaster Management and Fire Brigade Services in April 2008. This data and findings will be included to determine the disaster risk in terms of the following two major hazards in the Western Cape Province:

- Fire risk;
- Flood risk.

The following assumptions with regards to the research population will be accepted as determined by the DPLG&H:

- Dependency on public transport thus general poor accessibility to transport opportunities;

- Low household income;
- Low employment level; and
- Low skills level.

### 3 Methodology

#### 3.1 Data Cleaning

In the first phase of the project, the NHD database had to be obtained, cleaned and prepared before continuing to next phase. The deliverable for the phase was to create a point shapefile of all the spatial locations of each dwelling in an informal settlement and a polygon (area) shapefile for each informal settlement's physical boundaries/perimeter. The flow chart for this phase is shown in Figure 1.

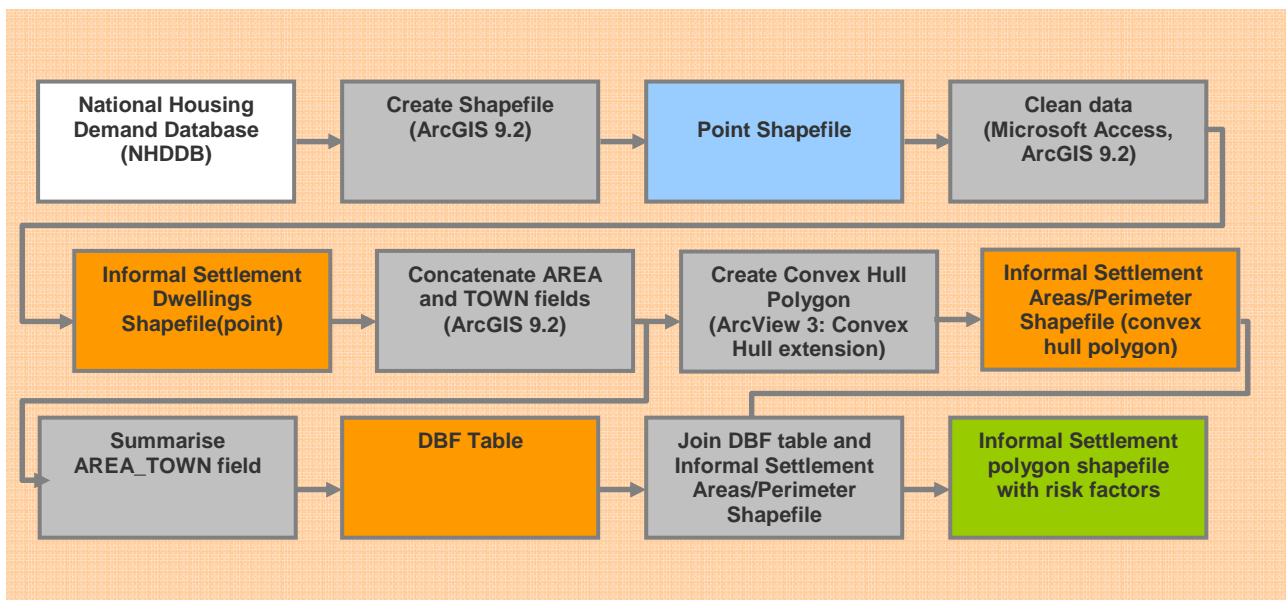


Figure 1: Phase 1- Data Cleaning

A point shapefile of each dwelling was created using the coordinates captured in the NHD database. The AREA and TOWN fields were concatenated into one field called, JOIN. Services for each informal settlement were calculated using the Summarise function on the Area field of the point shapefile and the result were exported to a database file (dbf).

Thereafter an ArcGIS 9.x extension, XToolsPro, was used. XToolsPro is freeware extension that can be downloaded from [www.xtoolspro.com](http://www.xtoolspro.com), and has a tool called, Create Convex Hull Polygon (use DETAIL option). This tool was used to draw a boundary around clusters of dwelling points with the same informal settlement name, using the JOIN field.

The Convex Hull Polygon tool creates an area/perimeter shapefile, for informal settlements, as shown in Figure 2.

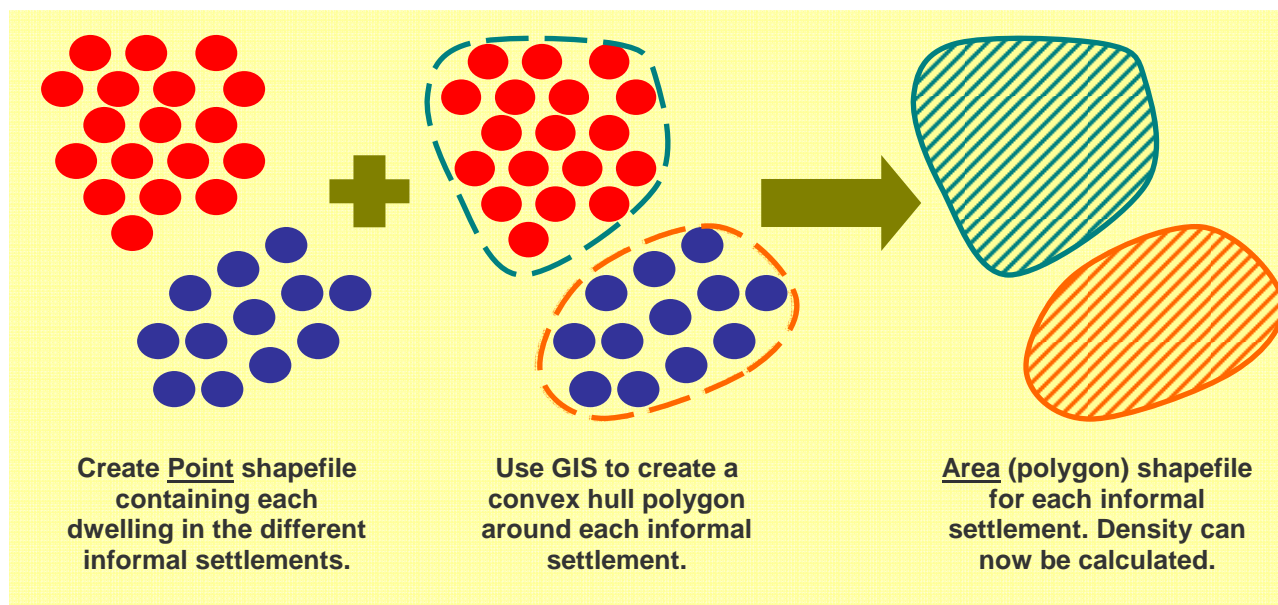


Figure 2: Creation of Informal Settlement Shapefiles (point and polygon)

The final Informal Settlements Vulnerability Index shapefile was created by joining the database file created for the summation of services to the convex hull polygon based on the field, JOIN, and thereafter exporting it to a new shapefile without any joined tables.

At the beginning of the study it was decided to calculate the dwelling density as follow:

$$\text{Density} = \text{number of dwellings units/area (hectare)}$$

In the final methodology, it was decided to calculate density parameter as the amount of occupants per hectare in an informal settlement, thus:

$$\text{Density} = \text{number of occupants/area (hectare)}$$

The reason for this approach being that the size of families living in informal dwellings has an influence on the pressure exercised on the existing services. This is more indicative than just considering the amount of dwellings.

### **3.2 Statistics Calculation**

The statistical calculations were done for each risk-variable in the second phase. Each risk variable was quantified based on the level of basic services (water, sanitation, electricity

and health) provided to each dwelling. These values were limited to, “YES” (access to service) and “NO” (no access to service) after consulting with the DPLG&H. It must be emphasised that the access to services was considered and not the quality of that service. Thus, for example, water availability was measured if there was a standpipe in the vicinity of the dwelling irrespective if it was 200 meter or 1 kilometre walk. Boolean values were assigned to the categorising risk-variables “YES” and “NO” values, where “YES” was allocated “1” and “NO” was “0”. Thereafter the values was summarised using the ArcGIS 9.2 field operation, Summarise, to calculate the amount of dwellings that have access to various services per informal settlement. This value was converted into a percentage for each informal settlement. The following risk variables were categorised as follow:

### 3.2.1 RF1 – Water Availability

	Available Water Services Types	Category	Boolean
1	No access to piped (tap) water	No	0
2	Piped (tap) water on community stand: distance greater than 200 m from dwelling	Yes	1
3	Piped (tap) water on community stand: distance less than 200 m from dwelling	Yes	1
4	Piped (tap) water inside yard	Yes	1
5	Piped (tap) water inside dwelling	Yes	1
6	Other	Yes	1

Table 1: Water Service Types

### 3.2.2 RF1 – Sanitation Availability

	Available Sanitation Services Types	Category	Boolean
1	Flush toilet (connected to sewerage system) inside the dwelling	Yes	1
2	Flush toilet (connected to sewerage system) outside the dwelling	Yes	1
3	Flush toilet (with septic tank) inside the house	Yes	1
4	Flush toilet (with septic tank) outside the house	Yes	1
5	Chemical toilet inside the house	Yes	1
6	Chemical toilet outside the house	Yes	1
7	Pit latrine with ventilation	Yes	1
8	Pit latrine without ventilation	Yes	1
9	Bucket latrine	Yes	1
10	None	No	0

Table 2: Sanitation Types

### 3.2.3 RF1 – Access to Electricity

	Available Electricity Services Types	Category	Boolean
1	Access to electricity	Yes	1
2	No Access to Electricity	No	0

Table 3: Electricity Access

### 3.2.4 RF1 – Health Conditions

TB was stipulated by DPLG&H as an indicator of health conditions within informal settlements. The original proposed methodology was to use TB prevalence of clinics as a proxy for TB prevalence within the informal settlements that fall within the “catchment areas” of the different clinics. Thus, a buffer of a predetermined distance would be placed around a clinic to extract its service (“catchment”) area as shown in Figure 2. The obtained TB cases for each clinic would be linked to the respective service area, using GIS.

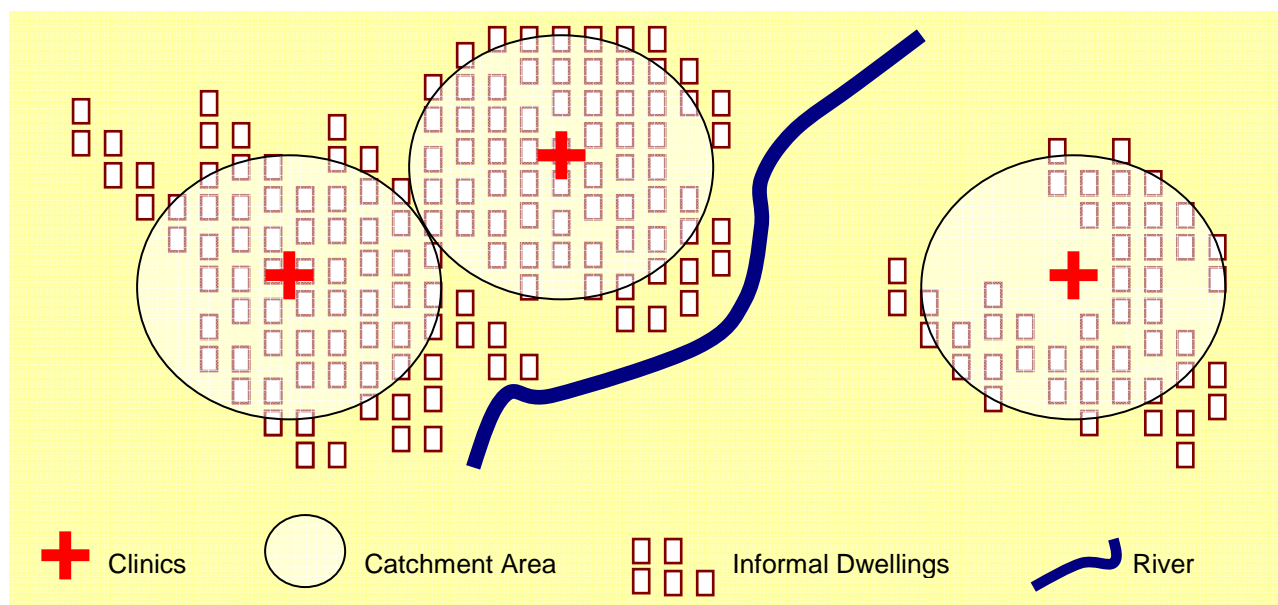


Figure 3: Clinic Catchment Area (polygon)

After a consultation meeting with Director: Clinical Research, Dr Nulda Beyers, at the Desmond Tutu TB Centre, University of Stellenbosch (US), it was recommended not to use this method due to its unreliability as a result of unpredictability of patient behaviour and the nature of TB data captured at clinics.



People tend to go to clinics for TB treatment that is close to their work place or outside their community where the risk of stigma is less. Thus, it would be inaccurate to assume that the service areas of clinics are only a certain radius around a clinic.

TB data captured by clinics can also not be regarded as a true representation of TB cases. This can be attributed to the two types of TB data i.e. prevalence data and proxy of incidence. Proxy of incidence is health data from clinics that indicates the amount people that receive medical services for TB. This is not accurate data as undetected cases in the public are not included. Prevalence data are based on door-to-door surveys being done where TB testing is done free of charge. The results are accurate but limited to small areas where surveys have been executed (Beyers 2008).

The Desmond Tutu TB Centre has done prevalence surveys for certain areas in the Cape Town area. Dr Beyers said that agreements could be reached between the DPLG&H and US for the possible sharing of data between the two entities. This will allow for the possible inclusion of US TB data in the vulnerability index for the future.

After a discussion with Research Manager, Ilse Eigelaar-Meets, at the DPLG&H, it was decided to exclude the TB data risk-variable from the vulnerability index until more accurate TB data can be obtained and a proper list of Western Cape clinics and their locations can be compiled.

### **3.2.5 RF2 – Fire**

A study was done for the Directorate: Disaster Management and Fire Brigade Services in April 2008 where the 100 most vulnerable informal settlements in terms of fire and flood were determined. This report can be obtained from Deputy Director Disaster Management, Dr Elmien Steyn (esteyn@pgwc.gov.za), at the Directorate: Disaster Management and Fire Brigade Services. The settlement area, number of dwellings, average wind speeds and calms were parameters considered when determining the fire risk. A total of 35 was identified outside the City of Cape Town area and were joined with the NHD point shapefile based on spatial location.

### **3.2.6 RF2 – Floods**

In the flood risk calculation the perimeter and area were taken into consideration as well as intersections with watercourses or wetlands. A buffer analysis of 25m around water

courses was used to identify areas where informal settlements would be vulnerable (Provincial Disaster Management 2008).

In the flood study 65 informal settlements were identified outside the City of Cape Town area. The informal settlements from this study were joined with the NHD point shapefile based on spatial location.

### 3.3 Scoring and Classification

#### 3.3.1 Score

The calculated values in the previous phase had to be classified. The following classification was assigned for each risk-variable:

	Quantity	Unit	Score	Weight
<b>Density</b>				
	0-45	Dwellings/unit	1	Low
	45.1-90	Dwellings/unit	2	Medium
	90.1-827	Dwellings/unit	3	High
<b>Water Availability</b>				
	0-80	Percentage	3	High
	80.1-90	Percentage	2	Medium
	90.1-100	Percentage	1	Low
<b>Sanitation Availability</b>				
	0-80	Percentage	3	High
	80.1-90	Percentage	2	Medium
	90.1-100	Percentage	1	Low
<b>Electricity Access</b>				
	0-80	Percentage	3	High
	80.1-90	Percentage	2	Medium
	90.1-100	Percentage	1	Low
<b>Fire/Flood</b>				
	0-33	Ranking	3	High
	33-66	Ranking	2	Medium
	67-100	Ranking	1	Low

Table 4: Classification

### 3.3.2 RF1 – Risk due to living conditions

The risk due to living conditions score was calculated by adding all the values for the socio-economic risk-variables together and classifying it. The classification of the risk due to living conditions is shown in Table 5. See Appendix A for the informal settlements with the highest risk due to living conditions score.

Quantity	Classification
0-4	Low
5-8	Medium
9-12	High

Table 5: Socio-economic Classification

### 3.3.3 RF2 - Disaster Risk Classification

The disaster risk scores were added and classified. The result is shown in Table 6. See Appendix B for the informal settlements with the highest disaster risk score.

Quantity	Classification
0-2	Low
3-4	Medium
5-6	High

Table 6: Disaster Risk Classification

### 3.3.4 Vulnerability Index Classification

The final score for vulnerability was calculated by adding all the values for the risk-variables (socio-economic and disaster risk) together and classifying it. The resulting value would be classified according to Table 7. See Appendix C for the informal settlements with the highest vulnerability index score.

Quantity	Classification
0-6	Low
7-10	Medium
11-18	High

Table 7: Vulnerability Index Classification

## 4 Results

The NHD database was received with a total of 100 146 records. A point shapefile was created containing the spatial location of 96 873 dwellings. These points were used to create the perimeter of 397 informal settlements in a GIS format. After the statistical calculations, scoring and classification the following result was obtained:

Classification	Risk due to living conditions	Disaster Risk	Vulnerability Index
Low	29	337	27
Medium	282	46	257
High	86	14	113
Total Amount	397	397	397

Table 8: Vulnerability Index Results

In the integration of the Disaster Risk Analysis only 33 out of 262 informal settlements could be scored for fire due to the large quantity of fire vulnerable settlements in the City of Cape Town area. The NHD database only contained informal settlements for the whole Western Cape Province except City of Cape Town. Only 65 of the 252 flood vulnerable informal settlements identified for the Western Cape could be integrated due to the difference in captured informal settlements between NHD database and Disaster Risk Analysis.

### 4.1 RF1 – Risk due to living conditions

The 86 high vulnerability informal settlements with scores between 12 and 19 were identified. Appendix C depicts these informal settlements together with their individual scores for each risk-variable. The following 7 settlements with the highest risk due to living conditions (scored 12) are depicted in Table 9.

Zwelitsha (Bredasdorp) informal settlement has a high score due to poor water (53.97%), electricity (71.43%) and sanitation (46.03%) services, and a high occupancy density (175 occupants/hectare). Sandkamp in Citrusdal has a high occupancy density (124 occupants/hectare) and no water, sanitation or electricity services. Grags in Grags has a high 96 occupants/hectare density with only 39% having access to water, 31% to electricity provision and 27% to sanitation.

ID	AREA	TOWN	DEND_WEIGHT	DENO_WEIGHT	WAT_WEIGHT	ELEC_WEIGHT	SAN_WEIGHT	SE_WEIGHT
1	ZWELITSHA	BREDASDORP	MEDIUM	HIGH	HIGH	HIGH	HIGH	HIGH
2	SANDKAMP	CITRUSDAL	MEDIUM	HIGH	HIGH	HIGH	HIGH	HIGH
3	CRAGS	CRAGS	LOW	HIGH	HIGH	HIGH	HIGH	HIGH
4	PLAKKERSKAMP (LANGVILLE)	LANGVILLE	MEDIUM	HIGH	HIGH	HIGH	HIGH	HIGH
5	NEW ORLEANS	PAARL	LOW	HIGH	HIGH	HIGH	HIGH	HIGH
6	JAMESTOWN 1	STELLENBOSCH	MEDIUM	HIGH	HIGH	HIGH	HIGH	HIGH
7	HERMATAGE	SWELLENDAM	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH

Table 9: RF1 – Risk due to living conditions (Highest Score 12)

Plakkerskamp (Langville) has a high occupant density of 153 occupants/hectare and high risk to living conditions scores; 66% has water, 27% electricity and 34% sanitation services. New Orleans in Paarl occupancy density is 222 occupants/hectare with a low water (56%), sanitation (58%) and electricity (45%) provision. Jamestown in Stellenbosch has a high score due to poor water (80%), electricity (0%) and sanitation (30%) services, and a high occupancy density (149 occupants/hectare). Hermatage (Swellendam) has a high occupancy density (295 occupants/hectare) and no water, sanitation or electricity services.

## 4.2 RF2 – Disaster Risk

The informal settlements with a high classification for disaster risk are shown in Table 10. Powertown (Klein Brakrivier), Asla Park (Mossel Bay), Joe Slovo Park (Mossel Bay), Mbekweni (Paarl), George (Vredenburg) and Vanwyksvlei (Wellington) have the highest score of 6 for disaster risk due to high flood and fire risks.

ID	AREA	TOWN	FIRE_CNT	FIRE_PERC	FIRE_CLS	FIRE_WEIGHT	FLOOD_CNT	FLOOD_PERC	FLOOD_CLS	FLOOD_WEIGHT	RISK_CNT	RISK_WEIGHT
1	POWERTOWN	KLEIN BRAKRIVIER	9	25.71	3	HIGH	10	15.15	3	HIGH	6	HIGH
2	ASLA PARK	MOSSEL BAY	7	20.00	3	HIGH	1	1.52	3	HIGH	6	HIGH
3	JOE SLOVO PARK	MOSSEL BAY	1	2.86	3	HIGH	4	6.06	3	HIGH	6	HIGH
4	MBEKWENI	PAARL	6	17.14	3	HIGH	5	7.58	3	HIGH	6	HIGH
5	GEORGE	VREDENBURG	5	14.29	3	HIGH	3	4.55	3	HIGH	6	HIGH
6	VANWYKSVLEI	WELLINGTON	3	8.57	3	HIGH	2	3.03	3	HIGH	6	HIGH
7	CHATSWORTH	ATLANTIS	23	65.71	2	MEDIUM	11	16.67	3	HIGH	5	HIGH
8	HEUWELSIG	CITRUSDAL	18	51.43	2	MEDIUM	16	24.24	3	HIGH	5	HIGH
9	SANDHILLS	DE DOORNS	17	48.57	2	MEDIUM	6	9.09	3	HIGH	5	HIGH
10	POLLOCROSS	ENDULI	12	34.29	2	MEDIUM	7	10.61	3	HIGH	5	HIGH
11	GREATER BRAK	GROOT BRAKRIVIER	15	42.86	2	MEDIUM	9	13.64	3	HIGH	5	HIGH
12	GREATER BRAK RIVER	GROOT BRAKRIVIER	15	42.86	2	MEDIUM	9	13.64	3	HIGH	5	HIGH
13	GROOTBRAK	GROOT BRAKRIVIER	15	42.86	2	MEDIUM	9	13.64	3	HIGH	5	HIGH
14	WOLWEDANS	GROOT BRAKRIVIER	15	42.86	2	MEDIUM	9	13.64	3	HIGH	5	HIGH

Table 10: RF2 – Disaster Risk (Highest Scores 6 & 5)

Chatsworth (Atlantis), Heuwelsig (Citrusdal), Sandhills (De Doorns), Pollocross (Enduli), Greater Brak (Groot Brakrivier), Greater Brak Rivir (Groot Brakrivier), Groot Brak (Groot Brakrivier) and Wolwedans (Groot Brakrivier) have scores of 5 where the flood risk was high and fire medium.

### 4.3 Vulnerability Index Results

A total of 88 informal settlements were identified with a high vulnerability index. Zwelitsha (Bredasdorp) has a score of 16 where the risk due to living conditions is high and flood risk low and fire high. The informal settlement has poor water (53.97%), electricity (71.43%) and sanitation (46.03%) services, and a high occupancy density (175 occupants/hectare).

ID	AREA	TOWN	DENO_WEIGHT	WAT_WEIGHT	ELEC_WEIGHT	SAN_WEIGHT	SE_WEIGHT	FIRE_WEIGHT	FLOOD_WEIGHT	RISK_WEIGHT	V_WEIGHT
1	ZWELITSHA	BREDASDORP	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	LOW	MEDIUM	HIGH
2	JOE SLOVO PARK	MOSEL BAY	HIGH	LOW	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
3	JAMESTOWN 1	STELLENBOSCH	HIGH	HIGH	HIGH	HIGH	HIGH	LOW	HIGH	MEDIUM	HIGH
4	KHAYELITSHA (VREDENDAL)	VREDENDAL	MEDIUM	HIGH	HIGH	HIGH	HIGH	HIGH	LOW	MEDIUM	HIGH
5	SANDKAMP	CITRUSDAL	HIGH	HIGH	HIGH	HIGH	HIGH	LOW	LOW	LOW	HIGH

Table 11: Vulnerability Index (Highest Scores 16 & 15)

Joe Slovo Park (Mossel Bay) has good water provision but high occupant density (93 occupants/hectare) and poor electricity provision (10%), sanitation services (64%). Fire and flood risks are both high. Jamestown in Stellenbosch has a high score due to poor water (80%), electricity (0%) and sanitation (30%) services, and a high occupancy density (149 occupants/hectare) with a low fire risk and high flood risk. Khayelitsha (Vredendal) experience poor water (66%), sanitation (34%) or electricity (0.32%) services and a medium occupancy density of 75 occupants/hectare. The fire and flood risk are high and low respectively.

## 5 Challenges and Difficulties

Various difficulties were experienced in this study due to the integration of other completed products into this project. Solutions were used that will minimise the impact on the final result.

## 5.1 National Housing Demand Database

The National Housing Demand database forms the foundations of this project as it contains the coordinates of all informal settlement dwellings and the socio-economic data. Any errors, spatially or tabular, would result in margin of error in the final vulnerability index result. This database contained a total of 100 146 records from which a 107 points had to be deleted due to either empty coordinate fields or incorrect latitude coordinates. This 100 039 records was joined with the cleaned profile database that was done by Soreaso Social Research Solutions and 97 056 records were linked. It was also found that different coordinates were stacked on each other, sometimes up to four points. This did not influence the density calculations, however.

Different spellings were used for the same informal settlement which caused for 1917 unique names before cleaning this field. Errors were also evident where two neighbouring settlements will have their names mixed in the point shapefile. See Figure 4 for graphical explanation. Topographic maps were used as background layer in the GIS to edit settlements name. The socio-economic data was captured in both upper and lower case and was changed to a uniform format. After the completion of the cleaning, the database had 96 873 records.

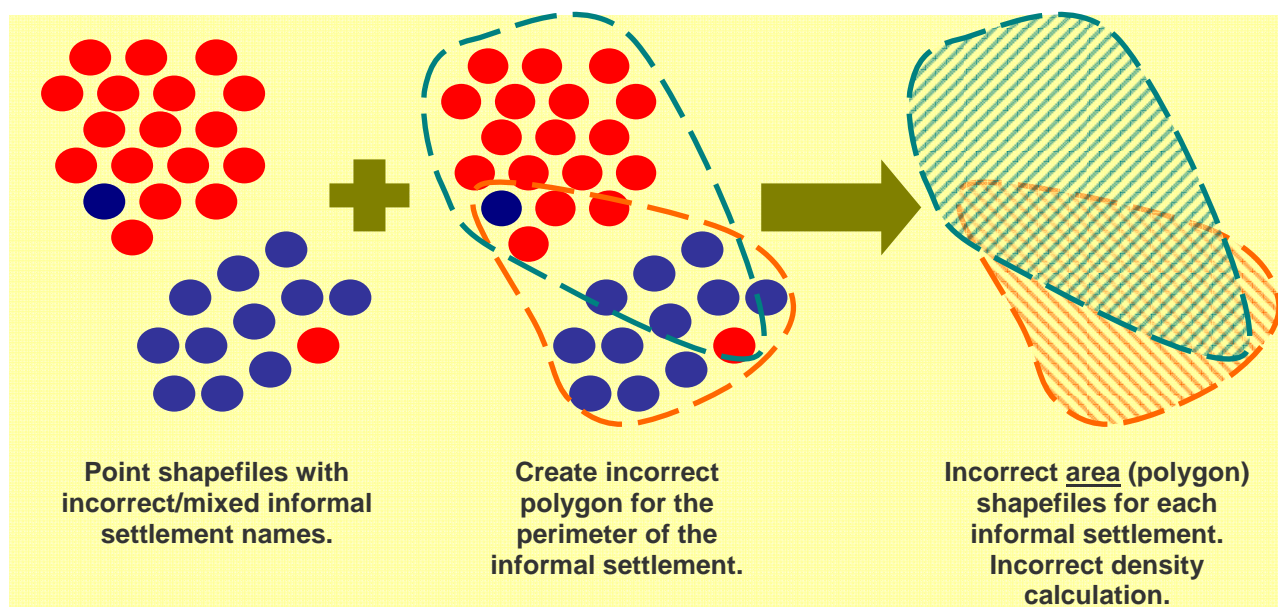


Figure 4: Incorrect Settlement Name Use

The dwelling type (informal settlement, backyard dwelling) was determined by exporting the cleaned point shapefile into a Google Earth file, kml, and viewing it in Google Earth. In areas where it was difficult to determine the type, it was indicated as “UNSURE”.

## **5.2 Disaster Risk Analysis**

The integration of the Disaster Risk Analysis was difficult due to the coverage of the NHD database. Data was captured for the whole of Western Cape Province except City of Cape Town area when the database was provided for this project. The Risk Analysis included the Cape Town area and most of the prioritised informal settlements were situated in City of Cape Town area, especially for the fire hazard. Another difficulty was the different methodology used to capture the informal settlements for Risk Analysis. In the Risk Analysis data was captured during interviews where the settlements perimeters were mapped on an aerial photograph and imported into GIS. This resulted in a difference between informal settlements identified/captured in the Risk Analysis and the NHD database and prevented integration. A process was followed where the Risk Analysis polygon and the newly created NHD Informal Settlement shapefile polygon were overlaid and joined based on spatial location.

## **6 Conclusion**

The vulnerability index has been compiled based on the socio-economic data from the NHD database and the Disaster Risk Analysis. A total of 113 highly vulnerable informal settlements have been identified outside the City of Cape Town. This methodology used has relation to similar studies done for the City of Cape Town's Directorate Development Services. It was decided by the DPLG&H not to integrate these studies as important provincial hotspots will get lost in the City of Cape Town informal settlements. This study of the City of Cape Town can be obtained from the Director, Noahmaan Hendricks, of Development Services (021 400 3934 or noahmaan.hendricks@capetown.gov.za). This methodology should provide some indication of where there is a need for action outside the Cape Town area and can be re-implemented with updated data.



## 7 Reference studies

Beyers N 2008. Director, Desmond Tutu TB Centre: Clinical Research. University of Stellenbosch: Tygerberg Campus. Interviewed on 19 November about the mapping of TB cases to indicate health conditions for informal settlements.

Provincial Disaster Management 2008. *Disaster Management: Prioritisation of High Risk Areas in the Western Cape*. Cape Town: Western Cape Department of Local Government and Housing.



49	OUKAMP (STRUISBAAI)	35	67	0.42	84.09	2	MEDIUM	160.97	3	HIGH	35	100.00	1	LOW	22	62.86	3	HIGH	2	5.71	3	HIGH	10	HIGH
50	TARBIEF	10	35	2.28	4.38	1	LOW	15.33	1	LOW	4	40.00	3	HIGH	0	0.00	3	HIGH	0	0.00	3	HIGH	10	HIGH
51	CONVENT	16	17	0.06	286.93	3	HIGH	304.86	3	HIGH	9	56.25	3	HIGH	15	93.76	1	LOW	9	56.25	3	HIGH	10	HIGH
52	WHITE CITY (SWELLENDAM)	301	572	3.19	64.42	3	HIGH	179.42	3	HIGH	287	85.35	1	LOW	55	18.27	3	HIGH	189	62.79	3	HIGH	10	HIGH
53	RIVIER SE WAL	8	27	0.03	261.05	3	HIGH	881.05	3	HIGH	8	100.00	1	LOW	0	0.00	3	HIGH	0	0.00	3	HIGH	10	HIGH
54	BLOCK F	99	258	0.68	143.22	3	HIGH	373.23	3	HIGH	99	100.00	1	LOW	35	35.35	3	HIGH	37	37.37	3	HIGH	10	HIGH
55	VILLIERSDORP	886	3100	9.23	93.87	3	HIGH	336.03	3	HIGH	866	100.00	1	LOW	460	53.12	3	HIGH	250	28.87	3	HIGH	10	HIGH
56	WILDERNESS	21	68	1.48	14.17	1	LOW	45.88	2	MEDIUM	17	80.65	2	MEDIUM	0	0.00	3	HIGH	6	28.57	3	HIGH	10	HIGH
57	PINE VALLEY	307	975	10.01	30.68	1	LOW	97.43	3	HIGH	307	100.00	1	LOW	188	64.50	3	HIGH	109	35.50	3	HIGH	10	HIGH
58	ZOLANI	882	4647	72.32	12.20	1	LOW	64.26	2	MEDIUM	878	99.55	1	LOW	647	73.36	3	HIGH	672	78.19	3	HIGH	9	HIGH
59	NEW FRANCE	79	204	2.84	29.89	1	LOW	77.18	2	MEDIUM	79	100.00	1	LOW	0	0.00	3	HIGH	0	0.00	3	HIGH	9	HIGH
60	SUNNY SIDE ORCHARD	92	240	4.96	18.56	1	LOW	48.42	2	MEDIUM	92	100.00	1	LOW	55	59.78	3	HIGH	50	54.35	3	HIGH	9	HIGH
61	THEMALETHU-ZONE 6	758	1561	31.70	23.92	1	LOW	49.25	2	MEDIUM	720	64.99	1	LOW	14	1.85	3	HIGH	87	11.48	3	HIGH	9	HIGH
62	THEMALETHU-ZONE 7	1152	4254	58.76	19.28	1	LOW	71.19	2	MEDIUM	1128	97.92	1	LOW	779	67.82	3	HIGH	890	77.26	3	HIGH	9	HIGH
63	THEMALETHU-ZONE 8	1155	3344	54.18	21.31	1	LOW	81.71	2	MEDIUM	1136	98.35	1	LOW	729	63.12	3	HIGH	748	64.85	3	HIGH	9	HIGH
64	GOEDGEGIN	5	23	0.31	16.14	1	LOW	74.23	2	MEDIUM	2	40.00	3	HIGH	1	20.00	3	HIGH	5	100.00	1	LOW	9	HIGH
65	DARK SIDE	65	177	2.73	23.82	1	LOW	64.87	2	MEDIUM	65	100.00	1	LOW	0	0.00	3	HIGH	0	0.00	3	HIGH	9	HIGH
66	HILLSIDE	13	42	0.58	22.54	1	LOW	72.82	2	MEDIUM	13	100.00	1	LOW	0	0.00	3	HIGH	0	0.00	3	HIGH	9	HIGH
67	IRAQ	68	167	3.63	16.72	1	LOW	45.97	2	MEDIUM	67	98.53	1	LOW	0	0.00	3	HIGH	5	7.35	3	HIGH	9	HIGH
68	ZWELIHLI	3214	5201	87.71	36.64	1	LOW	59.30	2	MEDIUM	2843	82.23	2	MEDIUM	1812	56.38	3	HIGH	2869	83.04	2	MEDIUM	9	HIGH
69	KLEINKRANTZ	48	142	52.65	0.91	1	LOW	2.70	1	LOW	39	81.25	2	MEDIUM	0	0.00	3	HIGH	13	27.08	3	HIGH	9	HIGH
70	DAM SE BOS	851	2896	44.09	19.30	1	LOW	61.14	2	MEDIUM	851	100.00	1	LOW	405	47.59	3	HIGH	9	1.06	3	HIGH	9	HIGH
71	EDAMINI	218	611	8.84	24.65	1	LOW	69.09	2	MEDIUM	217	99.54	1	LOW	94	43.12	3	HIGH	0	0.00	3	HIGH	9	HIGH
72	KANONKOP	33	117	1.80	20.57	1	LOW	72.92	2	MEDIUM	33	100.00	1	LOW	25	75.76	3	HIGH	1	3.03	3	HIGH	9	HIGH
73	NEKKIES	909	2508	38.41	23.67	1	LOW	65.30	2	MEDIUM	908	99.89	1	LOW	270	29.70	3	HIGH	310	34.10	3	HIGH	9	HIGH
74	NEWREST	81	145	9.15	8.85	1	LOW	15.85	1	LOW	66	81.48	2	MEDIUM	1	1.23	3	HIGH	0	0.00	3	HIGH	9	HIGH
75	VEDELHUISE	77	135	2.87	26.82	1	LOW	47.01	2	MEDIUM	74	96.10	1	LOW	0	0.00	3	HIGH	1	1.30	3	HIGH	9	HIGH
76	MALGAS	8	22	0.42	19.04	1	LOW	52.37	2	MEDIUM	8	100.00	1	LOW	0	0.00	3	HIGH	0	0.00	3	HIGH	9	HIGH
77	NEW HORIZONS 2	109	269	5.72	19.06	1	LOW	52.29	2	MEDIUM	104	95.41	1	LOW	4	3.67	3	HIGH	18	16.51	3	HIGH	9	HIGH
78	LAWAIIKAMP (ROBERTSON)	227	573	7.77	29.22	1	LOW	73.76	2	MEDIUM	223	88.24	1	LOW	152	66.96	3	HIGH	24	10.57	3	HIGH	9	HIGH
79	ROBERTSON	324	890	22.14	14.64	1	LOW	40.20	1	LOW	287	88.58	2	MEDIUM	215	66.36	3	HIGH	79	24.38	3	HIGH	9	HIGH
80	BEVERLEY HILLS (SEDFIELD)	89	239	3.02	29.45	1	LOW	79.10	2	MEDIUM	86	86.63	1	LOW	0	0.00	3	HIGH	53	59.55	3	HIGH	9	HIGH
81	SIZAMILE	407	862	11.19	36.38	1	LOW	77.05	2	MEDIUM	402	88.77	1	LOW	39	9.58	3	HIGH	319	78.38	3	HIGH	9	HIGH
82	SLANGPARK	113	208	2.76	40.98	1	LOW	75.44	2	MEDIUM	113	100.00	1	LOW	5	4.42	3	HIGH	88	77.88	3	HIGH	9	HIGH
83	CLOETESVILLE 1	150	472	2.37	63.27	2	MEDIUM	199.09	3	HIGH	148	98.67	1	LOW	117	78.00	3	HIGH	123	82.00	2	MEDIUM	9	HIGH
84	HARMONY PARK	142	572	6.66	21.32	1	LOW	85.87	2	MEDIUM	142	100.00	1	LOW	75	52.82	3	HIGH	109	76.76	3	HIGH	9	HIGH
85	DIE PLAAT	18	74	13.08	1.37	1	LOW	5.65	1	LOW	10	55.56	3	HIGH	6	33.33	3	HIGH	15	83.33	2	MEDIUM	9	HIGH
86	TOUWSRANTEN	51	155	4.97	10.26	1	LOW	31.19	1	LOW	44	86.27	2	MEDIUM	19	37.25	3	HIGH	28	54.90	3	HIGH	9	HIGH

## Appendix B: RF2 – Disaster risk results

ID	AREA	TOWN	FIRE_CNT	FIRE_PERC	FIRE_CLS	FIRE_WEIGHT	FLOOD_CNT	FLOOD_PERC	FLOOD_CLS	FLOOD_WEIGHT	RISK_CNT	RISK_WEIGHT
1	POWERTOWN	KLEIN BRAKRIVIER	9	25.71	3	HIGH	10	15.15	3	HIGH	6	HIGH
2	ASLA PARK	MOSSEL BAY	7	20.00	3	HIGH	1	1.52	3	HIGH	6	HIGH
3	JOE SLOVO PARK	MOSSEL BAY	1	2.86	3	HIGH	4	6.06	3	HIGH	6	HIGH
4	MBEKWENI	PAARL	6	17.14	3	HIGH	5	7.58	3	HIGH	6	HIGH
5	GEORGE	VREDENBURG	5	14.29	3	HIGH	3	4.55	3	HIGH	6	HIGH
6	VANWYKSVLEI	WELLINGTON	3	8.57	3	HIGH	2	3.03	3	HIGH	6	HIGH
7	CHATSWORTH	ATLANTIS	23	65.71	2	MEDIUM	11	16.67	3	HIGH	5	HIGH
8	HEUWELSIG	CITRUSDAL	18	51.43	2	MEDIUM	16	24.24	3	HIGH	5	HIGH
9	SANDHILLS	DE DOORNS	17	48.57	2	MEDIUM	6	9.09	3	HIGH	5	HIGH
10	POLLOCROSS	ENDULI	12	34.29	2	MEDIUM	7	10.61	3	HIGH	5	HIGH
11	GREATER BRAK	GROOT BRAKRIVIER	15	42.86	2	MEDIUM	9	13.64	3	HIGH	5	HIGH
12	GREATER BRAK RIVER	GROOT BRAKRIVIER	15	42.86	2	MEDIUM	9	13.64	3	HIGH	5	HIGH
13	GROOTBRAK	GROOT BRAKRIVIER	15	42.86	2	MEDIUM	9	13.64	3	HIGH	5	HIGH
14	WOLWEDANS	GROOT BRAKRIVIER	15	42.86	2	MEDIUM	9	13.64	3	HIGH	5	HIGH
15	KWA MANDLENKOSI	BEAUFORT-WEST	28	80.00	1	LOW	15	22.73	3	HIGH	4	MEDIUM
16	ZWELITSHA	BREDASDORP	10	28.57	3	HIGH	66	100.00	1	LOW	4	MEDIUM
17	KHAYELITSHA (CITRUSDAL)	CITRUSDAL	25	71.43	1	LOW	14	21.21	3	HIGH	4	MEDIUM
18	PINEVIEW	GRABOUW	2	5.71	3	HIGH	66	100.00	1	LOW	4	MEDIUM
19	BOSSIEGIF	PLETTENBERG BAY	35	100.00	1	LOW	18	27.27	3	HIGH	4	MEDIUM
20	MANDELA UITBREIDING	RIVERSDALE	35	100.00	1	LOW	21	31.82	3	HIGH	4	MEDIUM
21	MIDDELPOS	SALDANHA	4	11.43	3	HIGH	66	100.00	1	LOW	4	MEDIUM
22	JAMESTOWN 1	STELLENBOSCH	24	68.57	1	LOW	12	18.18	3	HIGH	4	MEDIUM
23	WITZENVILLE	TULBAGH	8	22.86	3	HIGH	63	95.45	1	LOW	4	MEDIUM
24	KHAYELITSHA (VREDENDAL)	VREDENDAL	11	31.43	3	HIGH	66	100.00	1	LOW	4	MEDIUM
25	RAINBOW VILLAGE	ALBERTINIA	35	100.00	1	LOW	22	33.33	2	MEDIUM	3	MEDIUM
26	THERONSVILLE	ALBERTINIA	35	100.00	1	LOW	22	33.33	2	MEDIUM	3	MEDIUM
27	BLANCO	BLANCO	35	100.00	1	LOW	25	37.88	2	MEDIUM	3	MEDIUM
28	KHAYELITSHA (CLANWILLIAM)	CLANWILLIAM	19	54.29	2	MEDIUM	66	100.00	1	LOW	3	MEDIUM
29	BOKKRAAL	DYSSELSDORP	35	100.00	1	LOW	26	39.39	2	MEDIUM	3	MEDIUM
30	PACALTSDORP	GEORGE	35	100.00	1	LOW	34	51.52	2	MEDIUM	3	MEDIUM
31	PACALTSDORP F	GEORGE	35	100.00	1	LOW	40	60.61	2	MEDIUM	3	MEDIUM
32	PROTEA PARK	GEORGE	35	100.00	1	LOW	36	54.55	2	MEDIUM	3	MEDIUM
33	ROSEMORE	GEORGE	35	100.00	1	LOW	35	53.03	2	MEDIUM	3	MEDIUM
34	BERVELLY HILLS	GRABOUW	14	40.00	2	MEDIUM	66	100.00	1	LOW	3	MEDIUM
35	SONSKYNVALLEI	HARTENBOS	20	57.14	2	MEDIUM	51	77.27	1	LOW	3	MEDIUM
36	BLIKKIESDORP	HEIDELBERG	35	100.00	1	LOW	41	62.12	2	MEDIUM	3	MEDIUM
37	DOLLARS SQUARE	HEIDELBERG	35	100.00	1	LOW	41	62.12	2	MEDIUM	3	MEDIUM
38	HEIDELBERG EAST	HEIDELBERG	35	100.00	1	LOW	41	62.12	2	MEDIUM	3	MEDIUM
39	JOE SLOVO PARK (HEIDELBERG)	HEIDELBERG	35	100.00	1	LOW	41	62.12	2	MEDIUM	3	MEDIUM
40	LAWAAIKAMP	HEIDELBERG	35	100.00	1	LOW	41	62.12	2	MEDIUM	3	MEDIUM
41	DAM SE BOS	KNYSNA	35	100.00	1	LOW	23	34.85	2	MEDIUM	3	MEDIUM
42	ETHEMBENI	KNYSNA	35	100.00	1	LOW	43	65.15	2	MEDIUM	3	MEDIUM
43	FLENTER	KNYSNA	35	100.00	1	LOW	43	65.15	2	MEDIUM	3	MEDIUM
44	HORNLEE	KNYSNA	35	100.00	1	LOW	42	63.64	2	MEDIUM	3	MEDIUM
45	JOODSE KAMP	KNYSNA	35	100.00	1	LOW	43	65.15	2	MEDIUM	3	MEDIUM
46	NEKKIES	KNYSNA	35	100.00	1	LOW	24	36.36	2	MEDIUM	3	MEDIUM
47	RHOBOLOLO	KNYSNA	35	100.00	1	LOW	43	65.15	2	MEDIUM	3	MEDIUM
48	WHITE LOCATION	KNYSNA	35	100.00	1	LOW	43	65.15	2	MEDIUM	3	MEDIUM
49	XOLWENI	KNYSNA	35	100.00	1	LOW	43	65.15	2	MEDIUM	3	MEDIUM
50	ILINGELETHU	MALMESBURY	16	45.71	2	MEDIUM	66	100.00	1	LOW	3	MEDIUM
51	D'ALMEIDA	MOSSEL BAY	35	100.00	1	LOW	30	45.45	2	MEDIUM	3	MEDIUM
52	ELANGENI	MOSSEL BAY	35	100.00	1	LOW	28	42.42	2	MEDIUM	3	MEDIUM
53	EXTENSION 6	MOSSEL BAY	35	100.00	1	LOW	33	50.00	2	MEDIUM	3	MEDIUM
54	EXTENSION 8	MOSSEL BAY	35	100.00	1	LOW	31	46.97	2	MEDIUM	3	MEDIUM
55	KWANONQABA EXT 1	MOSSEL BAY	35	100.00	1	LOW	27	40.91	2	MEDIUM	3	MEDIUM
56	TARKA	MOSSEL BAY	35	100.00	1	LOW	32	48.48	2	MEDIUM	3	MEDIUM
57	JOE SLOVO PARK	RIVIERSONDEREND	21	60.00	2	MEDIUM	47	71.21	1	LOW	3	MEDIUM
58	EXTENTION 7	VILLIERSDORP	35	100.00	1	LOW	37	56.06	2	MEDIUM	3	MEDIUM
59	VILLIERSDORP	VILLIERSDORP	35	100.00	1	LOW	37	56.06	2	MEDIUM	3	MEDIUM
60	VILLIERSDORP 1	VILLIERSDORP	35	100.00	1	LOW	37	56.06	2	MEDIUM	3	MEDIUM

## Appendix C: Vulnerability Index Results

ID	AREA	TOWN	DWELL_NO	OCCUPANTS	HECTARE	DENS_DWELL	DEND_WEIGHT	DENS_OCCUP	DENO_WEIGHT	MAT_WEIGHT	ELEC_WEIGHT	SAN_WEIGHT	SE_CNT	SE_WEIGHT	FIRE_WEIGHT	FLOOD_WEIGHT	RISK_CNT	RISK_WEIGHT	VLCNT	VL_WEIGHT
0	ABBOTSDALE	ABBOTSDALE	41	258	86.30	0.48	LOW	2.90	LOW	LOW	LOW	LOW	4	LOW	LOW	LOW	LOW	LOW	6	LOW
1	RAINBOW VILLAGE	ALBERTINIA	31	82	13.89	2.23	LOW	6.62	LOW	LOW	LOW	LOW	4	LOW	LOW	MEDIUM	3	MEDIUM	7	MEDIUM
2	THERONSVILLE	ALBERTINIA	61	318	14.74	4.14	LOW	21.58	LOW	LOW	MEDIUM	LOW	5	MEDIUM	MEDIUM	3	MEDIUM	8	MEDIUM	
3	ASHTON	ASHTON	283	1337	47.40	5.97	LOW	28.20	LOW	LOW	HIGH	LOW	8	MEDIUM	LOW	2	LOW	8	MEDIUM	
4	ZOLANI	ASHTON	882	4647	72.32	12.20	LOW	64.26	MEDIUM	LOW	HIGH	HIGH	9	HIGH	LOW	2	LOW	11	HIGH	
5	BO-KRAAL	ASKRAAL	30	110	2.77	10.83	LOW	39.70	LOW	MEDIUM	MEDIUM	HIGH	8	MEDIUM	LOW	2	LOW	10	MEDIUM	
6	UITBREIDING 1	ASKRAAL	27	100	39.19	0.89	LOW	2.56	LOW	LOW	HIGH	HIGH	8	MEDIUM	LOW	2	LOW	9	MEDIUM	
7	UITBREIDING 2	ASKRAAL	43	179	158.04	0.27	LOW	1.13	LOW	LOW	MEDIUM	HIGH	7	MEDIUM	LOW	2	LOW	9	MEDIUM	
8	CHATSWORTH	ATLANTIS	72	339	59.25	1.22	LOW	5.72	LOW	HIGH	LOW	LOW	6	MEDIUM	HIGH	5	HIGH	11	HIGH	
9	PAALHANDE	BARRYDALE	9	19	3.48	2.59	LOW	5.47	LOW	HIGH	HIGH	HIGH	10	HIGH	LOW	2	LOW	12	HIGH	
10	RONDOMSKRIK	BARRYDALE	7	12	1.80	3.89	LOW	6.66	LOW	HIGH	HIGH	LOW	6	MEDIUM	LOW	2	LOW	10	MEDIUM	
11	SMITHSVILLE	BARRYDALE	36	119	21.25	1.69	LOW	5.90	LOW	MEDIUM	HIGH	LOW	7	MEDIUM	LOW	2	LOW	9	MEDIUM	
12	HILLSIDE (BEAUFORT-WEST)	BEAUFORT-WEST	129	667	34.25	3.77	LOW	19.48	LOW	LOW	LOW	LOW	4	LOW	LOW	2	LOW	6	LOW	
13	HILLSIDE TWO	BEAUFORT-WEST	340	1248	10.88	31.90	LOW	116.91	HIGH	LOW	LOW	LOW	6	MEDIUM	LOW	2	LOW	8	MEDIUM	
14	KWA MANDLENKOSI	BEAUFORT-WEST	555	2461	78.49	7.97	LOW	31.35	LOW	HIGH	MEDIUM	LOW	7	MEDIUM	HIGH	4	MEDIUM	11	HIGH	
15	MIDTOWN	BEAUFORT-WEST	6	20	0.12	50.07	MEDIUM	166.89	HIGH	LOW	LOW	LOW	6	MEDIUM	LOW	2	LOW	8	MEDIUM	
16	MIDTOWN PARK	BEAUFORT-WEST	170	846	9.41	18.06	LOW	89.87	MEDIUM	LOW	LOW	LOW	5	MEDIUM	LOW	2	LOW	7	MEDIUM	
17	SPOORWEG (BEAUFORT-WEST)	BEAUFORT-WEST	38	179	4.79	7.84	LOW	37.39	LOW	LOW	LOW	LOW	4	LOW	LOW	2	LOW	6	LOW	
18	TOEKOMSRUS	BEAUFORT-WEST	180	818	8.39	28.19	LOW	128.09	HIGH	LOW	LOW	LOW	6	MEDIUM	LOW	2	LOW	8	MEDIUM	
19	MOOUTSIG	BETTIESBAAI	10	41	0.84	11.95	LOW	48.99	MEDIUM	HIGH	HIGH	HIGH	11	HIGH	LOW	2	LOW	13	HIGH	
20	DMA	BITTERFONTEIN	13	27	17.57	0.74	LOW	1.54	LOW	LOW	LOW	LOW	6	MEDIUM	LOW	2	LOW	8	MEDIUM	
21	BLANCO	BLANCO	86	354	48.85	1.78	LOW	7.25	LOW	LOW	HIGH	HIGH	8	MEDIUM	LOW	3	MEDIUM	11	HIGH	
22	BONNIEVALE	BONNIEVALE	322	1566	21.25	15.15	LOW	73.22	MEDIUM	LOW	HIGH	LOW	7	MEDIUM	LOW	2	LOW	9	MEDIUM	
23	HAPPYVALLEY	BONNIEVALE	490	2318	50.50	9.70	LOW	45.90	MEDIUM	LOW	HIGH	MEDIUM	8	MEDIUM	LOW	2	LOW	10	MEDIUM	
24	PLAKERSKAMP (BONNIEVALE)	BONNIEVALE	85	262	3.19	26.62	LOW	82.64	MEDIUM	LOW	MEDIUM	HIGH	8	MEDIUM	LOW	2	LOW	10	MEDIUM	
25	NEW FRANCE	BOTRIEVER	79	204	2.64	29.89	LOW	77.18	MEDIUM	LOW	HIGH	HIGH	9	HIGH	LOW	2	LOW	11	HIGH	
26	SUCCESSION AVE	BOTRIEVER	23	56	1.81	14.28	LOW	34.16	LOW	LOW	LOW	LOW	4	LOW	LOW	2	LOW	8	LOW	
27	KLEIN BEGIN	BREDASDORP	73	351	5.12	14.27	LOW	68.59	MEDIUM	LOW	MEDIUM	LOW	6	MEDIUM	LOW	2	LOW	8	MEDIUM	
28	ZWELITSHA	BREDASDORP	441	1471	8.38	52.64	MEDIUM	175.58	HIGH	HIGH	HIGH	HIGH	12	HIGH	LOW	4	MEDIUM	16	HIGH	
29	BUFFELJAGSRIVIER	BUFFELJAGSRIVIER	162	843	14.30	12.73	LOW	58.95	MEDIUM	LOW	HIGH	LOW	7	MEDIUM	LOW	2	LOW	9	MEDIUM	
30	BUFFELSJAG	BUFFELSJAGHT	18	63	0.49	38.54	LOW	107.59	HIGH	LOW	HIGH	LOW	8	MEDIUM	LOW	2	LOW	10	MEDIUM	
31	BERGSIG	CALITZDORP	326	1972	47.49	6.86	LOW	41.53	LOW	LOW	HIGH	HIGH	8	MEDIUM	LOW	2	LOW	10	MEDIUM	
32	EILAND RESORT	CERES	27	116	1.41	19.18	LOW	82.38	MEDIUM	LOW	MEDIUM	LOW	6	MEDIUM	LOW	2	LOW	8	MEDIUM	
33	ROOKAMP	CERES	129	847	11.78	10.97	LOW	72.02	MEDIUM	LOW	MEDIUM	LOW	6	MEDIUM	LOW	2	LOW	8	MEDIUM	
34	HEUWELTSH	CITRUSDAL	100	338	15.98	6.26	LOW	21.15	LOW	LOW	MEDIUM	HIGH	7	MEDIUM	HIGH	5	HIGH	12	HIGH	
35	KHAYELITSHA (CITRUSDAL)	CITRUSDAL	46	125	1.77	25.92	LOW	70.44	MEDIUM	LOW	HIGH	MEDIUM	8	MEDIUM	HIGH	4	MEDIUM	10	HIGH	
36	ORANJEVILLE	CITRUSDAL	44	117	5.90	7.46	LOW	19.84	LOW	LOW	HIGH	HIGH	8	MEDIUM	LOW	2	LOW	10	MEDIUM	
37	SANDKAMP	CITRUSDAL	26	59	0.47	54.83	MEDIUM	124.42	HIGH	HIGH	HIGH	HIGH	12	HIGH	LOW	2	LOW	14	HIGH	
38	HOPLAND (CLANWILLIAM)	CLANWILLIAM	242	746	3.82	83.41	MEDIUM	195.47	HIGH	LOW	HIGH	LOW	8	MEDIUM	LOW	2	LOW	10	MEDIUM	
39	KHAYELITSHA (CLANWILLIAM)	CLANWILLIAM	62	153	5.96	10.40	LOW	25.85	LOW	LOW	HIGH	LOW	6	MEDIUM	LOW	2	LOW	9	MEDIUM	
40	OUKAMP	CLANWILLIAM	6	30	0.22	27.83	LOW	139.16	HIGH	LOW	HIGH	LOW	8	MEDIUM	LOW	2	LOW	10	MEDIUM	
41	SEDERVILLE	CLANWILLIAM	4	22	0.01	377.83	HIGH	2078.06	HIGH	LOW	LOW	LOW	6	MEDIUM	LOW	2	LOW	8	MEDIUM	
42	COVIE	COVIE	3	6	0.34	8.87	LOW	17.75	LOW	LOW	LOW	LOW	4	LOW	LOW	2	LOW	6	LOW	
43	CRAGS	CRAGS	251	637	6.63	37.85	LOW	96.07	HIGH	HIGH	HIGH	HIGH	12	HIGH	LOW	2	LOW	14	HIGH	
44	BHONGOLWETHU	DE DOORNS	1307	3457	24.53	140.92	MEDIUM	140.92	HIGH	LOW	HIGH	LOW	8	MEDIUM	LOW	2	LOW	10	MEDIUM	
45	EAST	DE DOORNS	114	310	6.56	17.39	LOW	47.38	MEDIUM	LOW	HIGH	LOW	7	MEDIUM	LOW	2	LOW	9	MEDIUM	
46	EBALENI	DE DOORNS	106	374	1.70	62.42	MEDIUM	220.24	HIGH	LOW	HIGH	LOW	8	MEDIUM	LOW	2	LOW	10	MEDIUM	
47	EKUPHUMLENI	DE DOORNS	1235	3719	25.27	48.87	MEDIUM	147.17	HIGH	LOW	HIGH	LOW	8	MEDIUM	LOW	2	LOW	10	MEDIUM	









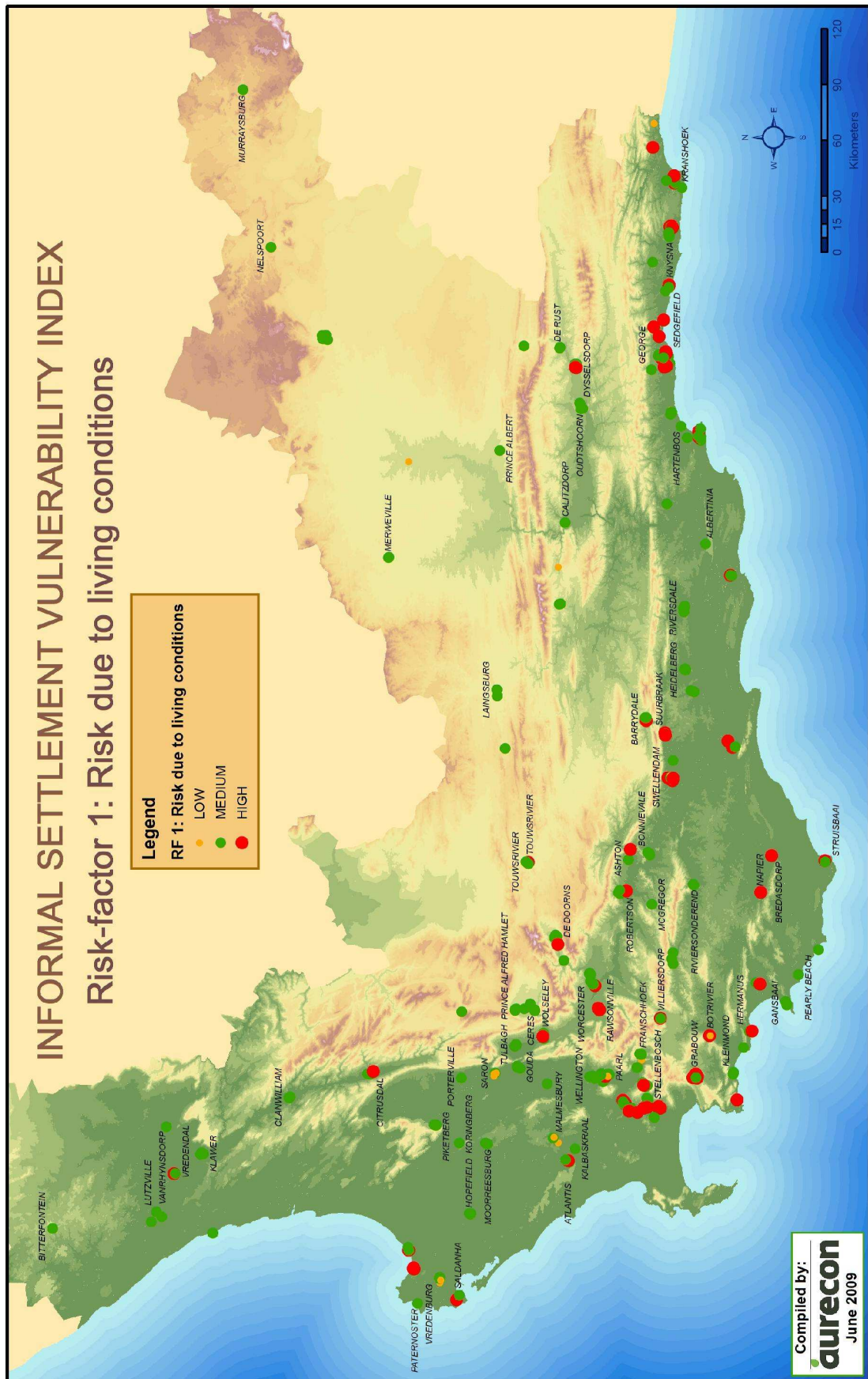




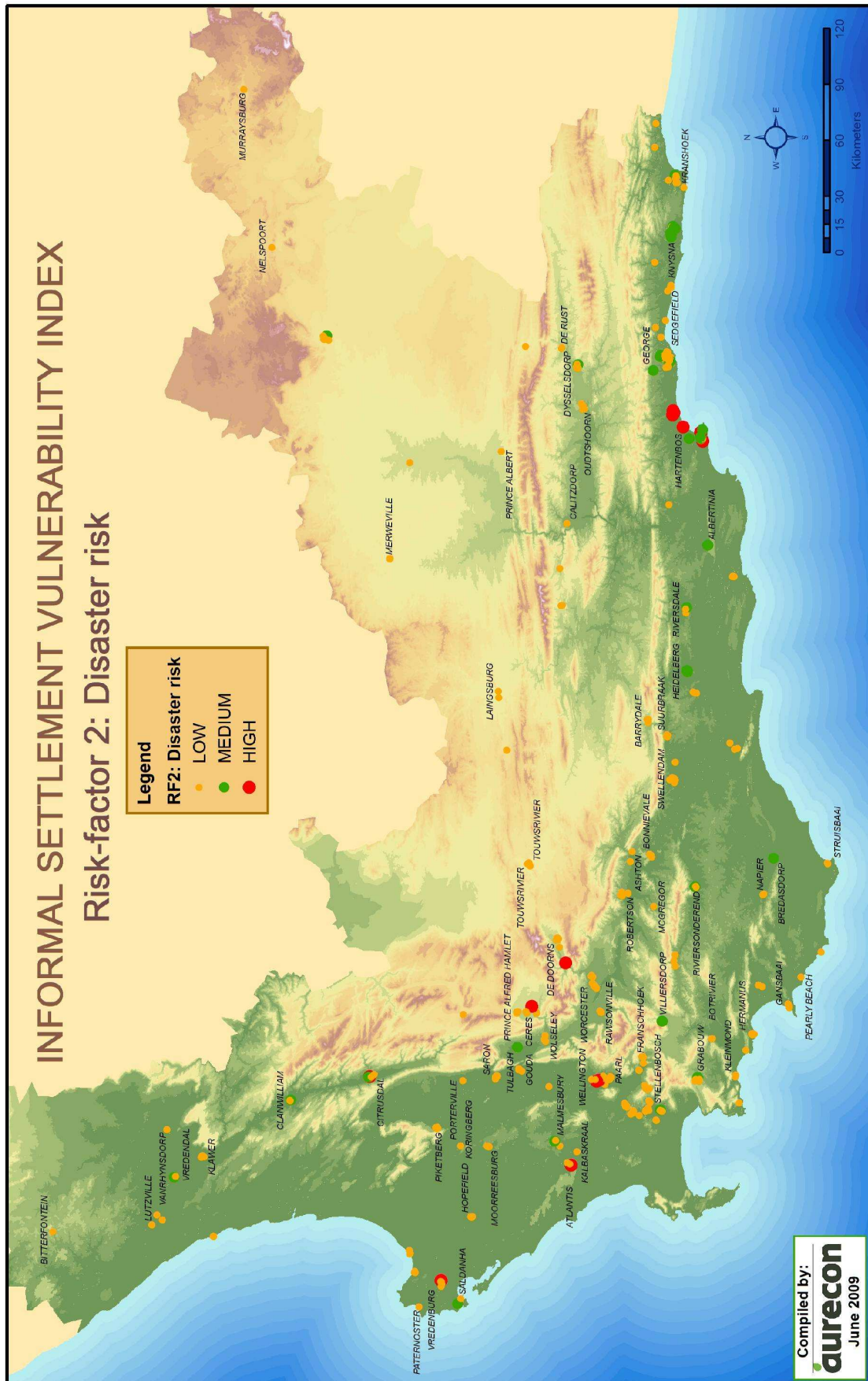


384	MONTANA	WOLSELEY	383	972	68.68	5.29	LOW	14.15	LOW	LOW	HIGH	LOW	LOW	6	MEDIUM	LOW	LOW	2	LOW	8	MEDIUM
385	PINE VALLEY	WOLSELEY	307	975	10.01	30.68	LOW	97.43	HIGH	LOW	HIGH	LOW	LOW	10	HIGH	LOW	LOW	2	LOW	12	HIGH
386	AVIAN PARK	WORCESTER	1672	7306	95.68	17.48	LOW	76.36	MEDIUM	HIGH	HIGH	LOW	LOW	11	HIGH	LOW	LOW	2	LOW	13	HIGH
387	CONSTANCIA	WORCESTER	95	586	2.62	36.20	LOW	223.31	HIGH	LOW	LOW	LOW	LOW	6	MEDIUM	LOW	LOW	2	LOW	8	MEDIUM
388	ESSELEN PARK	WORCESTER	194	1281	2.06	94.05	HIGH	621.02	HIGH	LOW	MEDIUM	LOW	LOW	7	MEDIUM	LOW	LOW	2	LOW	9	MEDIUM
389	MANDELA	WORCESTER	1612	6405	62.37	25.85	LOW	102.70	HIGH	LOW	MEDIUM	LOW	LOW	7	MEDIUM	LOW	LOW	2	LOW	9	MEDIUM
390	RIVERVIEW	WORCESTER	22	88	7.86	2.80	LOW	10.94	LOW	LOW	HIGH	LOW	LOW	8	MEDIUM	LOW	LOW	2	LOW	8	MEDIUM
391	VAN HUYSTEENLAAN	WORCESTER	7	17	1.07	6.65	LOW	15.90	LOW	LOW	HIGH	LOW	LOW	6	MEDIUM	LOW	LOW	2	LOW	8	MEDIUM
392	WORCESTER	WORCESTER	13	48	11.22	1.16	LOW	4.28	LOW	LOW	HIGH	LOW	LOW	6	MEDIUM	LOW	LOW	2	LOW	8	MEDIUM
393	ZWELLETEMBA	WORCESTER	875	4686	51.20	17.09	LOW	91.13	HIGH	LOW	LOW	LOW	LOW	6	MEDIUM	LOW	LOW	2	LOW	8	MEDIUM
394	ZOAR	ZOAR	300	1479	261.81	1.15	LOW	5.65	LOW	LOW	LOW	LOW	LOW	4	LOW	LOW	LOW	2	LOW	6	LOW
395	VLOTTENBURG 2	STELLENBOSCH	21	71	0.95	22.18	LOW	74.99	MEDIUM	LOW	MEDIUM	LOW	LOW	6	MEDIUM	LOW	LOW	2	LOW	8	MEDIUM
396	TOUWSRIVIER	TOUWSRIVIER	3	16	0.05	58.17	MEDIUM	310.24	HIGH	LOW	HIGH	LOW	LOW	8	MEDIUM	LOW	LOW	2	LOW	10	MEDIUM

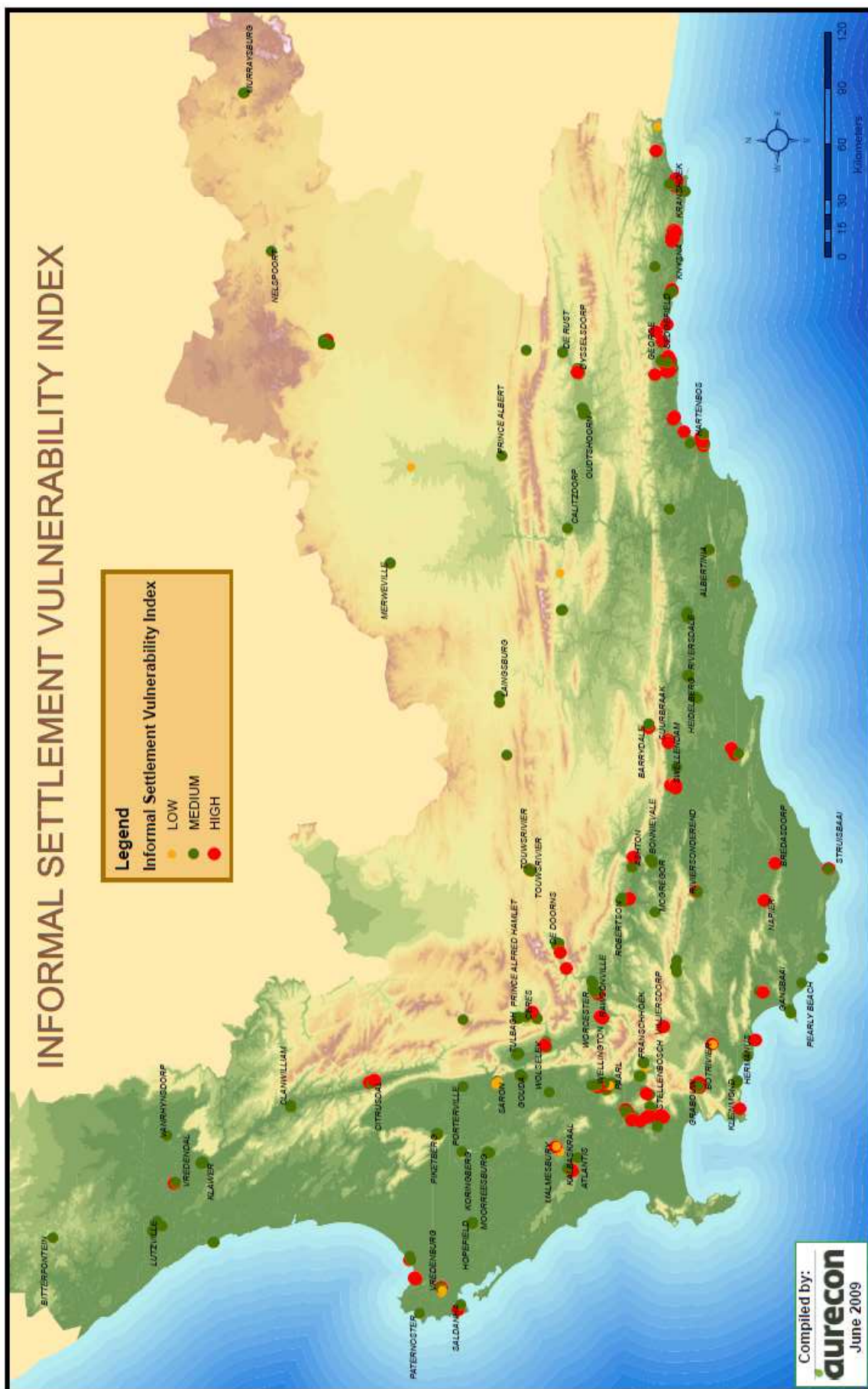
# Appendix D: RF1 – Risk due to living conditions (map)



## Appendix E: RF2 – Disaster risk (map)



# Appendix F: Informal Settlement Vulnerability Index (map)



## Appendix G: Field name descriptions

Field Name	Description
<b>FID</b>	Unique ID
<b>AREA</b>	Name of informal settlement
<b>TOWN</b>	Name of town
<b>JOIN</b>	Area, Town
<b>Cnt_JOIN</b>	Amount of informal dwellings per informal settlement
<b>HECTARE</b>	Area in hectare of informal settlement
<b>DENS_DWELL</b>	Density of informal settlement based on amount informal dwellings per hectare
<b>DEND_CLS</b>	Classification of informal dwelling density
<b>DEND_WEIGH</b>	Weighting of informal dwelling density
<b>Sum_OCCUPA</b>	Occupants per informal dwelling
<b>DENS_OCCUP</b>	Density of informal settlement based on amount occupants per hectare
<b>DENO_CLS</b>	Classification of informal occupant density
<b>DENO_WEIGH</b>	Weighting of informal occupant density
<b>Sum_SANI_C</b>	Sum of all informal dwellings with access to sanitation within informal settlement
<b>SAN_PERC</b>	Percentage of all informal dwellings with access to sanitation within informal settlement
<b>SAN_CLS</b>	Classification of sanitation availability
<b>SAN_WEIGHT</b>	Weighting of sanitation availability
<b>Sum_WATER_</b>	Sum of all informal dwellings with access to water within informal settlement
<b>WAT_PERC</b>	Percentage of all informal dwellings with access to water within informal settlement
<b>WAT_CLS</b>	Classification of water availability
<b>WAT_WEIGHT</b>	Weighting of water availability
<b>Sum_ELEC_C</b>	Percentage of all informal dwellings with access to electricity within informal settlement
<b>ELEC_PERC</b>	Percentage of all informal dwellings with access to electricity within informal settlement
<b>ELEC_CLS</b>	Classification of electricity provision
<b>ELEC_WEIGHT</b>	Weighting of electricity provision
<b>SE_CNT</b>	Total count for risk due to living conditions
<b>SE_WEIGHT</b>	Weighting of risk due to living conditions
<b>FIRE_CNT</b>	Count for risk due to fire hazards
<b>FIRE_PERC</b>	Fire risk percentage for each informal settlement
<b>FIRE_CLS</b>	Fire classification for each informal settlement
<b>FIRE_WEIGHT</b>	Fire weighting for each informal settlement
<b>FLOOD_CNT</b>	Count for risk due to flood hazards
<b>FLOOD_PERC</b>	Flood risk percentage for each informal settlement
<b>FLOOD_CLS</b>	Flood classification for each informal settlement
<b>FLOOD_WEIG</b>	Flood weighting for each informal settlement
<b>RISK_CNT</b>	Total count for disaster risk for each informal settlement
<b>RISK_WEIGHT</b>	Weighting for disaster risk for each informal settlement
<b>VI_CNT</b>	Total count for vulnerability index for each informal settlement
<b>VI_WEIGHT</b>	Weighting for vulnerability index for each informal settlement