



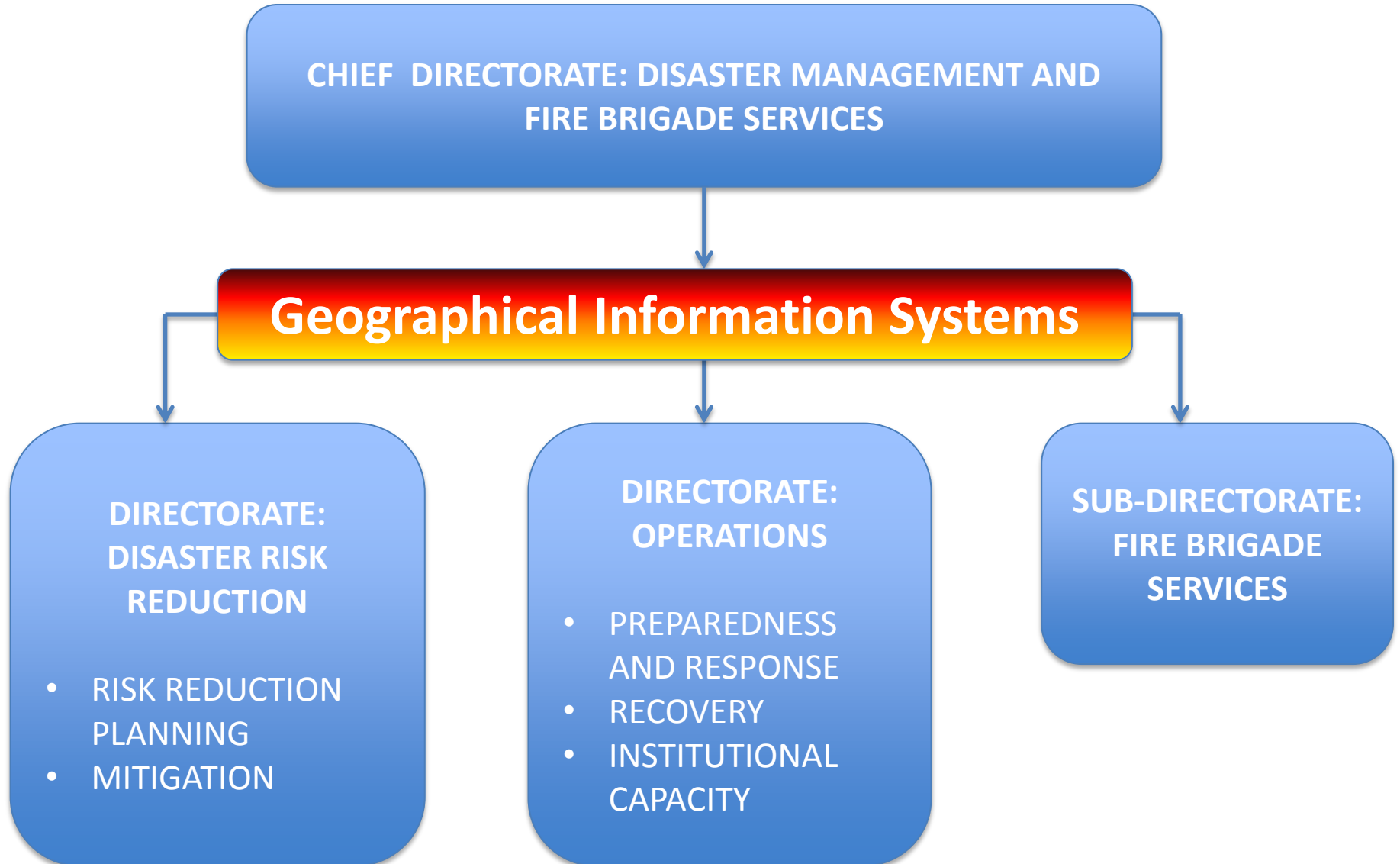
Western Cape
Government



THE USE OF GIS IN RISK REDUCTION PLANNING

N. Rylands 14 November 2013

WCDM Functions and Structure



Risk Identification and Assessment:

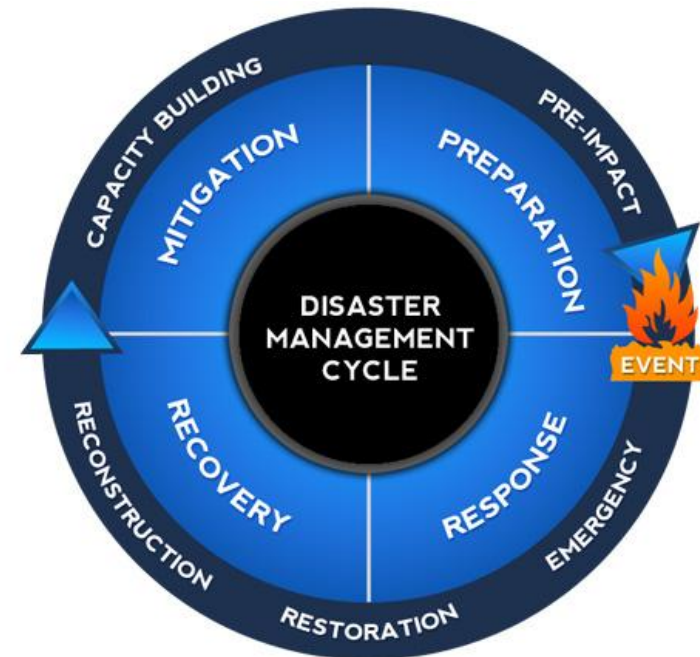
RISK IDENTIFICATION AND ASSESSMENT UNDERPINS AND INFORMS ALL RISK REDUCTION INITIATIVES

UPDATE OF DISTRICT LEVEL RISK ASSESSMENTS

- Development of a standardised risk assessment methodology
- Review all existing risk assessments
- **3 year process**
- **GIS used in Risk and Vulnerability mapping**

ASSISTANCE TO LOCAL MUNICIPALITIES:

- **MICRO/COMMUNITY BASED RISK ASSESSMENT:**
 - Workshops throughout municipality – ward level
 - Key Stakeholders:
 - Ratepayers
 - CPF's
 - Ward Committees
 - Municipal Officials
- Hazard mapping during workshops
- Identification of RR projects



Main Risks in the Western Cape

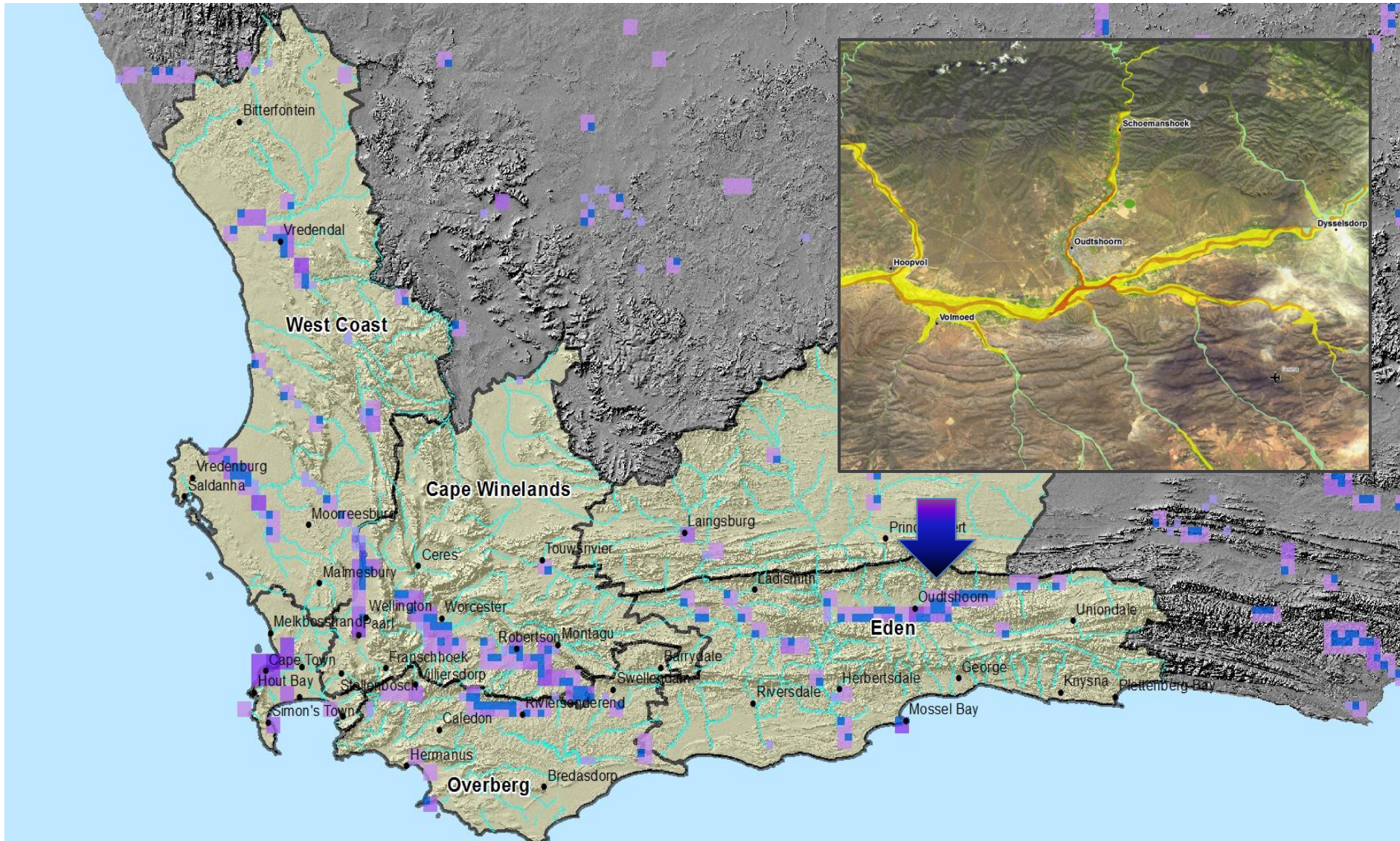
- **Flooding**
- **Fires**
- **Drought**
- **Human and Animal Diseases**
- **HAZMAT spill**



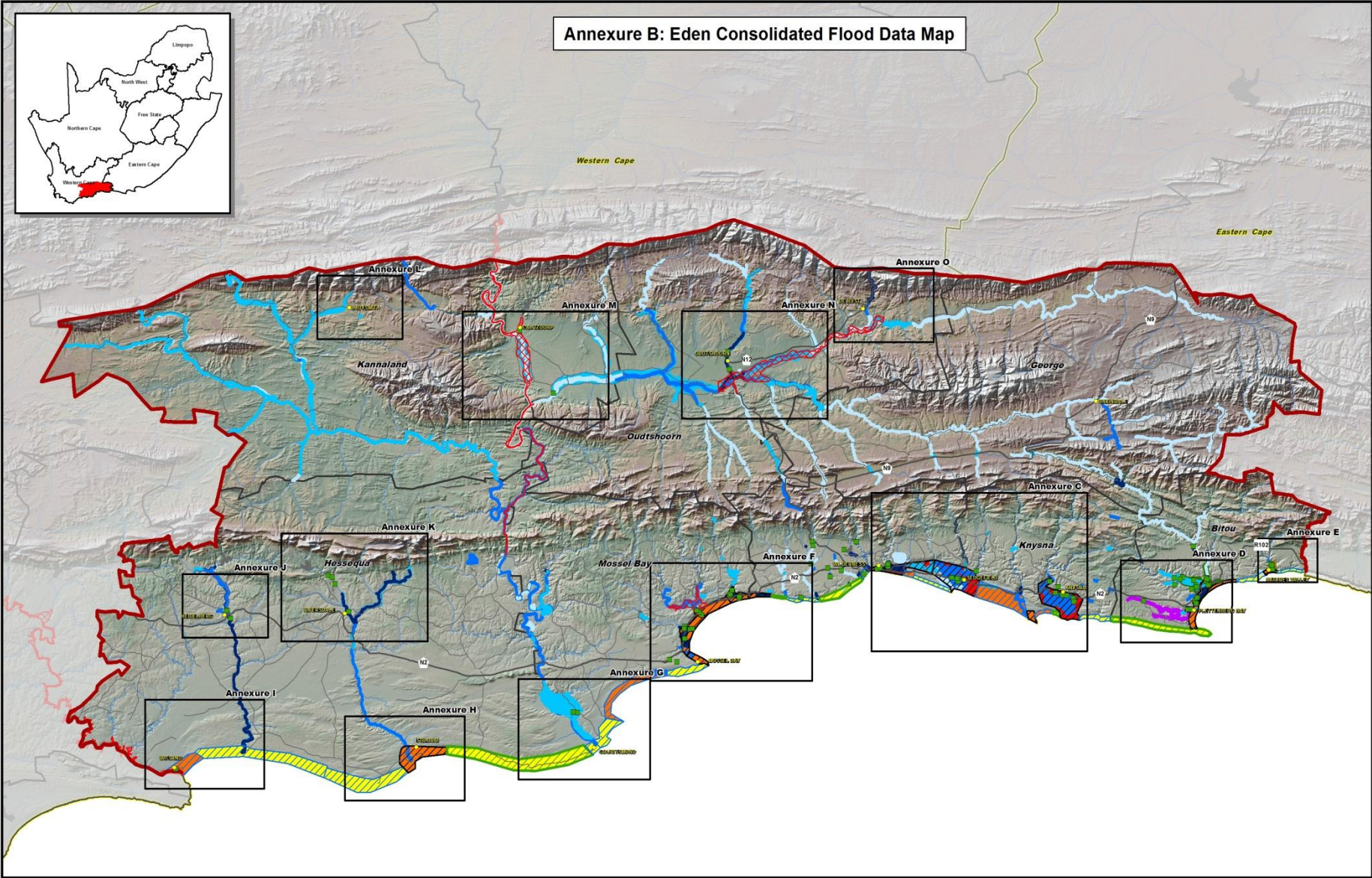
Reuters



Flood Risk for Western Cape



Annexure B: Eden Consolidated Flood Data Map



Legend

- Towns
- Flood Data - Workshop Results
- Rivers
- Highways
- Secondary Roads
- Eden District Boundary
- Local Municipality Bnd
- Provincial Boundaries
- Dams

Legend

Eden Flood Severity Index

- Low
- Medium
- High
- Very High

Dam Break Scenarios

- Keurbooms River Flood Hazards
- Piesang River Flood Hazards
- Grootrivier Flood Hazards

Legend

Eden sea level rise and flood risk assessment results (2010)

Sea level rise induced coastal erosion and inundation risk

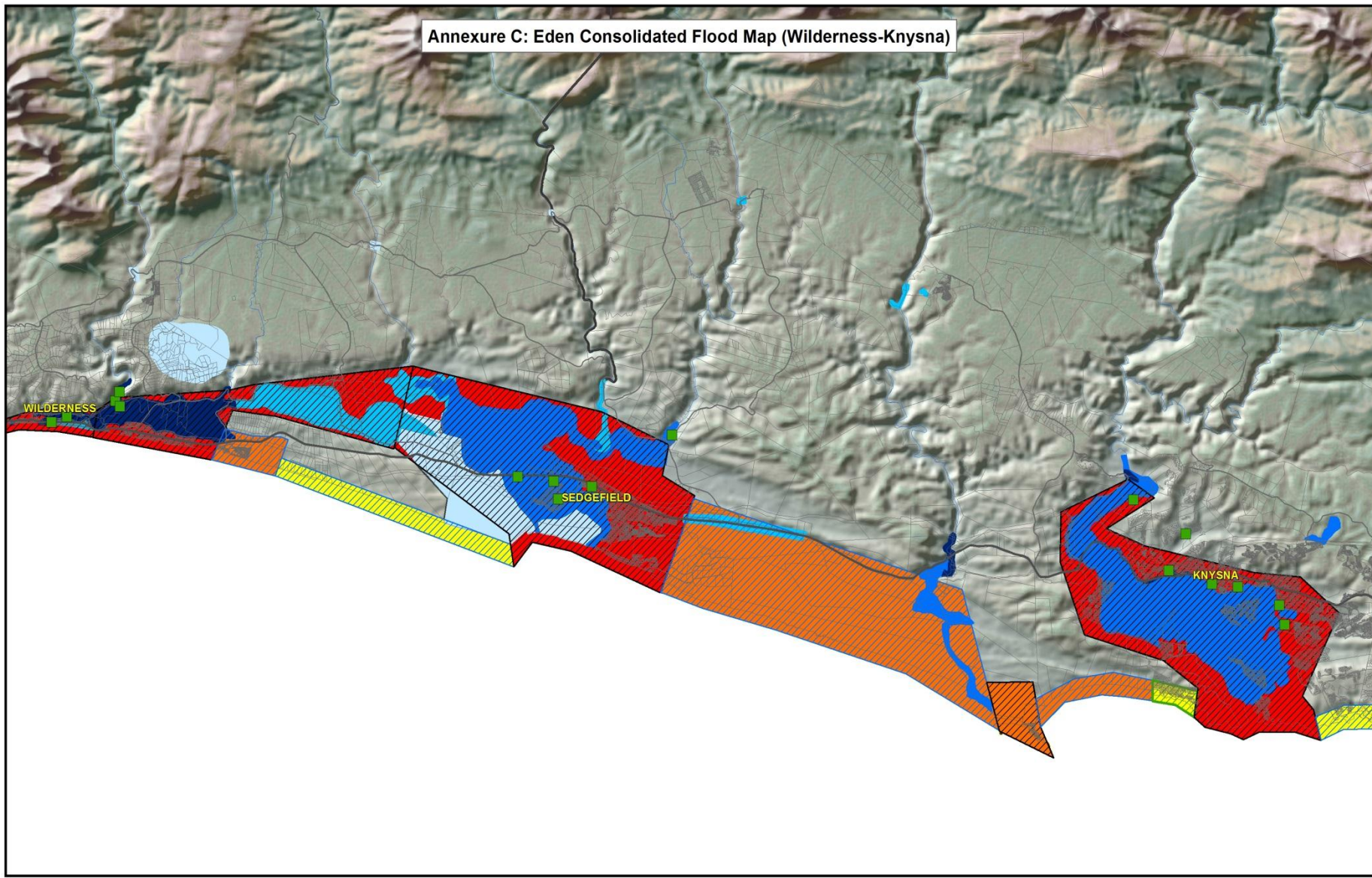
- Low
- Moderate
- High

Extreme Events risk (storm surges of tsunamis)

- Low
- Moderate
- High



Annexure C: Eden Consolidated Flood Map (Wilderness-Knysna)



Legend

- Flood Data - Workshop Results
- Rivers
- Highways
- Secondary Roads
- Eden District Boundary
- Cadastral
- Local Municipality Bnd
- Provincial Boundaries
- Dams

Legend

Eden Flood Severity Index

- Low
- Medium
- High
- Very High
- Dam Break Scenarios

Legend


Eden sea level rise and flood risk assessment results (2010)

Sea level rise induced coastal erosion and inundation risk

- Low
- Moderate
- High

Extreme Events risk (storm surges of tsunamis)

- Low
- Moderate
- High



Early Warning – Automatic Rainfall Sensors

User Menu

- update profile
- view rainfall map
- query & display data
- change password
- contact us

 Logout



Early Warning – Automatic Rainfall Sensors - Data



South African
Weather Service

ISO 9001 Certified Organisation

Rainfall Data Display Portal

Nicholson.lavemia

User Menu

- update profile
- view rainfall map
- query & display data
- change password
- contact us



Logout

Stations

0028565 3 GEORGE-GEELHOUTBOOM ARS
0724435 6 GIYANI - NSAMI DAM ARS
0441270B2 GOEDGEVONDEN ARS
0475736B8 GOUDKOPPIES ARS
0513239A0 GRAND CENTRAL AIRPORT ARS
0080457 5 GRANTA - ARS
0680055 1 GRAVELLOTE-RUBBERVALE ARS
0680176 6 GRAVELLOTTE ARS
0678776A7 HAENERTSBURG ARS
0009783X9 HEIDELBERG - KRUISRIVIER ARS
0365058A4 HENNENMAN ARS
0029229 3 HEROLD-LOVAIN ARS

Data Interval

- Five Minute
- Daily
- Hourly

Start Date

07/15/2013 00:00

End Date

07/22/2013 00:00

View Data

*Required input: Station, Data Interval, Startdate and End-date

Station Name	Latitude	Longitude	Height	Date and Time	Rain (mm)
GEORGE-GEELHOUTBOOM ARS	-33.9308	22.3250	346	7/15/2013 12:00:00 AM	1.4
GEORGE-GEELHOUTBOOM ARS	-33.9308	22.3250	346	7/16/2013 12:00:00 AM	0.0
GEORGE-GEELHOUTBOOM ARS	-33.9308	22.3250	346	7/17/2013 12:00:00 AM	0.0
GEORGE-GEELHOUTBOOM ARS	-33.9308	22.3250	346	7/18/2013 12:00:00 AM	0.0
GEORGE-GEELHOUTBOOM ARS	-33.9308	22.3250	346	7/19/2013 12:00:00 AM	0.4

Extract Data

Early Warning – DWA Dam and River Flows - Map



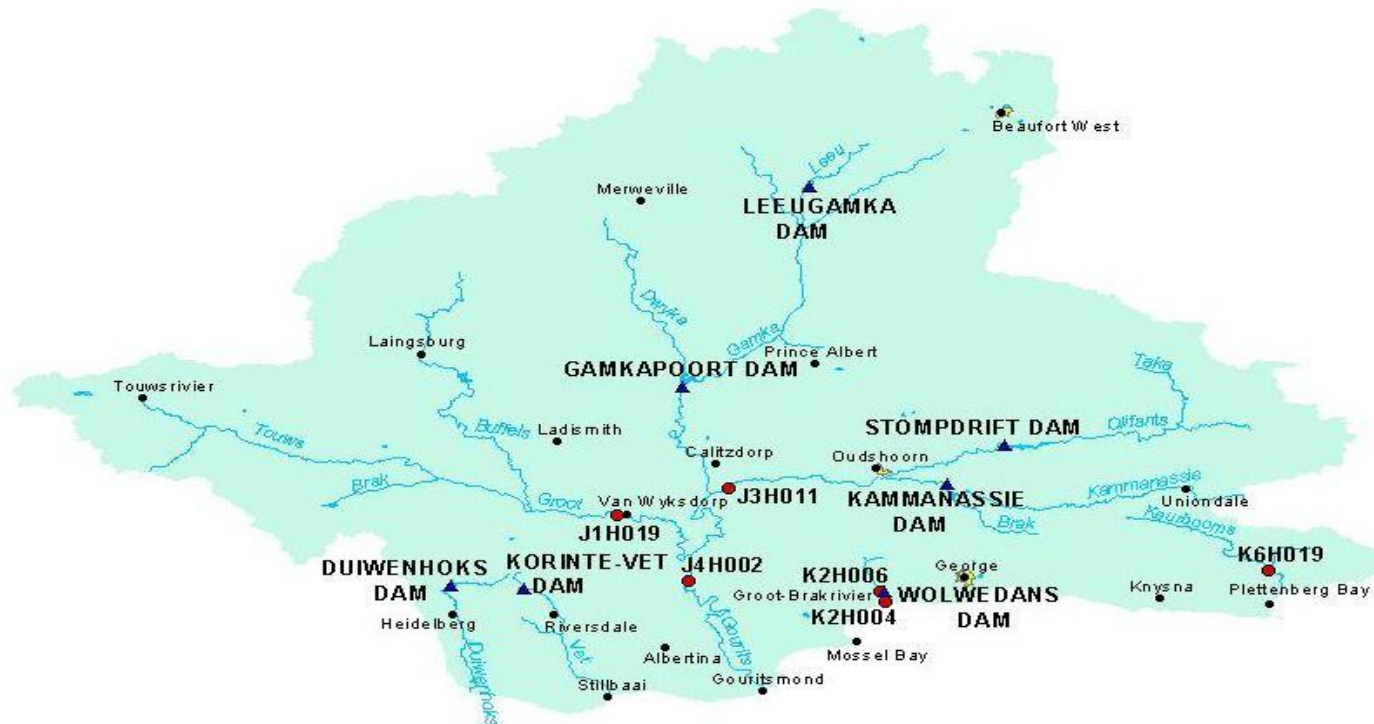
water affairs

Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA



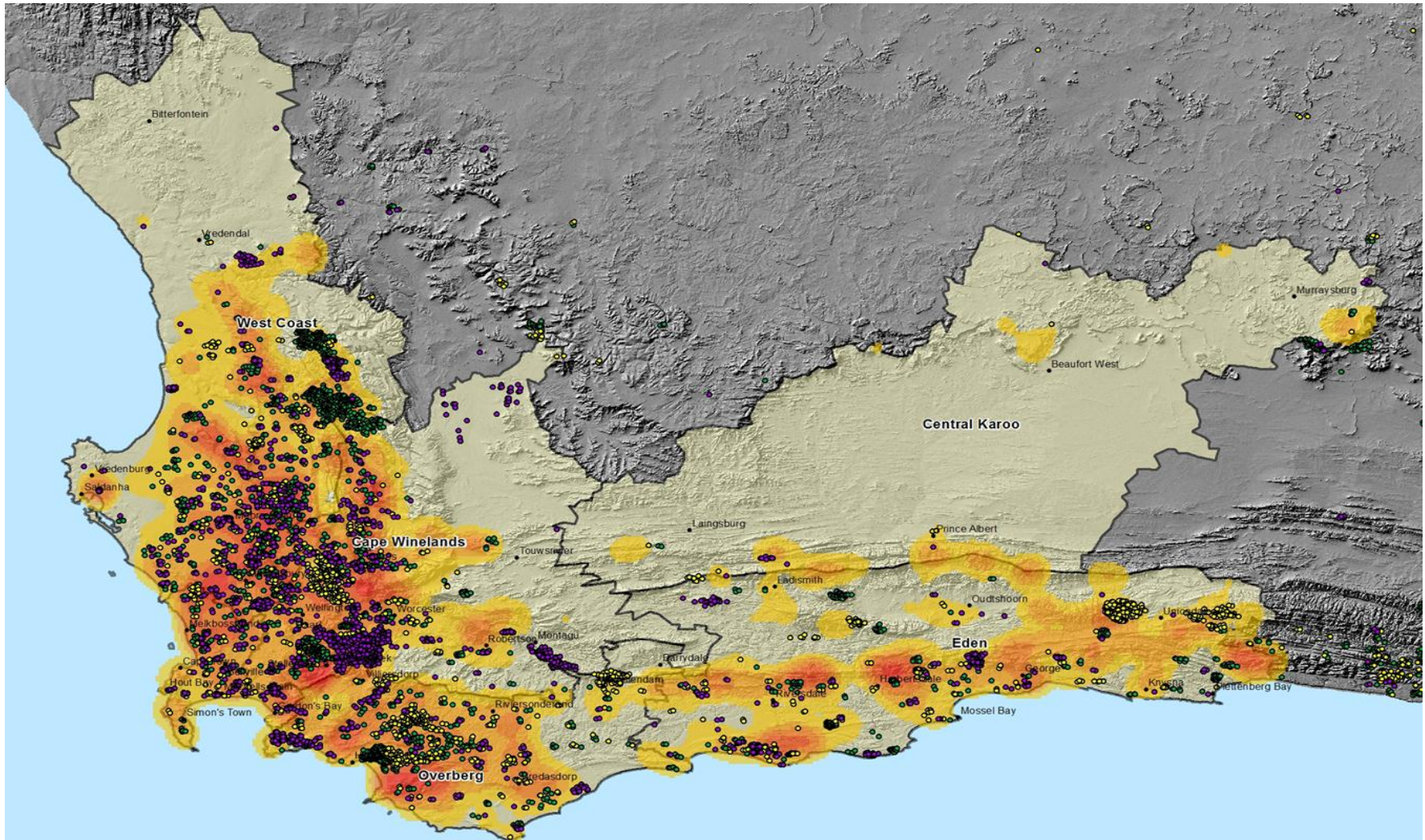
Home

16: Gouritz

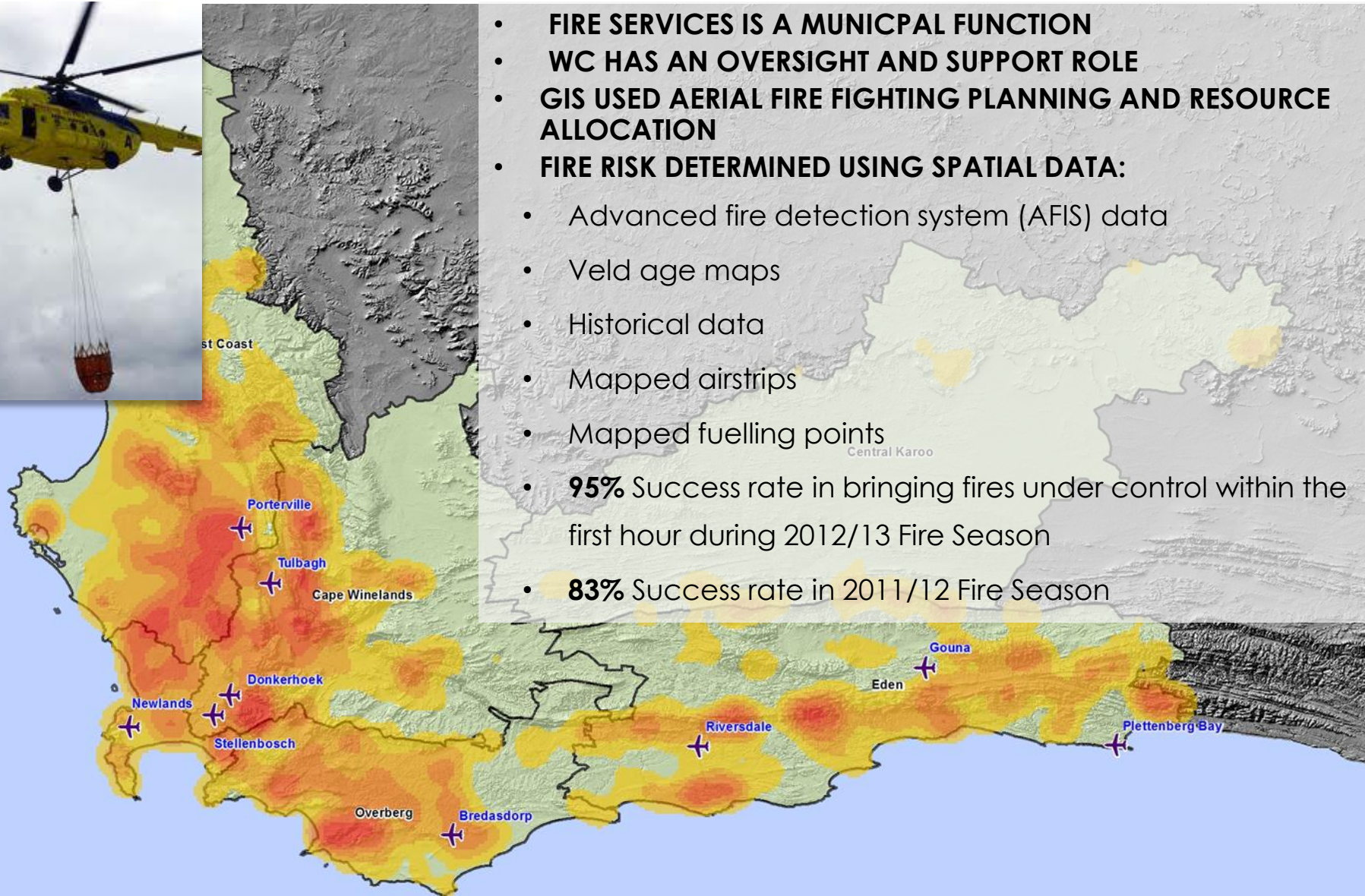


Fire Risk in Western Cape

Fire incidents from 2010 to 2013 as captured by AFIS



Western Cape Fire Brigade Services



- FIRE SERVICES IS A MUNICIPAL FUNCTION
- WC HAS AN OVERSIGHT AND SUPPORT ROLE
- GIS USED AERIAL FIRE FIGHTING PLANNING AND RESOURCE ALLOCATION
- FIRE RISK DETERMINED USING SPATIAL DATA:
 - Advanced fire detection system (AFIS) data
 - Veld age maps
 - Historical data
 - Mapped airstrips
 - Mapped fuelling points
 - **95%** Success rate in bringing fires under control within the first hour during 2012/13 Fire Season
 - **83%** Success rate in 2011/12 Fire Season

Risk is...

Risk

The chance of harmful effects occurring due to the interaction between a hazard and vulnerable conditions. Dynamic nature of risk.



**Disaster
Risk**

=



Hazard

X



Vulnerability

Reduce or avoid



Capacity



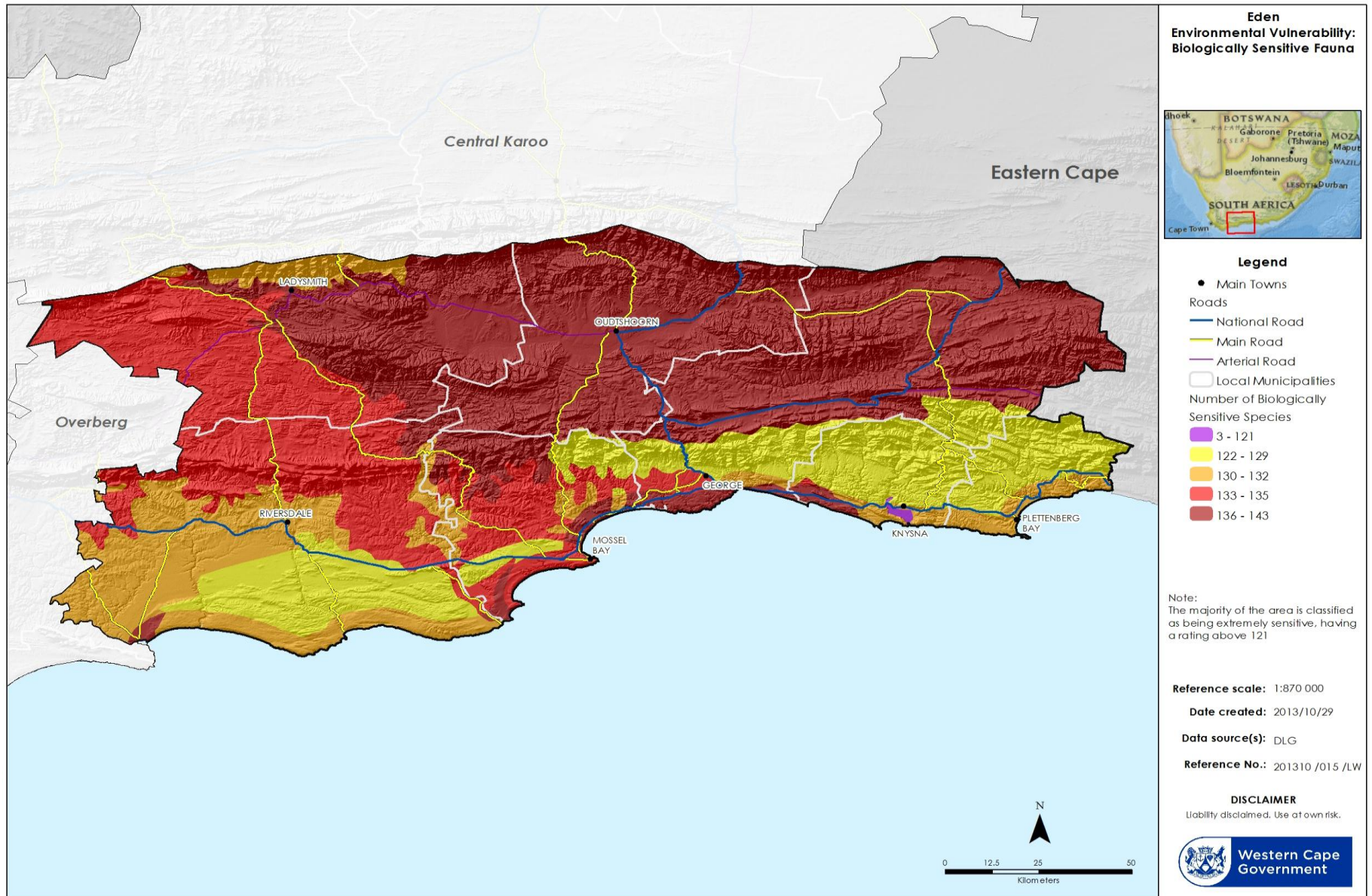
Increase



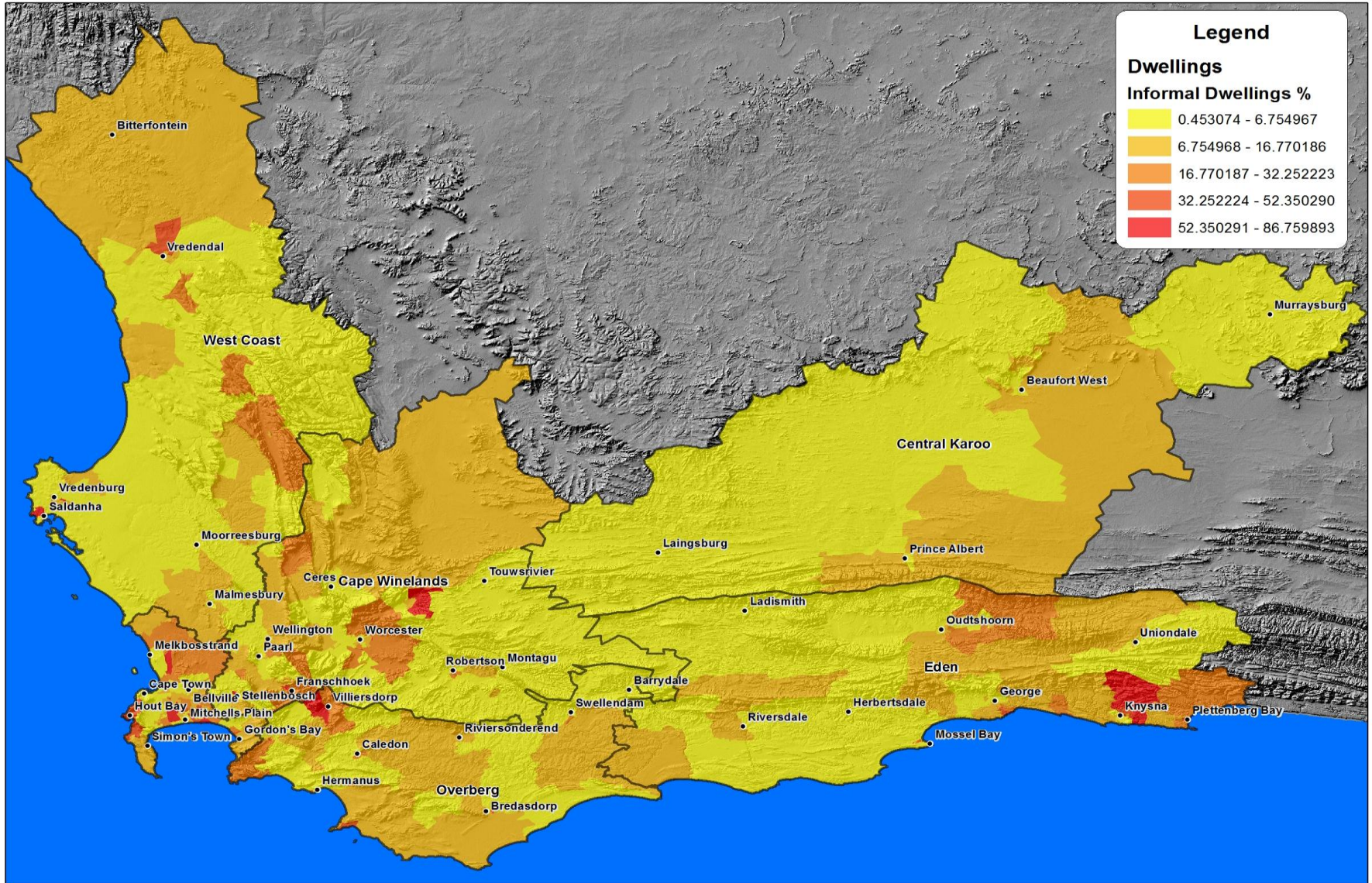
Risk Prioritisation

HAZARD CATEGORY	HAZARD	HAZARD				Vulnerability						CAPACITY						Relative Risk Rating	Relative Risk Priority	
		Score: 4. Very Likely 3. Likely 2. Unlikely 1. Rare	Score: 4. Monthly/weekly 3. Every 1-2 years 2. Every 2-5 years 1. Every 5-10 years	Score: 4. Major 3. Serious 2. Minor 1. Negligible	Hazard Rating	Vulnerability Score: 4. Extremely Vulnerable 3. Seriously Vulnerable 2. Slightly Vulnerable 1. Not Vulnerable					Vulnerability Rating	Capacity Score: 4. Very Good 3. Good 2. Poor 1. Very Poor								Capacity Rating
						Political	Economical	Social	Technological	Environmental		Physical Planning and Engineering	Societal Capacity	Economic Capacity	People Capacity and Competencies	Management Capacity	Institutional capacity			
Natural - Biological	Animal diseases	3	3	4	10	1	3	3	3	2	12	3	3	3	3	4	4	20	6.000	tolerable
Natural - Biological	Human diseases	3	4	3	10	2	3	3	1	1	10	3	3	2	3	3	3	17	5.882	tolerable
Natural - Biological	Wild fire	4	4	3	11	1	3	3	3	4	14	2	3	3	3	3	3	17	3.053	high
Natural - Geological	Coastal erosion	3	3	3	9	1	2	2	3	3	11	2	2	2	2	3	3	14	7.071	tolerable
Natural - Geological	Sea level rise	3	1	3	7	1	4	3	3	3	14	2	2	2	2	2	2	12	8.167	high
Environmental	Predator Animals	3	4	2	9	1	2	2	2	2	9	2	2	2	2	2	2	12	6.750	tolerable
Natural - Hydrom. - Atmosphere	Drought	3	2	4	9	2	4	3	2	3	14	3	2	3	3	3	3	17	7.412	high
Natural - Hydrom. - Atmosphere	Severe weather (strong wind)	4	3	2	9	1	2	2	2	2	9	2	3	3	3	3	3	17	4.765	tolerable
Natural - Hydrom. - Oceanographic	Storm surge	3	2	3	8	2	3	3	3	3	14	2	2	2	2	3	3	14	8.000	high
Natural - Hydrom. - Water	Floods	4	3	4	11	1	3	3	3	3	13	2	3	3	3	3	3	17	8.412	high
Technological - Critical infrastructure	Dam failure	1	1	3	5	1	3	3	3	3	11	3	2	2	3	3	3	16	3.438	low
Technological - Critical infrastructure	Disruption of electricity	2	2	3	7	1	3	3	3	1	11	2	3	3	3	3	3	17	4.529	tolerable
Technological - Critical infrastructure	Water Quality and Wastewater Management	3	3	3	9	1	3	3	1	3	11	2	2	2	2	3	3	14	7.071	tolerable
Technological - Transport incidents	Aircraft incident	2	2	3	7	1	3	3	3	2	12	3	2	3	3	3	3	17	4.941	tolerable
Natural - Geological	Seismic hazards	1	1	4	6	1	4	3	3	3	14	2	2	3	2	2	2	13	6.462	tolerable
Technological - Transport incidents	Road incident	4	4	3	11	1	3	3	2	1	10	3	3	3	3	3	3	18	6.111	tolerable
Technological - Industrial/Urban	Structural Fires	3	4	2	9	1	2	3	2	2	10	2	3	3	3	3	3	17	5.294	tolerable
Technological - Transport incidents	Petrochemical hazards	2	4	4	10	1	4	4	4	3	16	3	2	3	3	3	3	17	9.412	high
Technological - Industrial/Urban	HAZMAT: road or rail	3	4	3	10	1	3	2	2	4	12	2	2	3	3	3	3	16	7.500	high
Technological - Industrial/Urban	HAZMAT: ocean spill	2	2	3	7	1	3	3	1	4	12	3	2	3	3	3	3	17	4.941	tolerable
Environmental	Alien Invasive Species	3	3	3	9	1	2	2	2	4	11	3	2	2	3	3	3	16	6.188	tolerable
Environmental	Waste Management	2	2	2	6	1	2	2	2	2	9	3	2	2	3	3	3	16	3.375	low
Technological - Industrial/Urban	Social Conflict	2	3	3	8	3	3	3	2	2	13	2	2	2	2	2	2	12	8.667	high

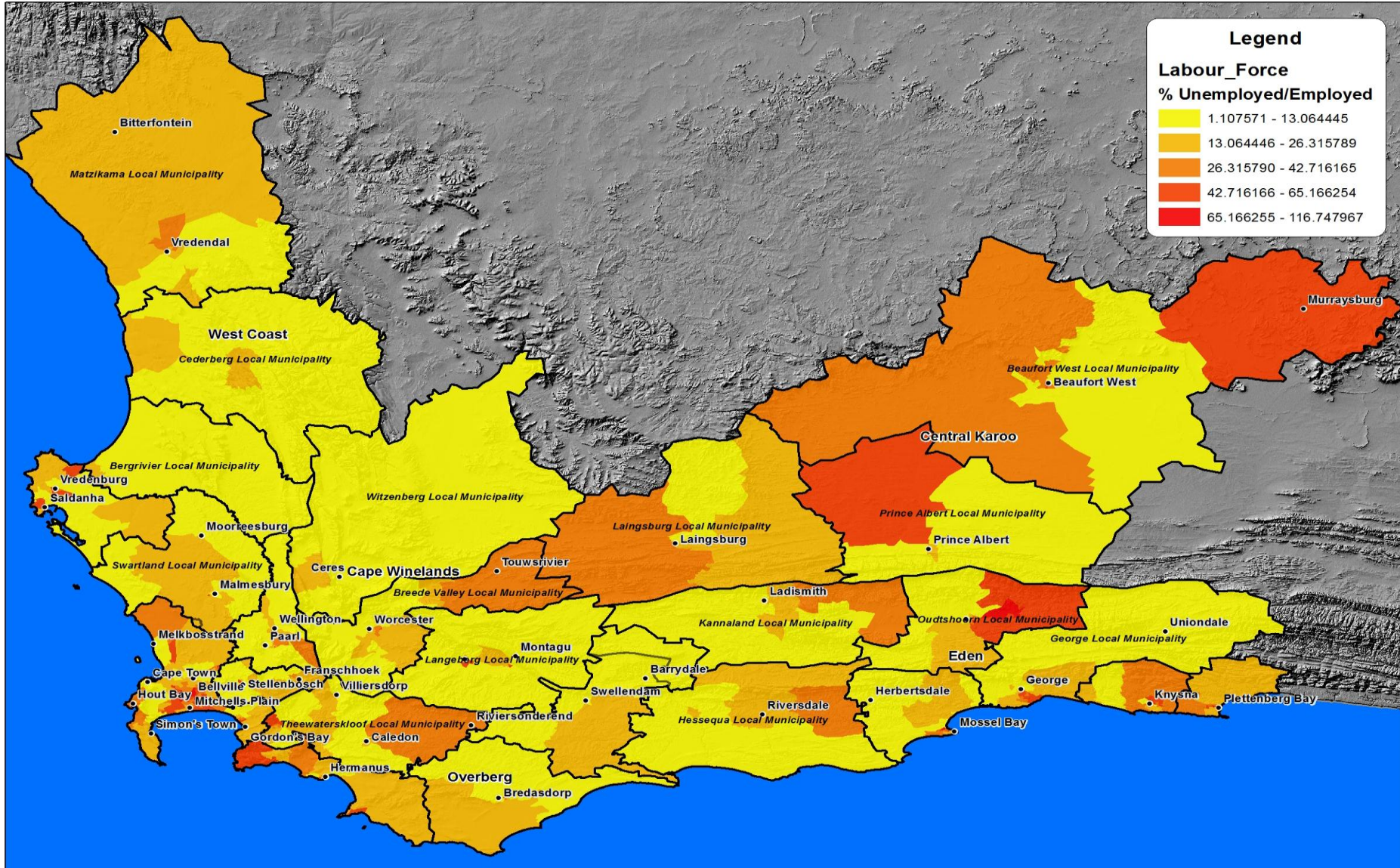
Biologically Sensitive Species – Environmental Vulnerability



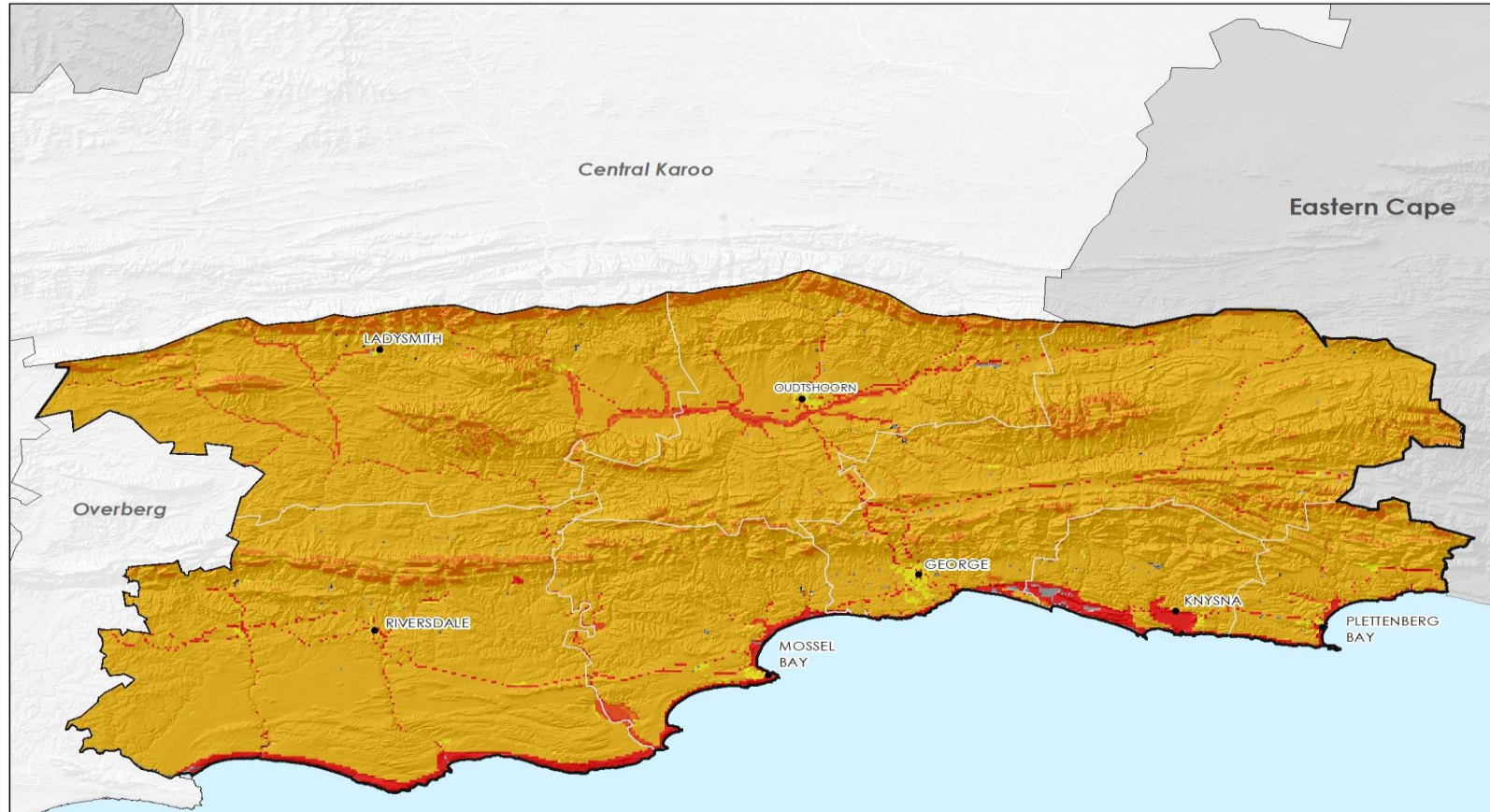
Informal Dwellings – Societal Vulnerability



High Unemployment – Economic Vulnerability



Aggregated Hazard Mapping



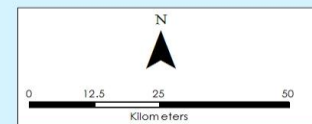
Eden Collective Hazards



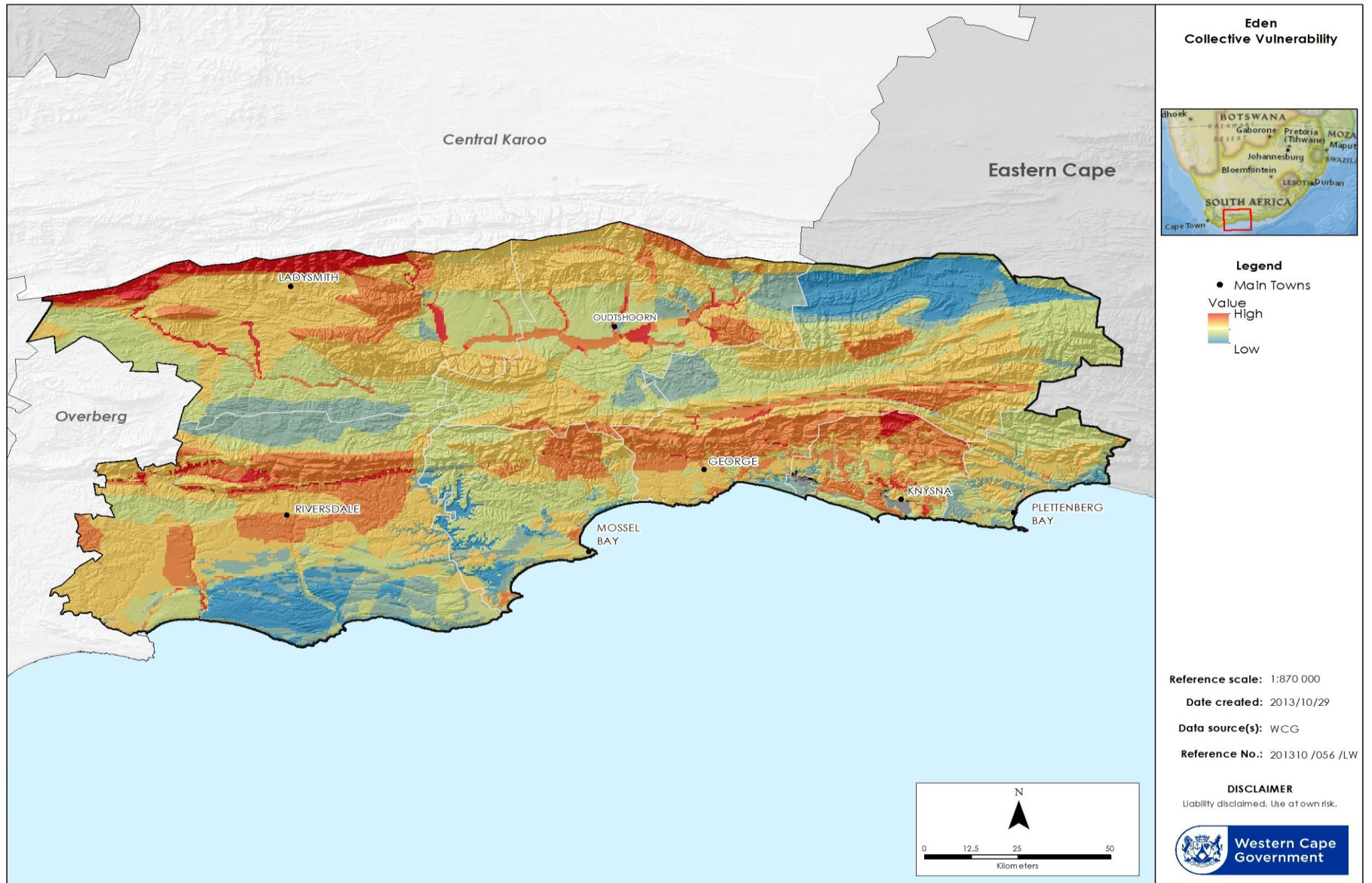
- Legend**
- Main Towns
 - Hazard rating
 - High
 - Low

Reference scale: 1:870 000
Date created: 2013/10/28
Data source(s): WCG
Reference No.: 201310 /054 /LW

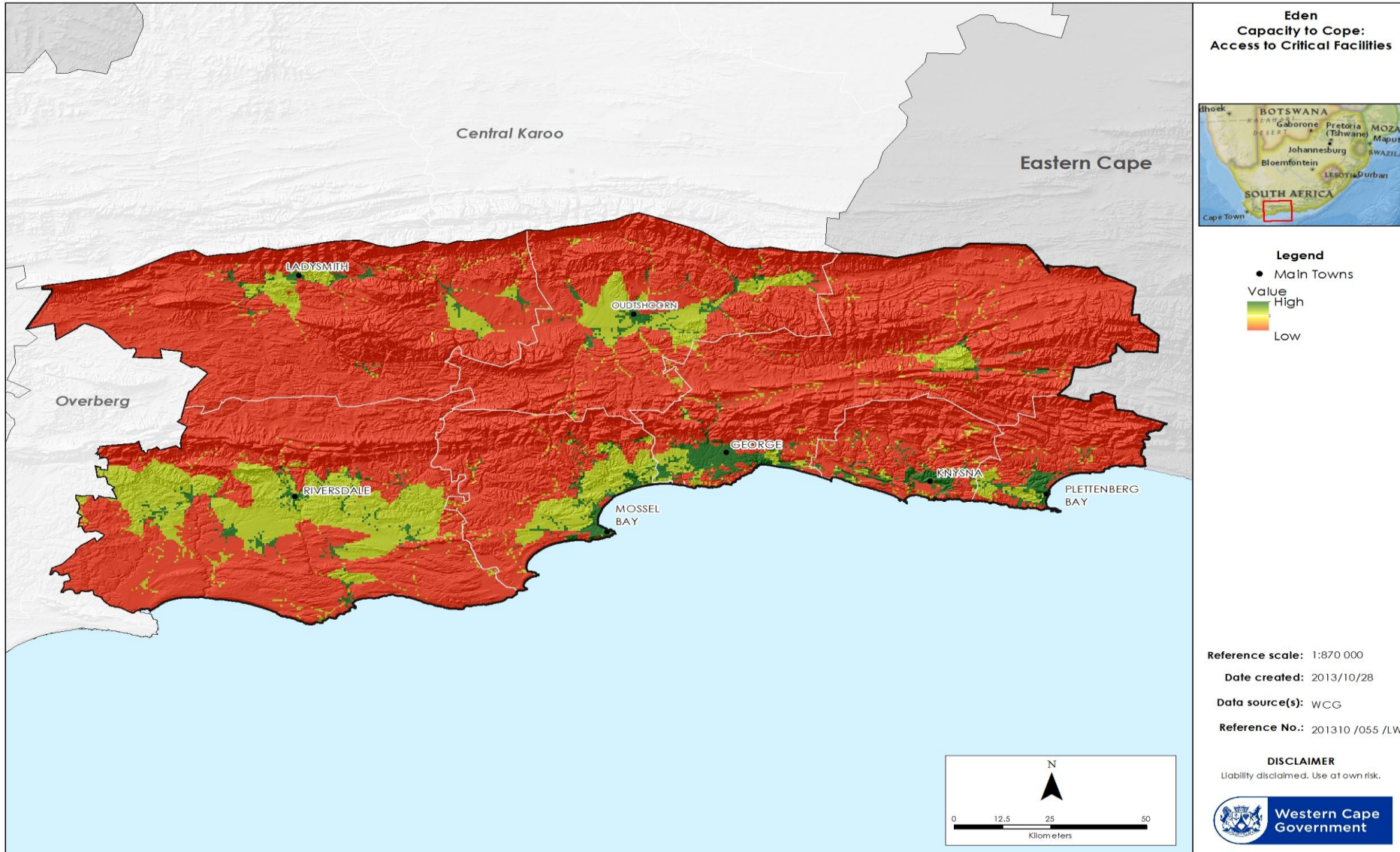
DISCLAIMER
Liability disclaimed. Use at own risk.



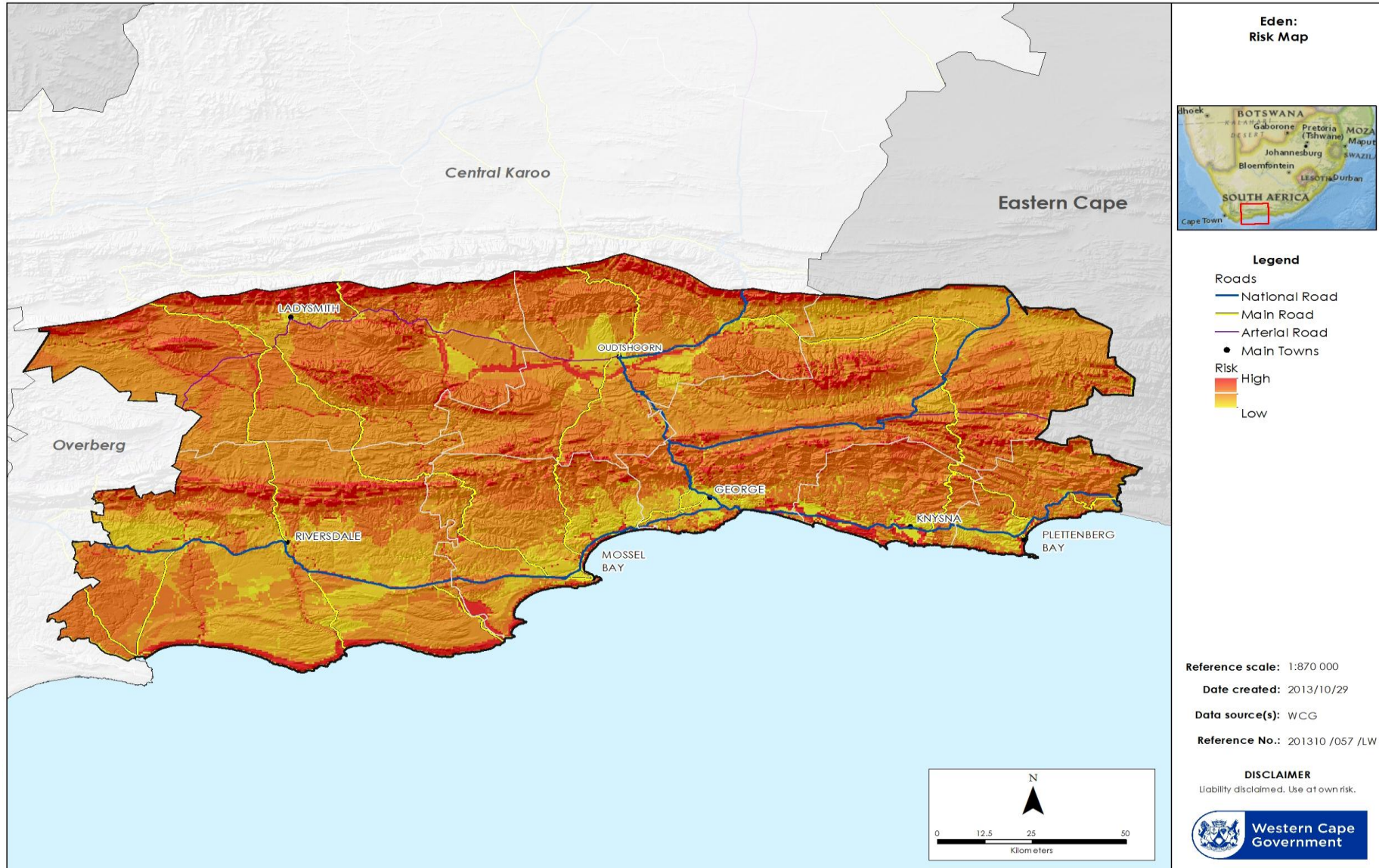
Vulnerability Mapping



Coping Capacity Mapping



Risk Mapping



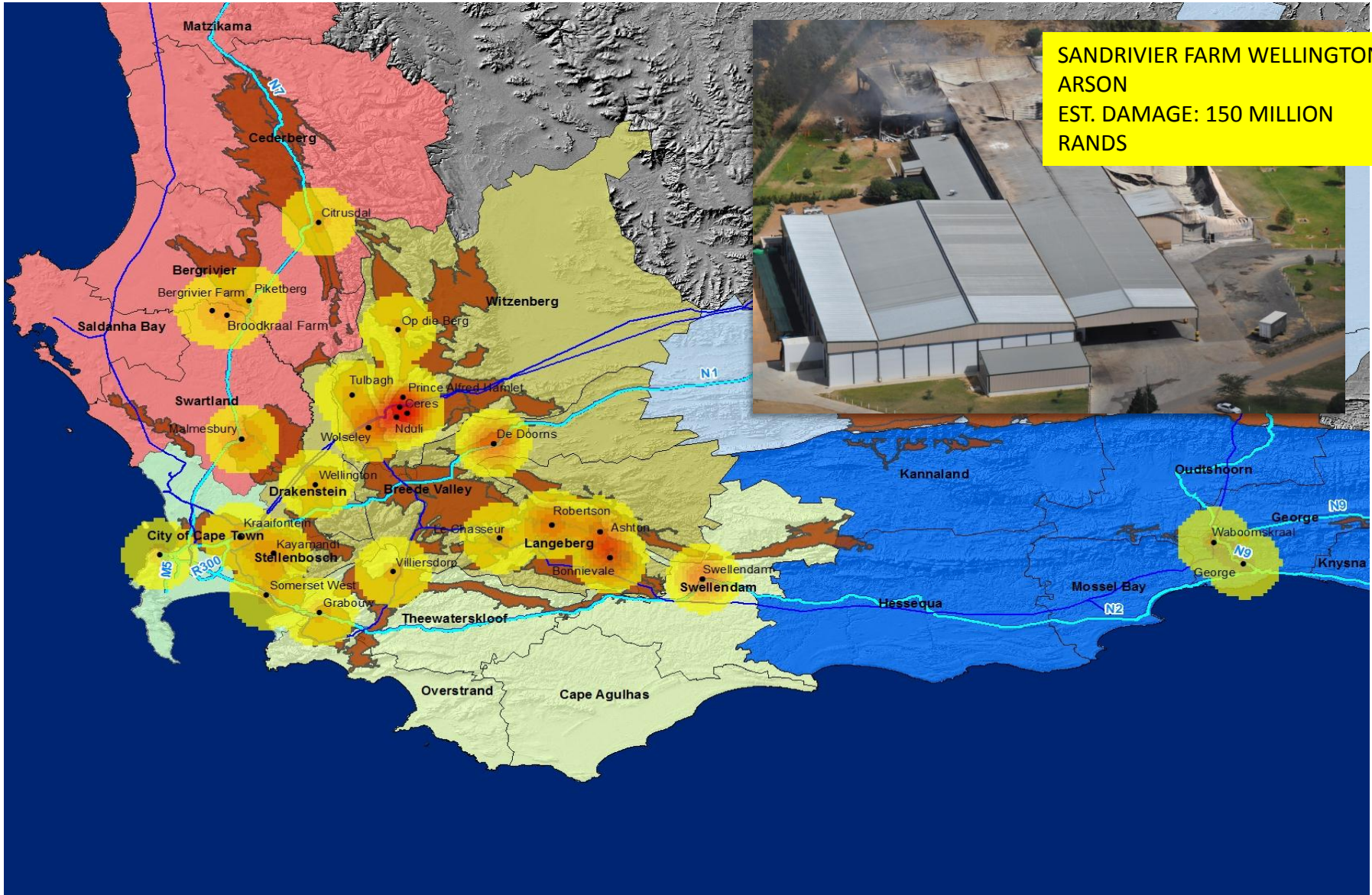
Micro Risk Assessment – Mossel Bay



Risk Reduction Project Identification



Farmworker Unrest in the Western Cape



Fire and Flood Awareness Campaigns

- Raises awareness primarily on fire and flood safety throughout the Province
- Delivered as industrial theatre shows at schools:
 - Content is fun, educational and realistic

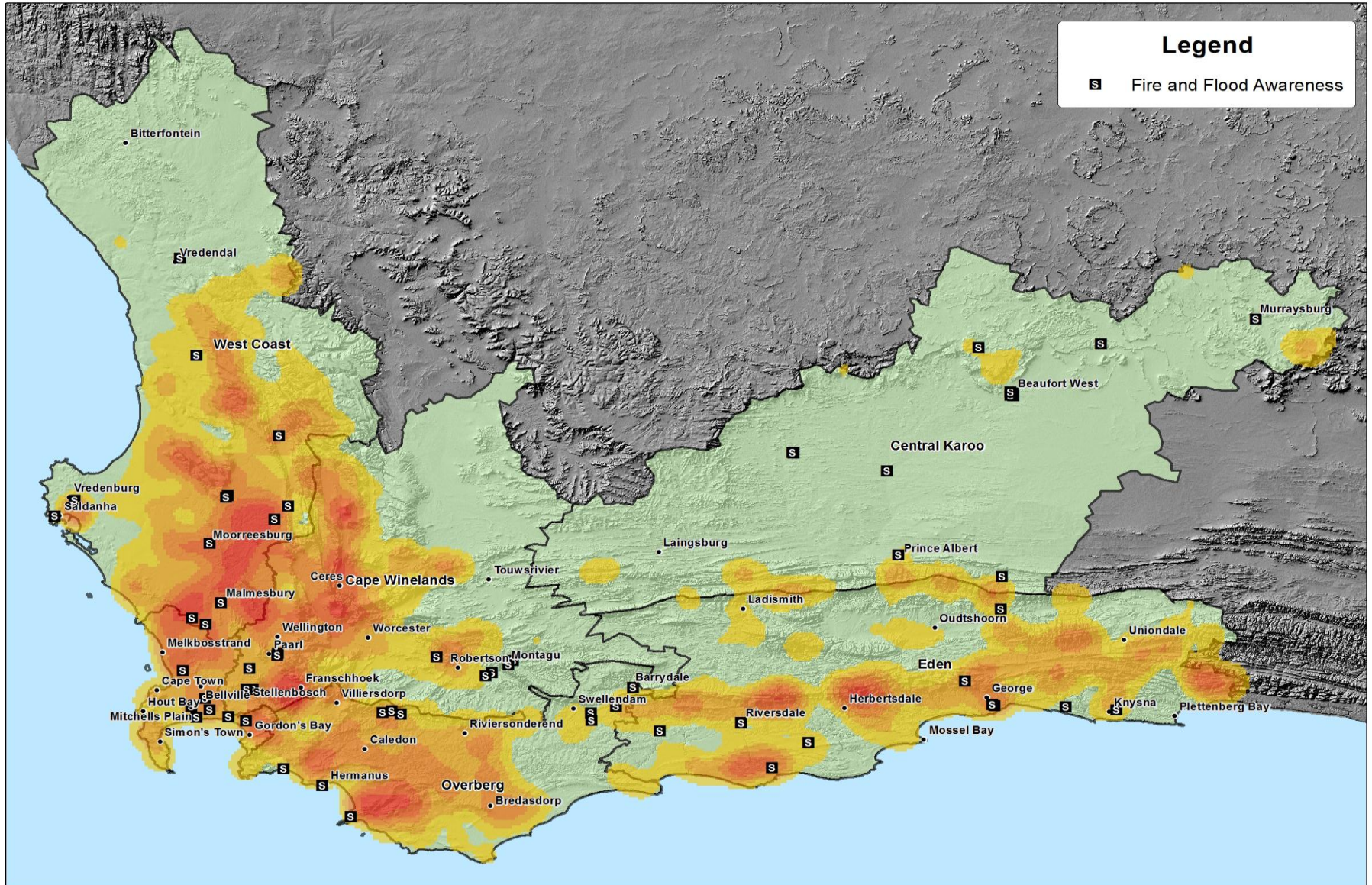


Why the emphasis on schools??

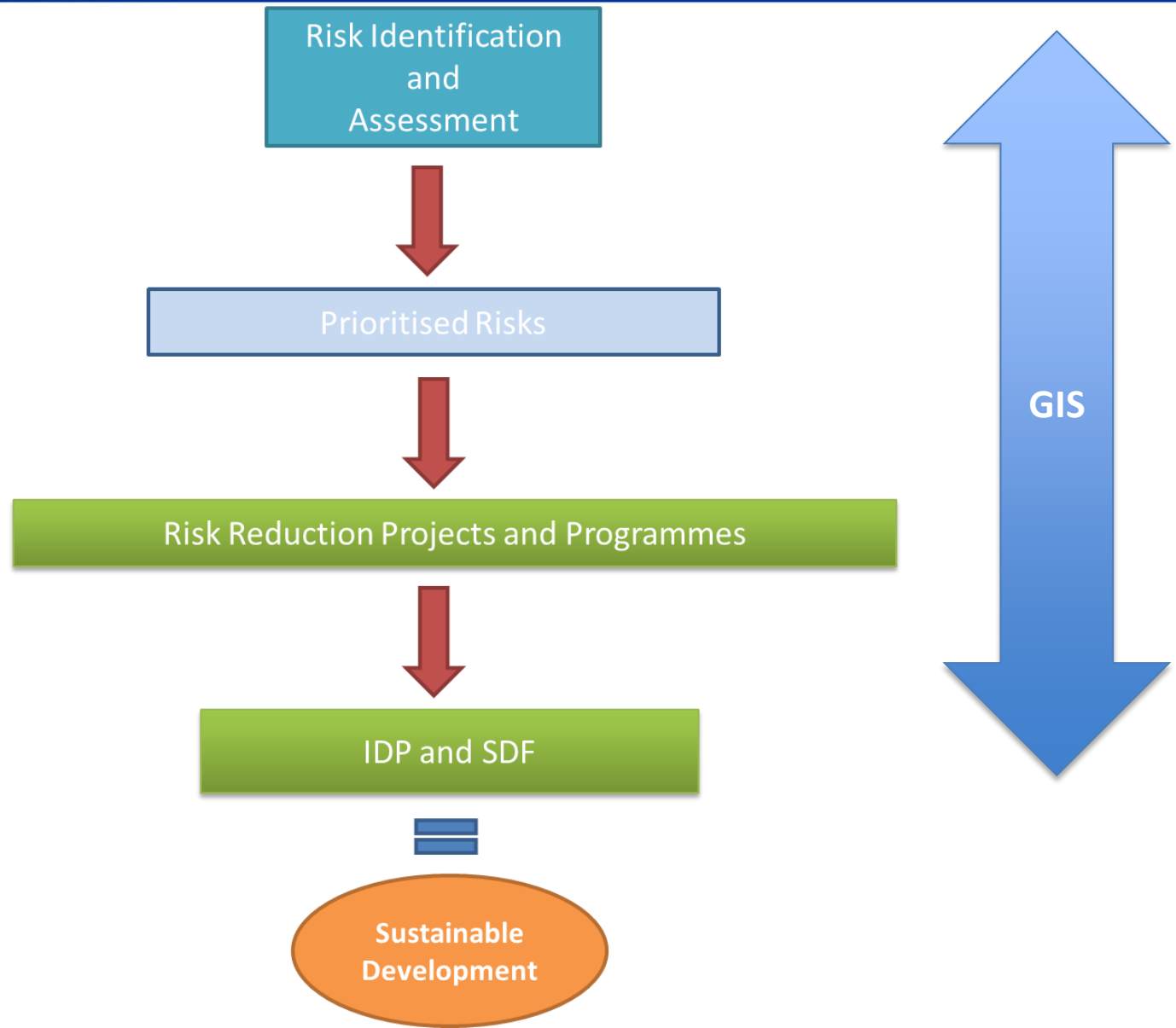
- Easier to cultivate risk avoidance behaviour in children
- To date we have reached about 11 000 (2012) and 18 000 (2013)



Fire and Flood Awareness Campaigns



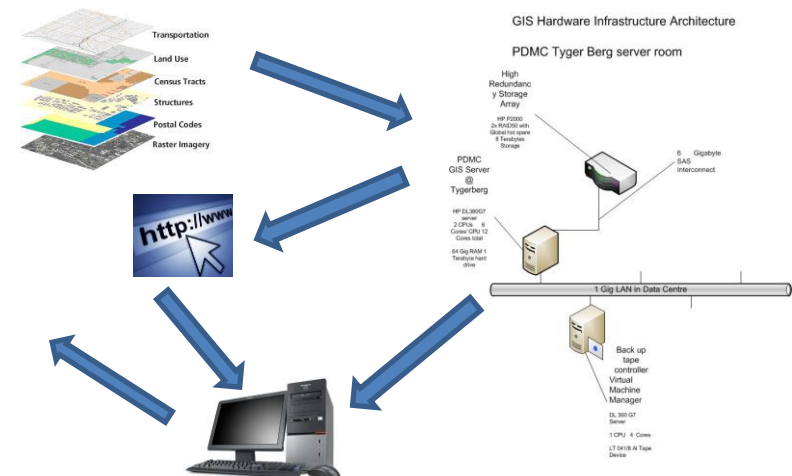
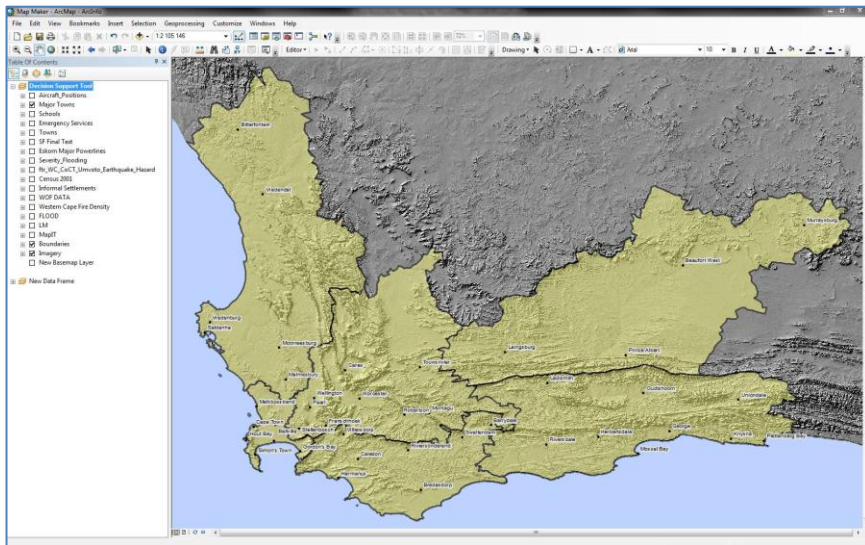
Risk Reduction Process Map



GIS Functionality at WCDM

Establishing and maintaining a Spatial Information System

- Development of a Strategic Roadmap for the Development of a Spatial Data Repository
- Installation and deployment of a an Enterprise GIS Solution
 - ArcGIS Server and SDE
 - Web publishing capability
- **WCDM updates and maintains base and operational datasets:**
- Mapping of risk reduction projects.
- Updating flood related data for Eden DM.
- **Providing strategic information to decision makers.**



GIS Functionality at WCDM

- Strategic Roadmap for the Development of a Spatial Data Repository



Figure 4 - Legislative influence

The National Disaster Management Framework of 2005 as well as the Province of the Western Cape Provincial Gazette 6698: The Western Cape Disaster Management Framework are legal publications that provide input into the function of the SDR. The SDR discussed in this document is specific to the PDMC and in itself the SDR is in response to a legal requirement as referenced below.

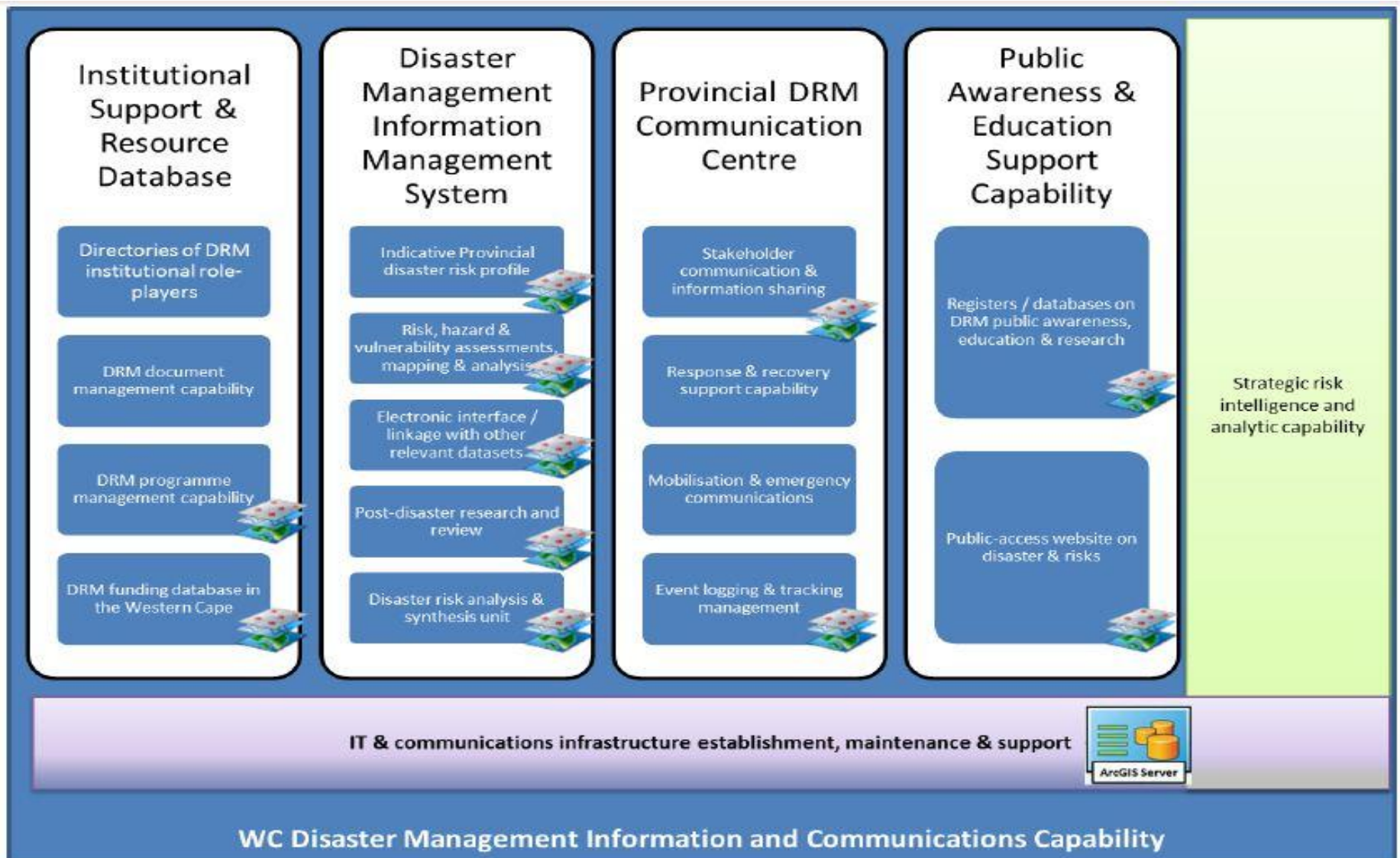
*Chapter 4 : Provincial Disaster Management
Part 2: Provincial disaster management centres
32. Assistance to National Centre*

- "b) *develop and maintain the disaster management electronic database envisaged in section 17 in so far as the database applies to the province"*

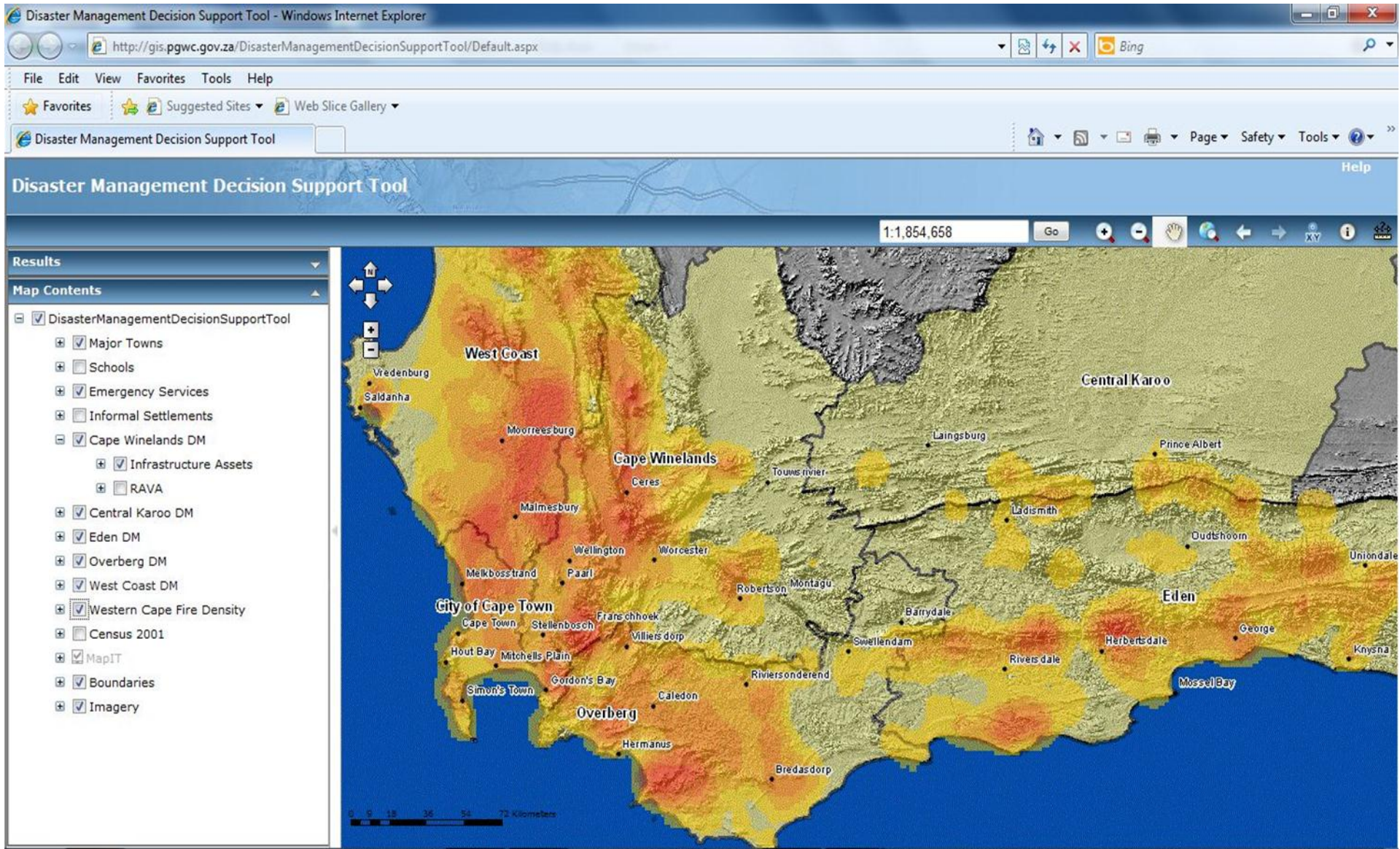
*Chapter 3 : National Disaster Management
Part 1: National Disaster Management Centre
Powers and duties of National Centre
17. Disaster management information system*

- "1) *The National Centre must act as a repository of, and conduit for, Information concerning disasters and disaster management, and, must for this purpose –*
- a) *collect information on all aspects of disasters and disaster management;*
 - b) *process and analyse such information;*

GIS Functionality at WCDM



Disaster Management Decision Support Tool



Disaster Management Decision Support Tool

Disaster Management Decision Support Tool - Windows Internet Explorer

http://gis.pgwc.gov.za/DisasterManagementDecisionSupportTool/Default.aspx

File Edit View Favorites Tools Help

Disaster Management Decision Support Tool

Disaster Management Decision Support Tool

1:14,490

Results

Map Contents

- DisasterManagementDecisionSupportTool
 - Major Towns
 - Schools
 - Emergency Services
 - Ambulance Stations
 - Fire_Stations
 - Medical_Facilities
 - Police
 - Informal Settlements
 - Cape Winelands DM
 - Infrastructure Assets
 - RAVA
 - Central Karoo DM
 - Eden DM
 - Overberg DM
 - West Coast DM
 - Western Cape Fire Density
 - Census 2001

Disaster Management Decision Support Tool

Disaster Management Decision Support Tool - Windows Internet Explorer

http://gis.pgwc.gov.za/DisasterManagementDecisionSupportTool/Default.aspx

File Edit View Favorites Tools Help

Disaster Management Decision Support Tool

Disaster Management Decision Support Tool

1:7,245

Results

Map Contents

- Emergency Services
- Informal Settlements
- Cape Winelands DM
 - Infrastructure Assets
 - Breede Valley
 - Drakenstein LM
 - HV Substation
 - MV Ground Mounted
 - MV Mini Substation
 - MV Pole Mounted Tra
 - MV RMU
 - MV Switching Substat
 - Bridge
 - Taxi Rank
 - Sanitation PumpStati
 - Sewerage Treatment
 - Solid Waste Disposal
 - WS BS Dam
 - Water Pump Station
 - Water Reservoir
 - Water Treatment Wo

Carolina Str.107 (MV Mini Substation)	
OBJECTID	108
GIS_ID	MS-0108
LEVEL_1	Electricity
LEVEL_2	Medium Voltage
LEVEL_3	Mini Sub-Station
LEVEL_4	11kV
LEVEL_5	With RMU
CONSTITUEN	315kVA
GRID_NUM	N4/209
NAME	Carolina Str.107
LOCATION	Drakenstein
LOCATION_T	Local Municipality

DisasterManagementDecisionSupportTool > MV Mini Substation

[Add to Results](#)

Future plans

- Based of Strategic Roadmap for development of Spatial Data Repository:
- Scenario planning software
- Risk modelling software e.g. Oil Spill modelling
- Incident capturing tool (Web based and Mobile)
- Etc.



**Western Cape
Government**

Local Government

Thank you