

CENSUS MAPPING WITH GIS IN NAMIBIA

BY

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Content of Presentation

- HISTORICAL BACKGROUND OF CENSUS TAKING IN NAMIBIA
- GIS ESTABLISHMENT AND SOFTWARE
- FIELDWORK AND GEOCODING SYSTEM
- ENCOUNTERED PROBLEMS
- CONTENT OF GIS DATABASE
- PLAN FOR 2011 CENSUS MAPPING
- DIFFERENT TYPES OF EA MAPS

Administrative setup

- Namibia has a land area of about 824 000 square kilometers with a population of 1.8 million
- The country is divided into 13 regions
- Regions are divided into 107 constituencies within the regions
- The biggest region has 11 constituencies
- Constituencies are demarcated based on population size

Census undertaken

- Before independence – census did not cover all areas
- 1991 first - post independence census – first census covered the whole country using traditional mapping method
- 2001 second post-independence census – GIS was created and used digital maps for census enumeration and covered the whole country
- Next Census is planned for 2011

GIS establishment at CBS

- In order to handle spatial data effectively, CBS moved away from analog to digital mapping by creating a GIS during 2001 census
- The main aim was to facilitate the production of base maps needed for fieldwork
- GIS infrastructure was acquired and setup with assistance of the consulting firm at Government cost
- Spanish government donated a photocopier/scanner for large maps and 4 x 4 vehicles for census mapping
- Missing spatial data was collected during census mapping

Establishment of GIS continue...

- Data warehouse was created from various sources using existing spatial data
- Spatial data needed for census undertaking was extracted and GIS database was created
- The GIS technology was used to capture and digitize spatial data collected from the field
- Data for institutional services was captured and Namplan dataset was created

Software

- Main GIS software are GEO-MEDIA 6.0 and ArcGIS 9.2
- ER Mapper, IDRIS ANDES and GeoPDF and MapGuide are also acquired for handling specific GIS activities
- Other mapping software i.e, ARCVIEW 3.1 and MAPINFO were introduced to help with the processing of field returns and production of thematic maps.
- OziExplore and ArcView 3.1 were very handy in downloading collected field data

Mapping fieldwork

- The country was demarcated into unique geographical areas known as enumeration areas and were captured into the database
- GPS (handheld and differential) were used during fieldwork
- The GIS has made it possible to retrieve, update, link (census/survey data to the geography), query the database, print maps based on any theme, etc.

Geocoding system

- All enumeration areas were given unique code numbers composed of nine digits
- numbers help to identify each EA by the level of administrative area
- Rural EAs are identified with code '99', while the urban EAs are coded '01'
- A constituency with two urban centers will have '01' for the first urban center and '02' for the second urban center

Geocoding continue...

- 1st and 2nd digits represent the region
- 3rd and 4th digits represent the constituency
- 5th and 6th digits represent the rural/urban status
- 7th, 8th and 9th digits represent the EA number within the constituency
- Example of EA numbers: 121001020 and 130499024

Problems during mapping and gis establishment

- Gis not part of CBS structure
- Lack of trained personnel
- Lack of training from the consultancy
- Lack of spatial data
- Lack of mapping publicity
- Boundary problems (Townlands)

Problems during mapping and gis establishment (cont...)

- Lack of transport (fuel)
- Accessibility of some areas (flood)

Summary of databases and data layers in the GIS

Boundaries

Constituency boundaries
Regional boundaries
National boundary
National park boundary
Conservancy boundaries
Farm boundaries
Communal land boundaries
Townlands
Locality boundaries

Namplan

Accommodation
Basic education
Health facilities
Localities
Service stations
Towns and villages
Ministries
Police stations
Higher education.....etc.

Map indexes

Topographic maps 1: 50000
Topographic maps 1: 250000
Aerial photographs
Land satellite images

Master sample frame

Master sample frame '02
Master sample updates '05/06
Boundary descriptions

Thematic data

Agro-ecological zones
Rainfall
Soil types
Vegetation types

Town data

Town lands
Cadastral
Streets
Street names
Townships

Namibia census

Namibia 1991 EAs

Namibia 2001 EAs

Namibia 2001 SAs

Hydrology

Lakes and pans

Rivers

Other infrastructure

Roads

Railway lines

Power lines

Water Supply

Thematic maps

- Maps based on any theme can be produced using the available software by linking the results to the geography or area of study.
- These can be printed out as hard copies or they can be viewed on the computer or handed out in digital format.
- However there are limitations with such outputs as they cannot be manipulated further.

Therefore advanced dissemination tools such as GIS-Web based system, etc. can be introduced.

It is a GIS that is accessible to users through the Intranet/Internet

New GIS Developments

- B-Tech in Geoinformatics with Polytechnic of Namibia
- CBS is busy setting up a Web-based GIS using open source software- Postgress
- This will enable GIS users to create their own maps through the internet
- User can request data updates through web application
- Updates can be done through the web

New GIS Developments (Cont...)

- CBS will maintain data, system hardware, software and other applications
- A forum will be created on the web for sharing of ideas and relevant data
- Will use Oracle as a central DB

Plans for 2011 census mapping

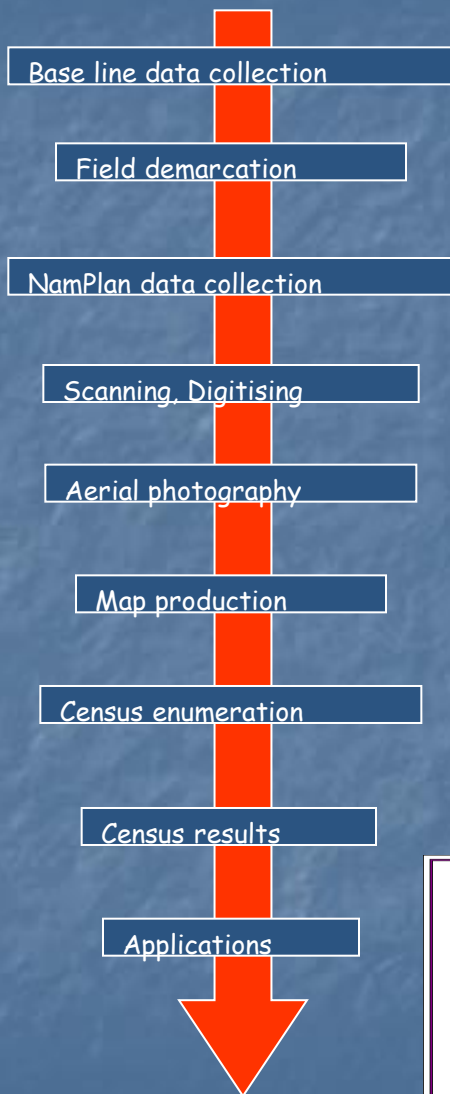
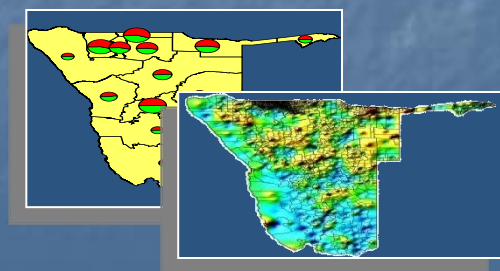
- Planning is in full swing (including how to improve census mapping publicity)
- Fieldwork is planned for 2008
- Pilot will be conducted to test mapping instruments early 2008
- Planning to use satellite images and aerial photos, etc.
- Planning to capture dwelling units and demarcate EAs as such - easy to control and will improve dissemination at lower geographical areas

GIS for Census Enumeration

Baseline data such as administrative boundaries, infrastructure and scanned topographical maps is collected from various organisations, and integrated into a GIS warehouse.

Integrated with the field demarcation is the collection of institutions and localities. The data is stored in the NamPlan database.

Accommodation
Commercial
Infrastructure
Emergency Response
Education
Government
Health
Industry
Other

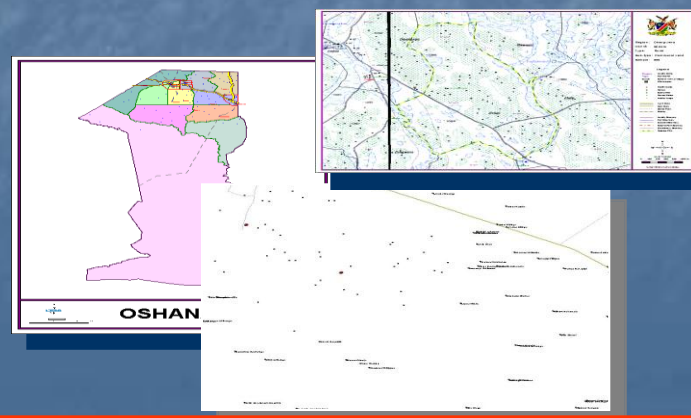


Base maps are produced for each field team. The field teams also capture GPS wave points for locality boundaries. After the fieldwork, the information collected is integrated into the GIS warehouse.

Digital aerial photographs were produced for areas without sufficient base line data, and used as backdrop to the Enumeration Area maps.



During the actual Census, an interviewer is assigned to each EA and every household within the demarcated area is visited.

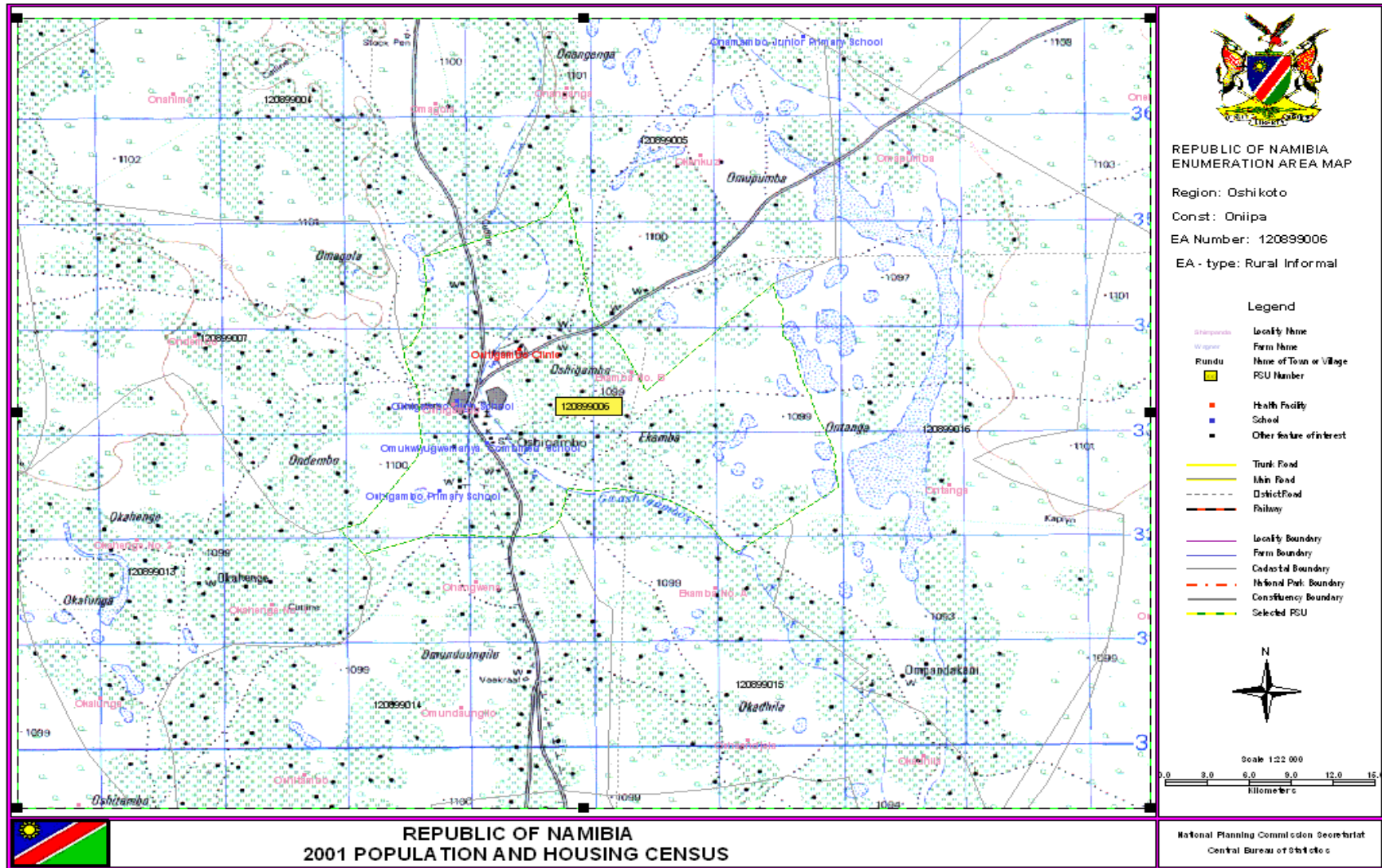


Types of EA maps

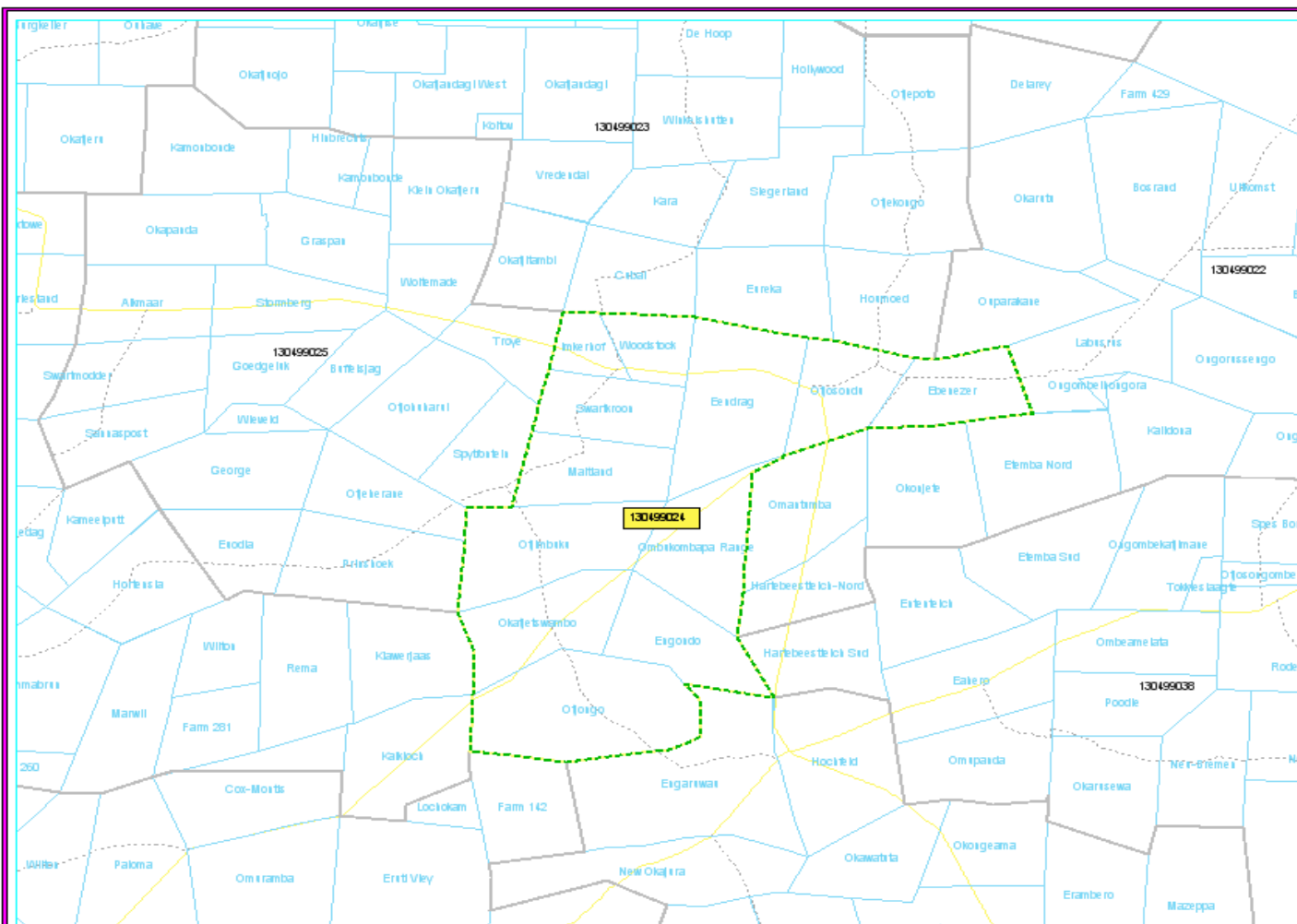


- Different types of maps are printed depending on the settings in different parts of Namibia. These are: Urban Formal; Urban Informal; Rural Formal and; Rural Informal.
- The Enumeration maps are produced in full colour in the GIS office. In 2001 census an excess of 6 000 A3 size maps were printed. Another 216 constituency map were also printed.

Eg.: Rural Informal EA



Eg.: Rural Formal EA



REPUBLIC OF NAMIBIA
ENUMERATION AREA MAP

Region: Otjozondjupa

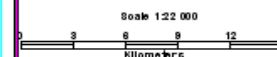
Const: Omatako

EA Number: 130499024

EA - type: Commercial Farms

Legend

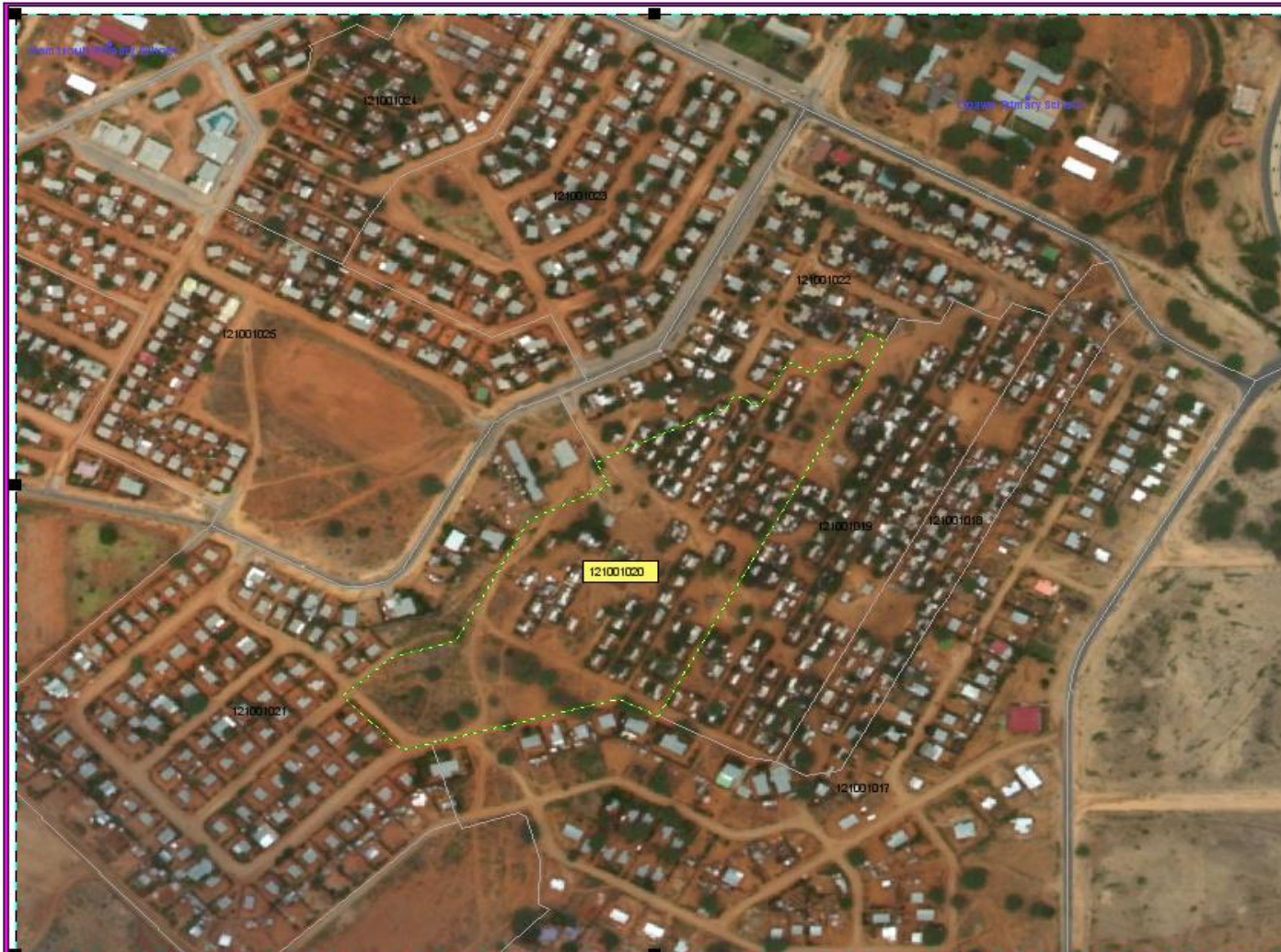
- **Shapwanda**
- **Wagoner**
- **Rundu**
- **Other feature of interest**
- **Locality Name**
- **Farm Name**
- **Name of Town or Village**
- **RSU Number**
- **Health Facility**
- **School**
- **Other feature of interest**
- **Trunk Road**
- **Main Road**
- **District Road**
- **Railway**
- **Locality Boundary**
- **Farm Boundary**
- **Constat Boundary**
- **National Park Boundary**
- **Constituency Boundary**
- **Selected RSU**



REPUBLIC OF NAMIBIA
2001 POPULATION AND HOUSING CENSUS

National Planning Commission Secretariat
Central Bureau of Statistics

Eg.: Urban Formal EA



REPUBLIC OF NAMIBIA
ENUMERATION AREA MAP

Region: Oshana

Const: Tsumeb

EA Number: 121001020

EA - type: Formal Urban

Legend

- Locality Name
- Farm Name
- Name of Town or Village
- PSU Number
- Health Facility
- School
- Other feature of interest
- Trunk Road
- Main Road
- District Road
- Railway
- Locality Boundary
- Farm Boundary
- Cadastral Boundary
- National Park Boundary
- Constituency Boundary
- Selected PSU



Scale 1:22 000

0 4 8 12 16
kilometers



REPUBLIC OF NAMIBIA
2001 POPULATION AND HOUSING CENSUS

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THANK YOU FOR YOUR ATTENTION!!!