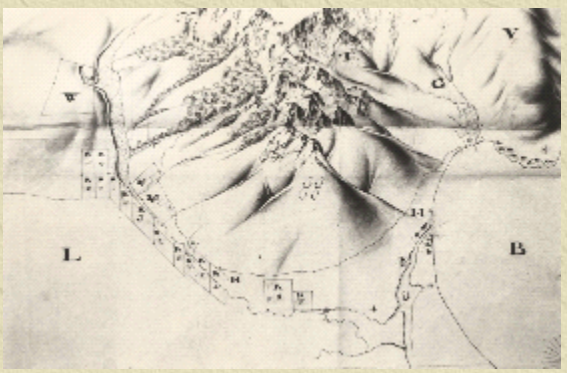
Locating the positions of the original Cape farms of the 1660's

A demonstration of cadastral reconstruction using regular techniques and GIS cadastral fabrics

Jennifer WHITTAL, South Africa
Susan JONES, New Zealand



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Objectives in terms of FIG 2010 themes

Challenges:

- To relocate the positions of original Cape farms surveyed some 350 years ago

Building the Capacity:

- To assess traditional cadastral reconstruction tools for this purpose
- To assess the usefulness of GIS tools in combination with the above
- To demonstrate the use of GIS cadastral fabrics to maintain the chain of cadastral evidence for the past and future

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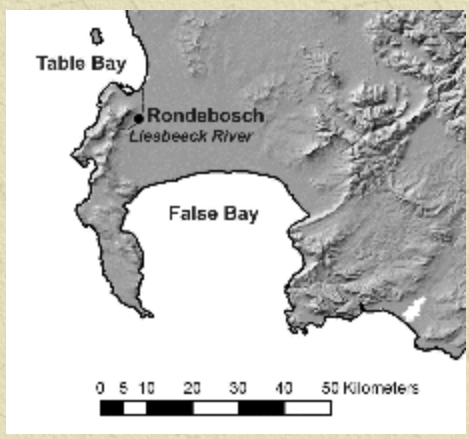
Early Cadastre at the Cape

- **First settlers**
  - Dutch East India Company
  - 1652
- **Early Farming**
  - 1657
  - Rondebosjen
  - Liesbeeck River
- **First Grants**
  - 1657–1679
  - 17 parcels by 1660
  - Surveyed by Pieter Potter



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Data Sources: 1660 Plan of Pieter Potter

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Data Sources:
1661 plan of Pieter Potter

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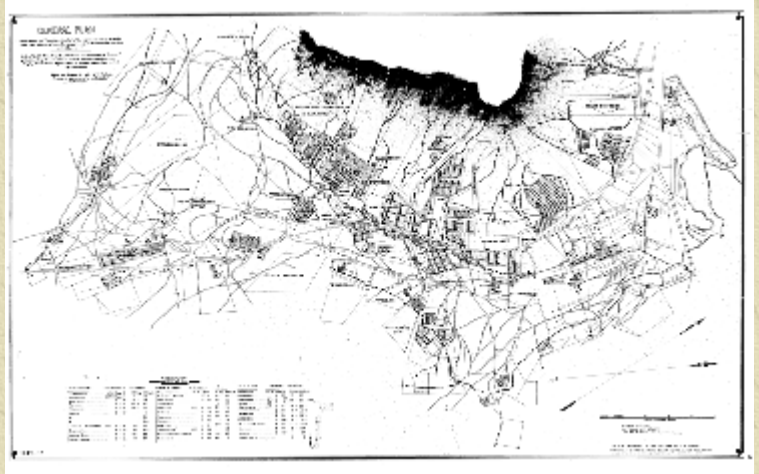
Data Sources:
1812–1813 farm map



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Data Sources: 1865 farm map

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Data Sources: noting sheets

- data and metadata
- 1:500, 1:1000
- Old Cape Farm boundaries

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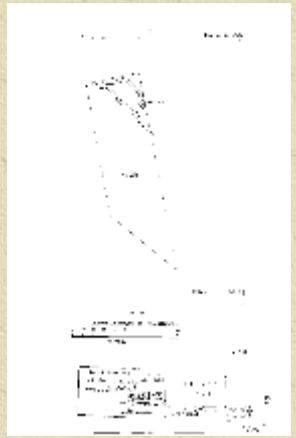
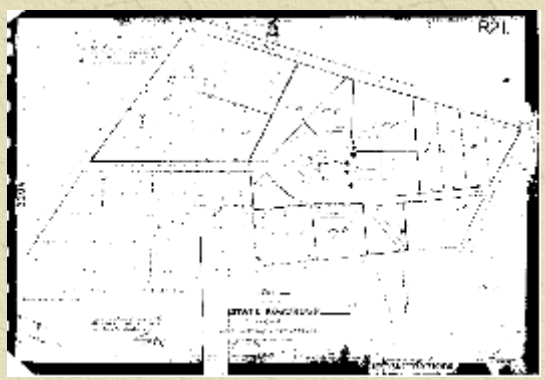
Data Sources: cadastral diagrams





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Methods

- Process of **evidentiary and methodological triangulation**
- **Georeferencing** – GIS map overlays
- Diagram/deed **tracing** (Siebritz, van Niekerk and Robinson)
- Cadastral surveying **reconstruction**
- Creation of a GIS **cadastral fabric**

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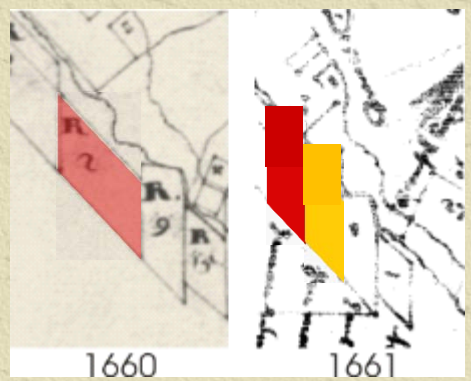
Initial Results

- **Early subdivision and boundary adjustment:**
  - 1660 –1661: subdivision into farms Rodenburg and Rouwkoop
  - Shapes substantially adjusted – reflected in grant text



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Initial Results

- **Tracing deeds**
  - 3 independent researchers
  - Multiple data repositories
  - Access denied to original documents
  - Incomplete records
  - Different referencing system

Only Rouwkoop Farm traced back to original plan

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Initial Results

- GIS overlay georeferencing
  - Farm boundaries common to successive plans
  - Localized rubber sheeting
  - 1661 – 1812 most problematic: topological evidence – position of river and tributaries
  - georeferencing confirmed by deed tracing for Rouwkoop, noting sheet Old Cape Farm boundaries

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Initial Results

- 4 possible common boundaries (1660 – 2005) along roads
- Deed Tracing – confirmed 3 of these
- Which side of the road, or in the middle?

more work needed …

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Cadastral surveying reconstruction

- Rouwkoop and Rodenburg
  - Farms with boundaries possibly still in use today
- Identification of critical current erven
  - Lot (erf) numbers, corners and boundaries
  - Over 500 e-diagrams
    and over 20 noting sheet images
    - Auto-emailer at SGO Cape
- Cadastral lineage
  - Critical erven traced back in time
  - Location of boundaries with respect to roads

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Cadastral surveying reconstruction

- Reconstruct "lost" corners/boundaries
  - Many data conversions:
  - Roods and cape feet to metres
  - Transformations from Local, Cape Town Local
- Rouwkoop Farm reconstructed
- Rodenburg Farm problematic
  - lineage incomplete – only back to 1790 (west side of river) and 1831 (east side of river)

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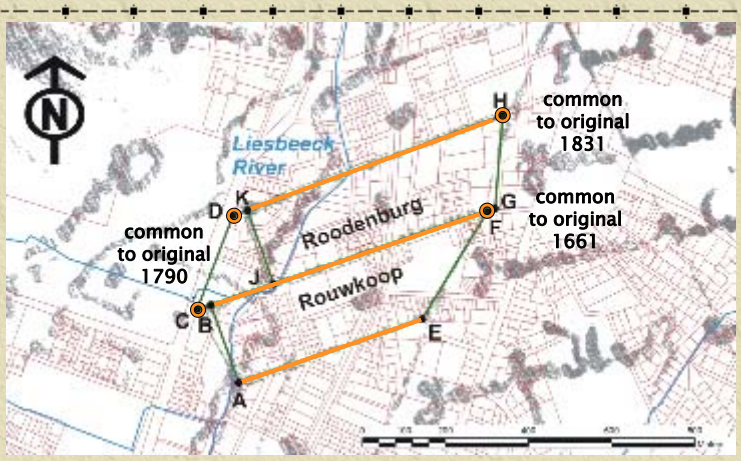
Reconstruction – 2005 – 1661 plan



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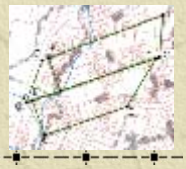
Results – Rouwkoop



- No original beacons to compare against
- Area:
  - Old 116 246 m² – new 115 539 m² =707 m²
  - equivalent to 1m on longest boundary; <0.5 m on all
- Angles:

	Old	Reconstruction	Current Beacon
A	90°	90.30.44	
B	90°	89.04.10	
F	40°	40.06.28	12 mm round iron peg
E	140°	140.18.39	

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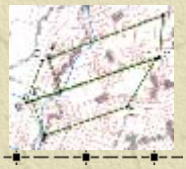
Results – Rouwkoop



- **Sides:**

	Old	Reconstructed
AB	196 m	199.3 m
BF	727 m	703.8 m
FE	314 m	304.0 m
EA	487 m	468.1 m

- **Boundary lengths:** 3m at best; 23 m at worst

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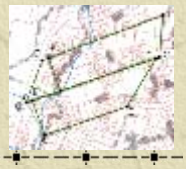
Part results – Rodenburg



- **Angles of portion West of river:**

	Old (1790)	Reconstruction	Current Beacon
D	130°	131.17.02	
C	50°	50.28.33	Tent peg in wall

- **Sides of portion West of river:**

	Old (1790)	Reconstructed
CD	241.8 m	241.3 m

➢ **Confirms position of E–W boundaries**

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GIS Cadastral Fabrics

- **Cadastral lineage** recorded, "chain of evidence" maintained
- **Mathematical gaps/overlaps maintained**
  - Not maintained in 2005 digital cadastre – not legal model
  - Non-topological digital cadastre possible

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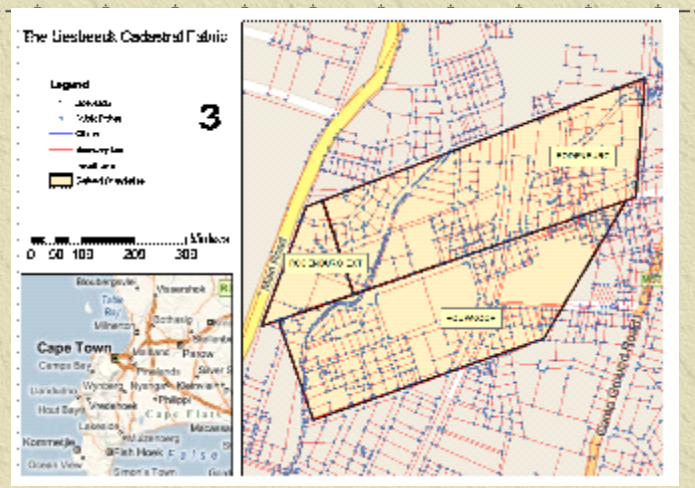
Cadastral Fabric of Rouwkoop and Rodenburg



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Conclusions

- **Land parcels from 350 years ago reconstructed:**
  - Rouwkoop reconstructed
  - Rodenburg N and S boundaries reconstructed
  - Boundaries ±0.5 m?
- **Successful mixed-method approach:**
  - GIS-based overlays for georeferencing
  - SGO noting sheets – critical data and metadata
  - Tracing grants – only partly successful
  - e-diagrams essential
  - Traditional cadastral reconstruction essential
  - GIS cadastral fabric: cadastral boundary/beacon record

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Thank You

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Reconstruction and 1661 plan

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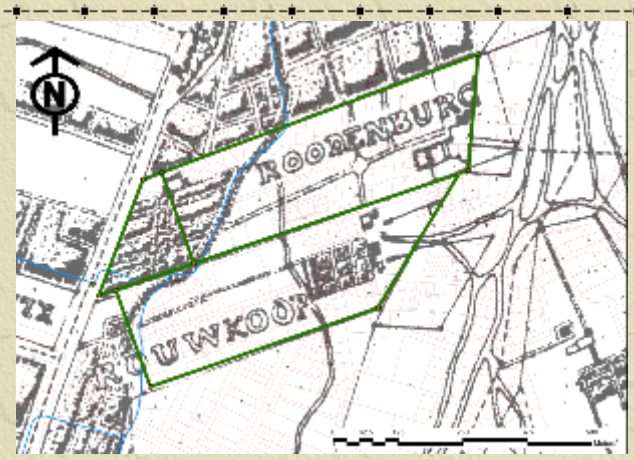
Reconstruction and 1812 plan



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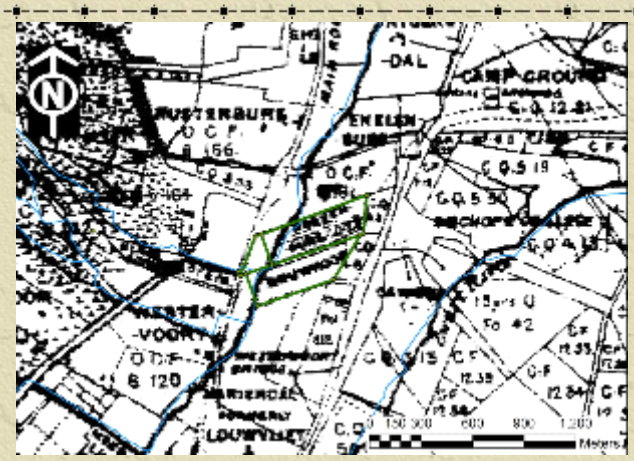
Reconstruction and 1865 plan



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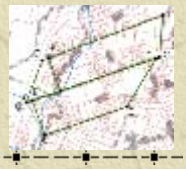
Results – Rodenburg



- No original beacons to compare against
- Diagram lineage incomplete
  - Boundary adjustment evident 1660–1790
  - Two later diagrams: Myrtle Grove (1831) east of river and Rodenburg west of river (1790)
  - Only N and S boundaries common to 1660/1
- Boundaries:
  - 3m at best
  - Eastern adjusted boundary of 1831 reconstructed
  - Western boundary JK reconstructed using 1660 area and angles as close to 90° as possible

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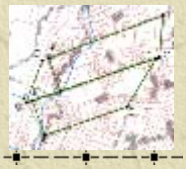
Results – Rodenburg



- Angles of portion East of river:

	Old (1831)	Reconstruction	Beacon
H	65°	64.51.50	12 mm round iron peg
G	140°	113.22.35	
J	90°	90.52.47	
K	90°	90.52.47	

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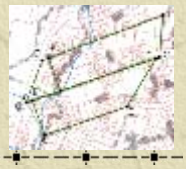
Results – Rodenburg



- Sides of portion East of river:

	Old (1660/1)	Old (1831)	Reconstructed
HG	297 m	223 m	226.0 m
GJ	499 m		562.7 m
JK	183 m		187.3 m
KH	731 m		655.6 m

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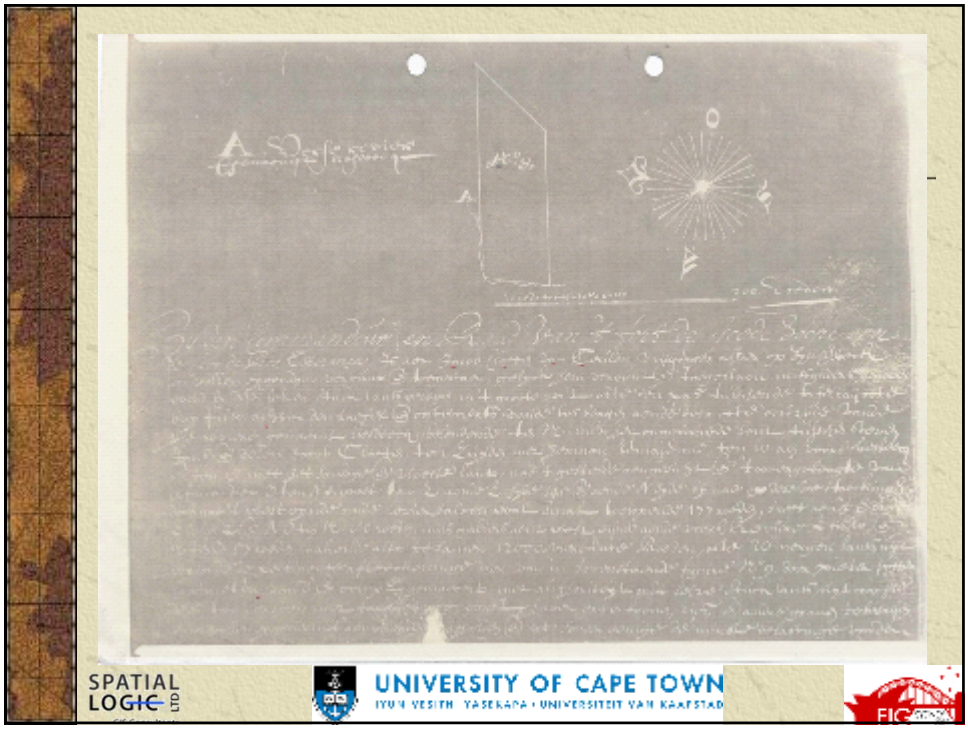
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