Locating the positions of the original Cape farms of the 1660’s
A demonstration of cadastral reconstruction using regular techniques and GIS cadastral fabrics

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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
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

Data Sources:
1660 Plan of Pieter Potter
Data Sources:
1661 plan of Pieter Potter

Data Sources:
1812–1813 farm map
Data Sources:
1865 farm map

Data Sources:
noting sheets
- data and metadata
- 1:500, 1:1000
- Old Cape Farm boundaries
Data Sources: cadastral diagrams

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
Initial Results

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

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
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

- 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 …
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)
Reconstruction – 2005 – 1661 plan

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:

<table>
<thead>
<tr>
<th></th>
<th>Old</th>
<th>Reconstruction</th>
<th>Current Beacon</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90°</td>
<td>90.30.44</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>90°</td>
<td>89.04.10</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>40°</td>
<td>40.06.28</td>
<td>12 mm round iron peg</td>
</tr>
<tr>
<td>E</td>
<td>140°</td>
<td>140.18.39</td>
<td></td>
</tr>
</tbody>
</table>
Results – Rouwkoop

- Sides:

<table>
<thead>
<tr>
<th></th>
<th>Old</th>
<th>Reconstructed</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>196 m</td>
<td>199.3 m</td>
</tr>
<tr>
<td>BF</td>
<td>727 m</td>
<td>703.8 m</td>
</tr>
<tr>
<td>FE</td>
<td>314 m</td>
<td>304.0 m</td>
</tr>
<tr>
<td>EA</td>
<td>487 m</td>
<td>468.1 m</td>
</tr>
</tbody>
</table>

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

Part results – Rodenburg

- Angles of portion West of river:

<table>
<thead>
<tr>
<th></th>
<th>Old (1790)</th>
<th>Reconstruction</th>
<th>Current Beacon</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>130°</td>
<td>131.17.02</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>50°</td>
<td>50.28.33</td>
<td>Tent peg in wall</td>
</tr>
</tbody>
</table>

- Sides of portion West of river:

<table>
<thead>
<tr>
<th></th>
<th>Old (1790)</th>
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</thead>
<tbody>
<tr>
<td>CD</td>
<td>241.8 m</td>
<td>241.3 m</td>
</tr>
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</table>

- Confirms position of E–W boundaries
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

Cadastral Fabric of Rouwkoop and Rodenburg
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

Thank You
Reconstruction and 1661 plan

Reconstruction and 1812 plan
Reconstruction and 1865 plan

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
### Angles of portion East of river:

<table>
<thead>
<tr>
<th></th>
<th>Old (1831)</th>
<th>Reconstruction</th>
<th>Beacon</th>
</tr>
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<tbody>
<tr>
<td>H</td>
<td>65°</td>
<td>64.51.50</td>
<td>12 mm round iron peg</td>
</tr>
<tr>
<td>G</td>
<td>140°</td>
<td>113.22.35</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>90°</td>
<td>90.52.47</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>90°</td>
<td>90.52.47</td>
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### Sides of portion East of river:

<table>
<thead>
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<th>Old (1831)</th>
<th>Reconstructed</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG</td>
<td>297 m</td>
<td>223 m</td>
<td>226.0 m</td>
</tr>
<tr>
<td>GJ</td>
<td>499 m</td>
<td></td>
<td>562.7 m</td>
</tr>
<tr>
<td>JK</td>
<td>183 m</td>
<td></td>
<td>187.3 m</td>
</tr>
<tr>
<td>KH</td>
<td>731 m</td>
<td></td>
<td>655.6 m</td>
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