

Development of the City of Cape Town GIS Heritage Inventory

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Abstract

Cape Town, the oldest colonial city in South Africa, has since 1975 been the subject of a number of surveys to identify the cultural heritage resources of the city. In 2006 the City of Cape Town initiated a project to consolidate information from these surveys into a single GIS-based heritage inventory. As part of the project, a number of hand-drawn survey maps were scanned and georectified, before the information was captured on-screen into heritage feature classes. The feature classes have been incorporated into the City's Planning geodatabase, which is linked to the City's electronic development control tracking systems. The Planning geodatabase is also linked to the City's intranet-based CityMapLite GIS viewer, which allows spatial heritage information to be viewed by planning and environmental management staff in all offices and by customers at the public counters.

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Introduction to the City of Cape Town

Cape Town is the oldest colonial city, first settled in the 17th century and second largest city in South Africa. The city is home to approximately 4 million people and host to more than 1,5 million visitors per year. The city has grown from a small refreshment station for ships on an international trade route, into the world class city that it is today. The streets of old Cape Town bear the weight of hundreds of years' worth of passing feet, of slaves and settlers, and its buildings and landscapes represent various periods of history of both the city and the country. In addition, artifacts and traces of the first inhabitants of the area, the San (Bushmen) and Khoekoen people, are found, every so often, in the area.

The urban and natural environments of Cape Town have many unique features. The city wraps partly around the Table Mountain National Park, included in the Unesco Cape Floral Region World Heritage Site. A convoluted coastline encircles much of the rest with Robben Island, another Unesco World Heritage Site situated just offshore. Once a colonial outpost under first Dutch and then English administration, subsequent development was characterised by forced removals and special reconstruction projects during Apartheid. More recently, rapid and sustained urbanisation has resulted in urban sprawl including numerous unplanned informal settlements.

Today, Cape Town contains elements of urban development typical of developed, developing and under-developed nations. It is both "First and Third World".

The massive social transformation of post-apartheid South Africa poses major challenges for urban heritage management. Development pressure has in recent years seen many previously undeveloped areas now urbanised and renewed interest in the re-development of the central business district and surrounding areas.

Despite the pressure on the city's resources, the conservation of the natural and built environments of Cape Town is a priority for the city council. Apart from the intrinsic value of these resources, they has been recognised as essential elements to attract investment and tourism to the city and the region.

Legislative framework for heritage management in South Africa

The National Heritage Resources Act (NHRA), proclaimed in 1999 introduced the concept of the National Estate to heritage management in South Africa. The National Estate encompasses heritage resources of cultural significance for present communities and future generations. The National Estate includes places to which oral traditions are attached or which are associated with living heritage, historical settlements, landscapes and natural features of cultural significance, archaeological and palaeontological sites, graves and burial grounds, graves of victims of conflict and sites relating to the history of slavery in South Africa. A place or object is considered part of the National Estate if it has cultural significance because of its importance in the community, or pattern of South Africa's history, its possession of rare aspects of South Africa's natural or cultural heritage or its strong or special association with a particular cultural group for social, cultural or spiritual reasons.

The Act also introduced certain principles to heritage management in South Africa:

- Heritage is a valuable, finite, non-renewable and irreplaceable resource, which must be carefully managed to ensure its survival.
- Every generation has a moral responsibility to act as a trustee of the natural and cultural heritage for succeeding generations.
- South Africa has a rich heritage, both natural and man-made, which is unique and worthy of conservation.
- Numerous cultures, both past and present, have contributed to that heritage and all have the right to be protected. Conservation of the heritage is in the interest of all South Africans.
- Every person, community and institution has an obligation to ensure that significant elements of the natural and cultural heritage are not damaged or destroyed.

The Act places a significant responsibility on local authorities to identify and manage heritage resources in their areas of jurisdiction. Municipalities are called upon to identify heritage resources (at the time of the compilation or revision of its zoning scheme) and put measures in place to manage and protect these resources. Structures older than 60 years are protected by the Act and may not be altered or demolished without a permit from the relevant provincial heritage authority. In addition, certain types of development may require a heritage impact assessment to be undertaken before the development may proceed.

The City of Cape Town (CCT) has recognized its responsibility to give effect to the principles contained in the Act by adopting a Cultural Heritage Strategy in October 2005. The Strategy

acknowledged that, in order for heritage management to be effective, it should be integrated at an early stage into development management, environmental management, urban design, planning, and cultural and social initiatives. One of the objectives of the strategy is the development of a Heritage Register and Inventory to provide the necessary information and knowledge tools to Council officials to fulfil the requirements of the Strategy and the Act.

Heritage management in the City of Cape Town

A wide range of decisions, routinely taken by the line functions of a municipality, can impact on the cultural heritage resources of the city. The building control and land use management functions in particular can have implications for historical buildings and landscape features. Heritage specialists employed by the CCT advise on applications that may affect cultural heritage resources and provide guidance to developers, particularly if the applications affecting structures older than 60 years.

The large number of building control and land use management applications received on a daily basis by the various district offices of the CCT however, makes it difficult to provide heritage input into every development application. The CCT relies to a large extent on town planners and building control officers to refer applications that may have implications for cultural heritage resources to the heritage specialists.

The CCT manages a number of urban conservation areas proclaimed under the provisions of the Cape Town Zoning Scheme.¹ The formal protection afforded to urban conservation areas has over time contributed significantly to the preservation of the character of these areas. However, large parts of the city remain without formal protection of heritage resources and the need exist to identify and protect heritage resources in these areas.

Requirement for the City of Cape Town GIS heritage resources inventory

The CCT initiated a project in 2003 to consolidate the 26 zoning schemes in its area of jurisdiction into a single, integrated zoning scheme. This “triggered” the requirement to develop a heritage inventory in terms of the NHRA. The CCT viewed this as an opportunity to undertake a city-wide assessment of heritage information available, review the boundaries of existing heritage areas and identify new heritage areas.

A needs analysis showed that the City of Cape Town required in summary the following aspects to be addressed in the development of a heritage inventory:

- the determination what heritage information is available, in what format and an assessment of the level of confidence in the information;
- to spatially identify properties with known cultural heritage resources and include these in a spatial heritage inventory;
- to assess current heritage areas (urban conservation areas) and spatially identify new heritage areas for further investigation and proclamation;
- to store the captured heritage information in such a way that planners and decision-makers can get access to this information ;
- to add to or update heritage information as decisions are taken and new heritage surveys, reports and research become available.

The CCT has an extensive GIS infrastructure and the decision was made to use GIS to create and manage the cultural heritage inventory. GIS provides a spatial dimension which is critical in the management of immovable cultural heritage resources. GIS also provides tools to share spatial information across the network with many users.

From surveys to a consolidated heritage inventory

Since 1975, 38 cultural heritage surveys (also referred to as conservation studies) have been undertaken in the greater CCT area. In addition, in excess of 300 reports have been completed with details on individual heritage resources.

The original heritage surveys were obtained and a decision taken on the best way to capture the information from each survey. Survey information was available in various formats, including hard-copy survey maps, CAD drawings, GIS layers and lists and publications. A number of the original, hand-coloured hard-copy survey maps produced during the surveys were in use at the heritage counters in the various districts. This posed a significant risk to the preservation of the maps and information and it was a priority to scan the original maps to digital media and make copies for use at the counters.

Certain scanned maps were geo-referenced using the geo-referencing tools in the ESRI ArcGIS software suite. Two control points were identified on each scanned raster. Approximate values were assigned to these control points to aid with the aligning of the scans. In most instances simple 'first order polynomial' routines were sufficient. Some of the older maps however, had become distorted over time and higher order polynomials procedures were required. Once an acceptable alignment with the cadastre had been achieved the maps were rectified using the bilinear interpolation method. The rectified rasters were then compressed using Lizartech's MrSid

compression routines for ease of use. The images were then used as backdrops for “heads-up” digitising of the relevant information.



Figure 1: Examples of scanned heritage survey maps

A personal geodatabase with a number of feature classes and attribute tables was created to facilitate the capture of heritage information from the surveys and reports. The CCT cadastral layer (a polygon layer) was converted to a point feature class (using the center point of each erf) to assist with the on-screen selection of erven with similar attributes. Additional layers were created to spatially capture cultural heritage resources located across multiple erven, for example rural cultural landscapes, vegetation of significance and existing and proposed heritage areas (urban conservation areas). Feature classes were also created to capture the boundaries of areas surveyed to assist with the identification of areas where cultural heritage information has to date not been collected.

Attributes were captured into the feature classes and attribute tables by overlaying the feature classes and tables on the georectified rasters. The legends of the various maps were used to interpret the colours and symbols used before attributes were captured. Contextual layers such as the cadastral, road and address layers assisted to identify features and capture attributes against the correct cadastral units. Additional information from accompanying documents and other heritage reports was added to complete the heritage inventory. Records were checked against the CCT 2005 1:10 000 colour aerial photography to verify that buildings identified in older surveys, still existed. Finally, metadata was captured for each feature class and table.

To date, 31034 heritage records have been captured in the heritage inventory which represents approximately 5% of the total number of properties in the City of Cape Town.

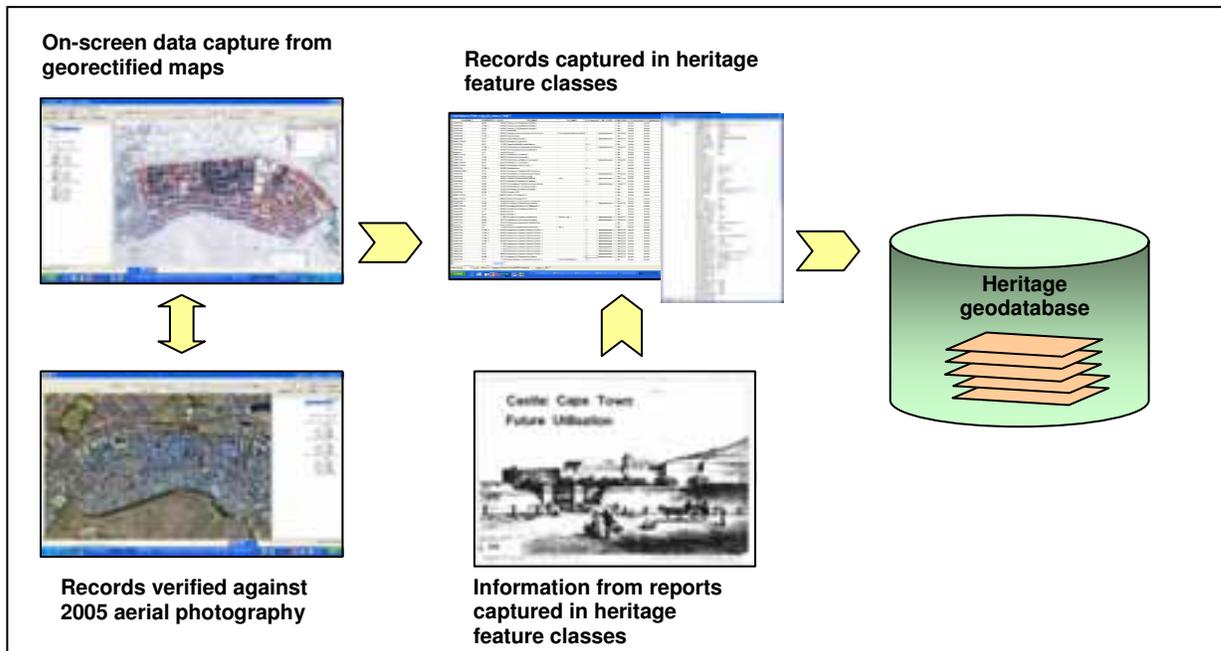


Figure 2: Process to capture cultural heritage information from surveys and report into a heritage geodatabase

Implementation of the CCT heritage inventory

The CCT manages planning information using an ArcSDE geodatabase. The Planning geodatabase is linked to the CCT Land Information System (LIS) and the Land Use Management (LUM) and Building Development Management (BDM) electronic tracking systems ("Trackers"). The CCT identified early in the project that decisions taken during land use and building development application processes could have significant implications for the protection of cultural heritage resources. It was therefore a priority to make heritage information available to decision-makers involved in these processes.

The heritage feature classes and tables were incorporated into the Planning geodatabase and a module created within the BDM and LUM tracking systems to read, display, edit and update the heritage information. At the same time, the business processes for land use management and building development applications, on which the tracking systems are based, were analyzed and

amended where required to integrate legislative requirements relating to cultural heritage management.

As the LUM and BDM Trackers are not available to all CCT officials, heritage information has been included in the environmental theme on the CCT Intranet GIS viewer (CityMapLite). The viewer allows users to query records and create simple maps using the layers displayed. The viewer is available at public counters where clients of the city can also access the information.

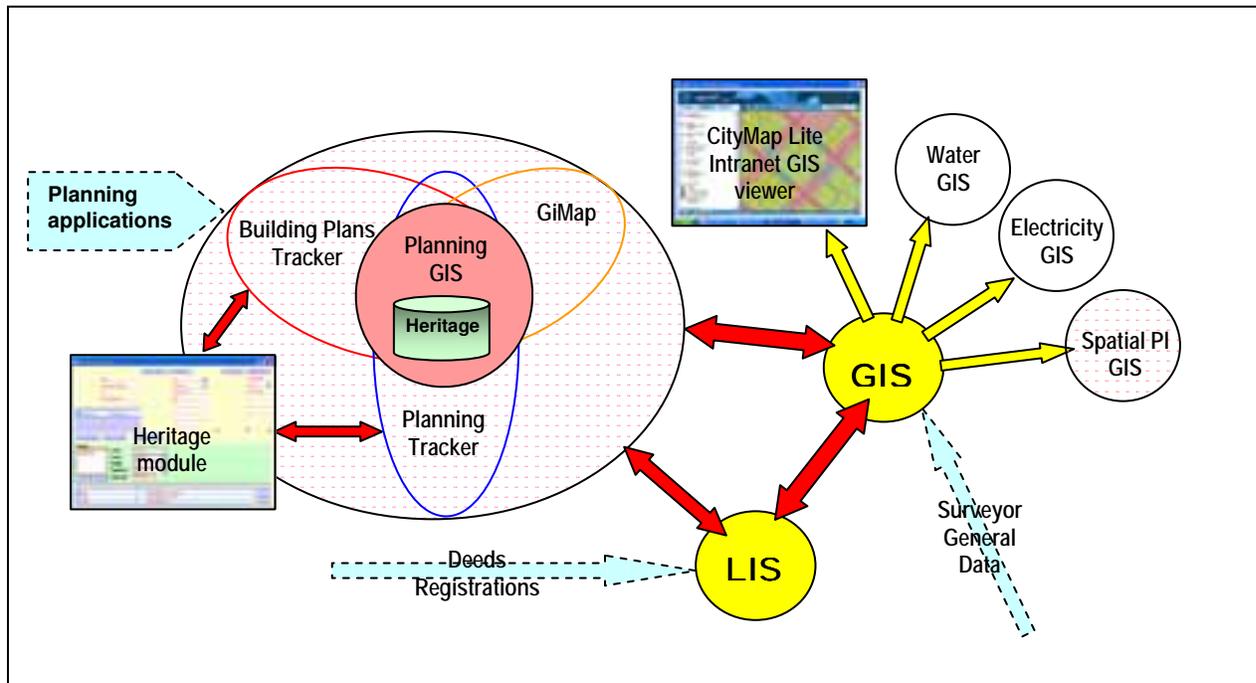


Figure 3: Planning GIS infrastructure with heritage inventory incorporated

Conclusion and way forward

Identifying buildings and environments of cultural significance and the degree of that significance is an essential prerequisite coherent and rational conservation planning and practice.² The City of Cape Town has initiated a process to develop a heritage inventory to improve the management of cultural heritage resources and ensure compliance with relevant national and provincial legislation. The CCT has leveraged its extensive investment in GIS technology towards achieving its objective to identify, assess, conserve, manage and enhance the heritage resources, structures and landscapes of all the people of Cape Town and ensure that the memories and values associated such resources are appropriately represented.³

The CCT plans to submit the heritage inventory to the provincial heritage resources authority, to list and include those heritage resources satisfying the criteria, on the provincial heritage register. If the provincial heritage resources agency is satisfied that the heritage resources identified in a particular geographical area are adequately provided for through the formal protective mechanisms, such as the zoning scheme provisions, the provincial heritage resources authority may give competence to the CCT to take decisions formerly reserved for the provincial heritage resources authority. This will benefit the CCT in its quest to streamline service delivery while at the same time conserving its natural and cultural resources for the current and future generations of Capetonians.

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End notes

¹ Before 1996, the greater Cape Town area consisted of 26 municipalities each with its own administration and land management system. In 1996 these municipalities were consolidated into 7 interim regional municipalities which paved the way for the creation of a metropolitan municipality, the City of Cape Town, in 2000.

² Townsend, S in Architecture SA, July and August 1996.

³ City of Cape Town Cultural Heritage Strategy, Oct 2005.