

Historic Cape Coast Site Analysis Utilizing Geographical Information System (GIS) and Aerial Imagery Analysis Technology for Integrated Planning

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The Central Region of Ghana contains a number of fifteenth through eighteenth century forts and related structures that served historically as the most important nodes in a trading network that linked Africa, Europe, and the New World. Among these structures are three World Heritage Sites: Cape Coast Castle, Elmina Castle, and Fort St. Jago. They are situated along a coastline remarkable for its natural beauty and among cities and villages that retain traditional lifeways and numerous historic structures, many related to the important trading history of the region.

The commerce along what was once known as the Gold Coast included not only gold and cocoa, but also the infamous slave trade. Because slaves were put on ships to the New World from the castles, preserving the castles is essential to the accurate telling of a history that is both a profoundly disturbing and significant episode in world history. In recent years, the castles have undergone extensive conservation. The structures are now stable, and enhanced interpretive programs are attracting considerable numbers of international tourists, notably Americans of African descent.

The benefits of increasing tourism, however, have not accrued to the populations of the towns in which the World Heritage Sites are located. Tourists arrive on buses, visit the castle sites briefly, and depart without staying in local hotels, visiting related historic sites, or purchasing local handicrafts. The towns are rapidly becoming living places for the poor, as more affluent residents move to the suburbs to escape the unsatisfactory living conditions of the towns, with their deteriorating infrastructures. In the towns, buildings are collapsing, roads are in poor repair, and those few utilities and sanitary facilities that exist are in urgent need of repair.

In preparation for planning for site improvement, US/ICOMOS is conducting a site analysis of the historic section of the town of Cape Coast. The analysis is utilizing aerial and satellite imagery analysis and geographical information system (GIS) technology. Initial results of the site analysis are presented here. Analysis will continue for an additional year after the charette in order to incorporate and treat data as recommended in the charette.

Included in this CD are 20 maps that have been produced from the GIS. These maps are, however, static documents that have been generated by a dynamic system. The GIS contains a great deal of data, both spatial and tabular, that can be queried in any number of ways. In the future, photographs taken at the ground surface will be included in the GIS, in addition to the aerial photographs already included. The GIS will be available to query in real time during the August charette.

Broadly speaking, the results of the site analysis, conducted and presented largely by means of a GIS, will be used to:

- Create a mechanism for the integrated, long-term planning for preservation and tourism related development;
- Plan and design infrastructure repair and new construction at Cape Coast;
- Plan for new conservation work within the Central Region of Ghana;
- Identify opportunities for developing and marketing handicrafts and other tourist services; and
- Plan and facilitate appropriate visitor access to cultural sites.

Construction of the GIS will also contribute greatly to empowering local stewardship institutions and involving the public in preservation efforts. Experience in planning for park and cultural and natural site management over the past two decades indicates that effective management is not possible without substantial public support. The manner in which the GIS will be formulated and the analysis conducted will help to enlist this necessary public support.

Douglas Comer is leading the GIS construction and the site analysis as a demonstration project of the US/ICOMOS Cultural Site Analysis Initiative, which he directs. This is one of the principal activities being conducted by US/ICOMOS in Cape Coast. US/ICOMOS is managing the Historic Preservation Component of the "Natural Resources Conservation and Historic Preservation Project, Central Region, Ghana" working in cooperation with Conservation International. USAID/Ghana funds the project.

Environmental Systems Research Institute (ESRI) is providing software, training and technical support for the initiative. As a part of this support, members of Ghana ICOMOS and the Ghana Heritage Conservation Trust (GHCT) will be trained to use GIS technology as a basis for planning and site management.

CULTURAL PARAMETERS

More specifically, the cultural parameters included in the GIS constructed for the site will include not only data relevant to historic structures and archaeological sites and features, but also features on the landscape of social and economic significance to the members of present day cultures. These will include:

- Religious sites (especially churches and shrines)
- Markets
- Traditional locations for vendors of various sorts
- Recreation areas
- Community gathering areas of other sorts
- Vehicle and pedestrian corridors
- Restaurants and other eating and drinking establishments
- Barriers to vehicle and pedestrian flow
- Locations where interpretive materials or guides can be acquired
- Utility corridors
- Parking areas (both constructed as such and ad hoc)
- Scenic views
- Circulation and sequencing of visitor use
- Activity nodes (by type of activity)
- Areas regarded as safety or health hazards
- Historic structures and sites within the historic district
- Development and land use practices external to the historic district of relevance (e.g., roads and trails, land ownership, existing activities, land use zoning)
- Key attractions in the region, especially those typically included in visitor activities
- Desired use areas as defined by local public groups and other interested groups (e.g., international preservation organizations, tour operators, industries)

Differences in standards for existing facilities will be identified (e.g., paved, unpaved, gravel surfaced roads; unsurfaced trails and boardwalks; visitor centers, administration buildings, restrooms).

ENVIRONMENTAL PARAMETERS

The relationship of the natural environment to cultural site preservation is intimate. One can not understand why structures and other remnants of past human activities are located as they are without reference to naturally occurring features such as sources of water and habitats that support animal and plant species useful to humans. Cultural sites can not be preserved unless one understands how natural processes either threaten or are compatible with site locations.

Information about the environment pertinent to site management concerns is being extracted from maps that contain, along with locations of structures and roads, hypsographical data. These maps were recently produced photogrammetrically, using stereoscopic aerial photographs, by a private firm under contract with the Ghana Survey Department. Elevation models, hydrology models, and watershed models have been derived from the hypsographical data. These models will be used to help determine optimal siting for improvements, and to identify environmental and cultural processes (erosion, development) that are threatening archaeological and other cultural resources.

ANALYSES

The various themes, or layers of information, described above will make possible a variety of analyses that will guide planning and development in the Central Region of Ghana in ways that are sustainable. Among those of particular applicability to the Central Region of Ghana are the following:

- Overly analyses, in which themes with complementary information are layered, can indicate 1) the best locations for facilities given the existing infrastructure and environmental parameters, 2) locations where visitor facilities would be necessary given certain levels of visitation, and 3) archaeological sites and other resources that are threatened by cultural and natural causes.
- Proximity analyses can 1) identify resources that would be threatened by construction activities, such as utility line installation, by identifying a zone of disturbance that would be produced by construction activities, and 2) can be used to recommend locations for visitor facilities such as restaurants, comfort stations, information kiosks, and first aid stations based upon proximity to attractions and activity nodes.
- Line of sight analyses recommend where certain facilities should not or should be located given visibility from key attractions and scenic view locations.
- Topographic analyses (including slope and aspect) can identify more or less favorable building sites as indicated by slope and aspect, or relationships among cultural and natural resources as indicated by likely topographic division or associations.
- Flow analyses identify probable paths of water flow and so locations subject to erosion or flooding.
- Density analyses determine clusters and patterns of vegetation and cultural sites that indicate niches or cultural patterns that might be threatened by development.

DATABASE

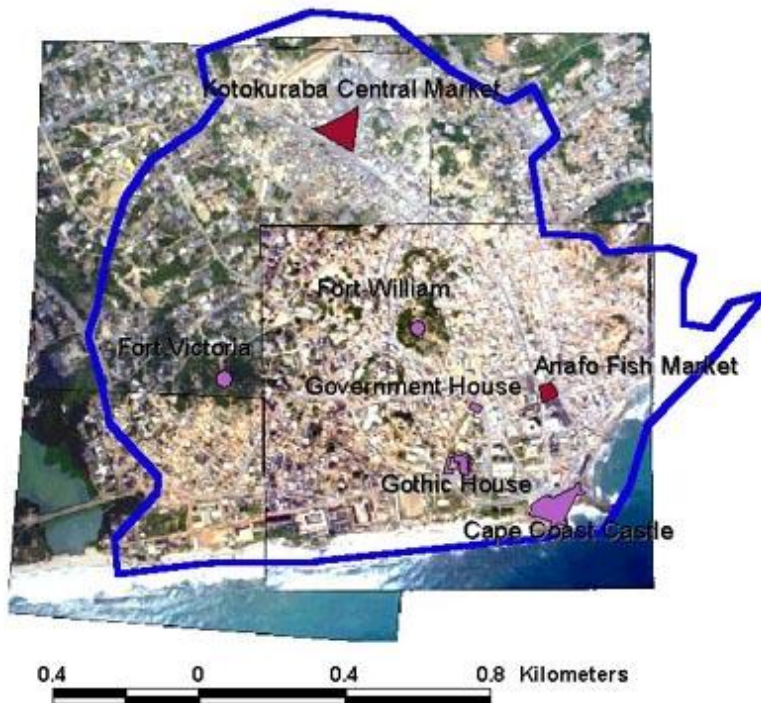
The GIS for the Central Region of Ghana will serve as an "intelligent" database. It will provide a compact space where all sorts of data relevant to Historic Cape Coast can be stored in digital format, including images, maps, documents, photographs, and even audio recordings. More importantly, data will be arranged so that it can be incorporated into displays like maps, charts, and tables, and can be queried in the service of sophisticated analytical procedures.

KEY TO MAPS

1. Aerial Photo Mosaic of Cape Coast Historic Core

This mosaic conveys a sense of the geographic setting of the historic core of Cape Coast. In particular, note the distribution of vegetation over the landscape and density of structures in the more developed portions of the city.

Aerial Photo Mosaic of Cape Coast Historic Core

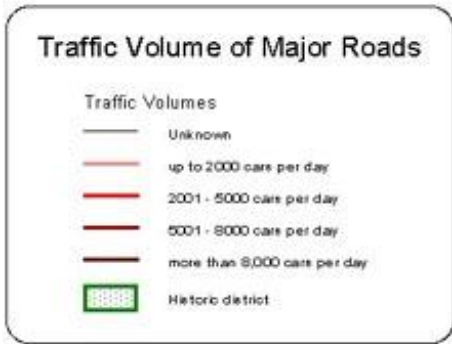


-  Historic Core
-  Historic Structures
-  Markets



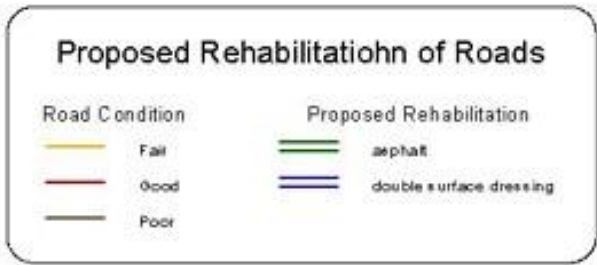
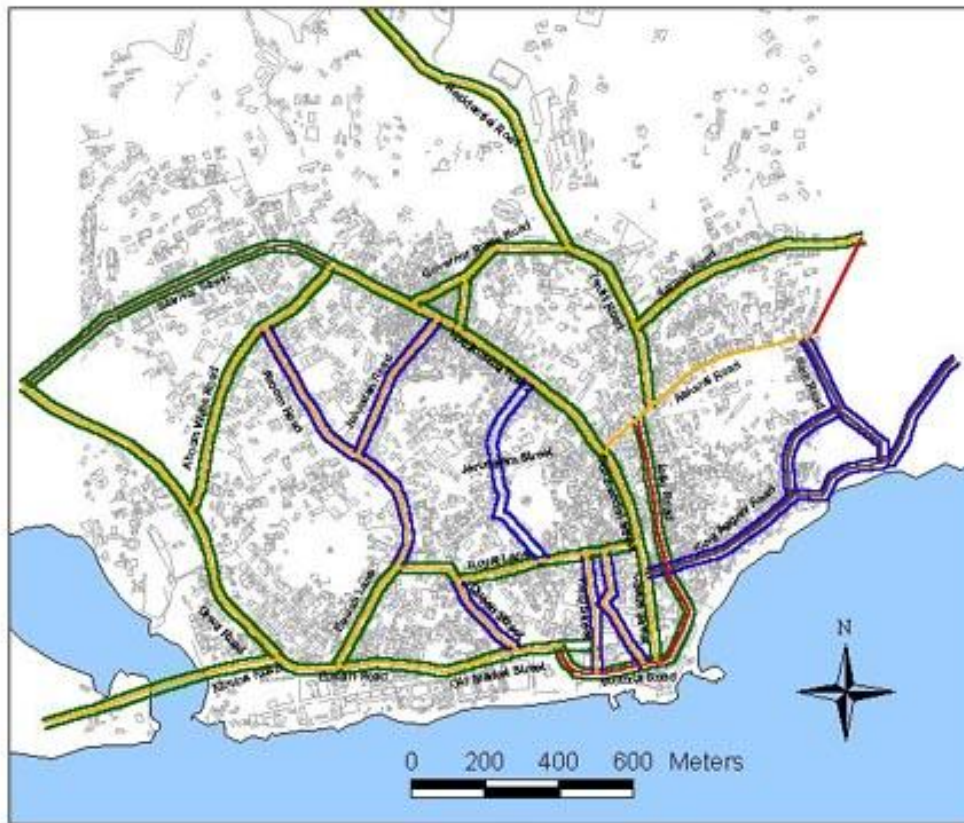
4. Traffic Volume of Major Roads

As presented in WB93 and UNDP94. Major roads are sometimes referred to here as key roads.



5. Proposed Rehabilitation of Roads

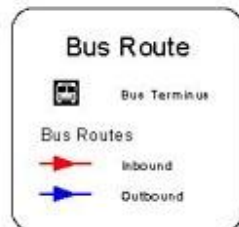
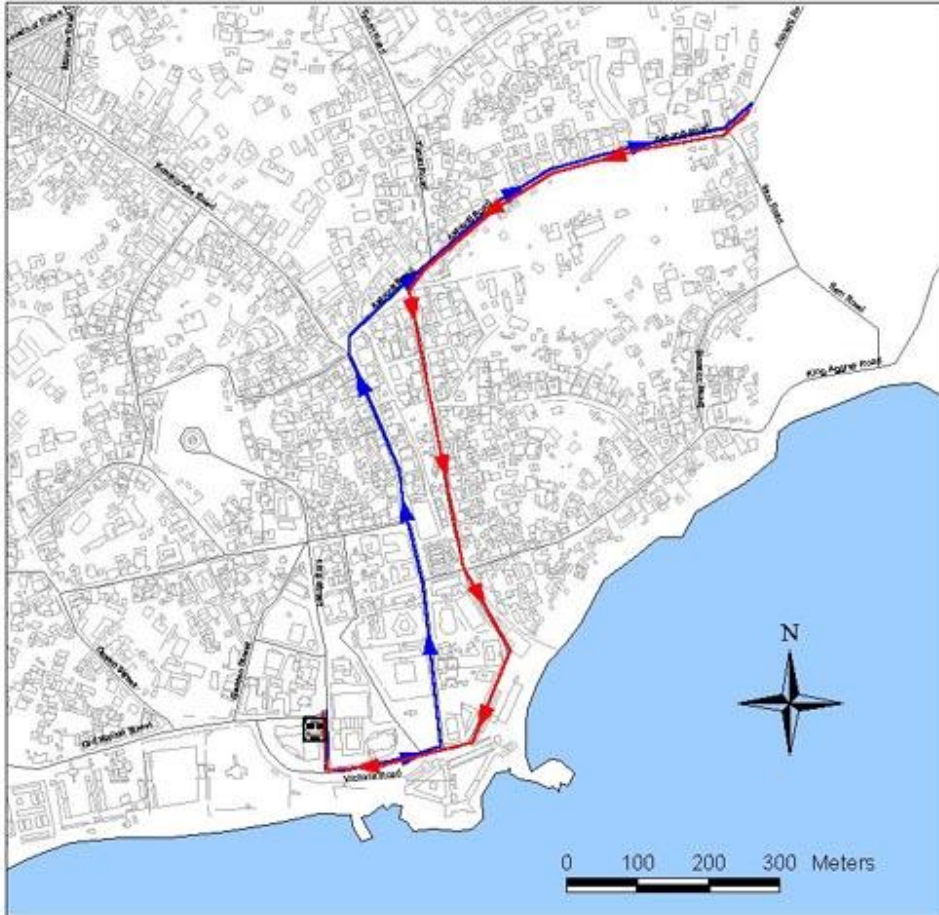
As proposed in WB93, page 61.



Rehabilitation proposed by The World Bank Structures Report [1993, p. 61]

6. Bus Route

Information provided by US/ICOMOS employees in Cape Coast, Ghana



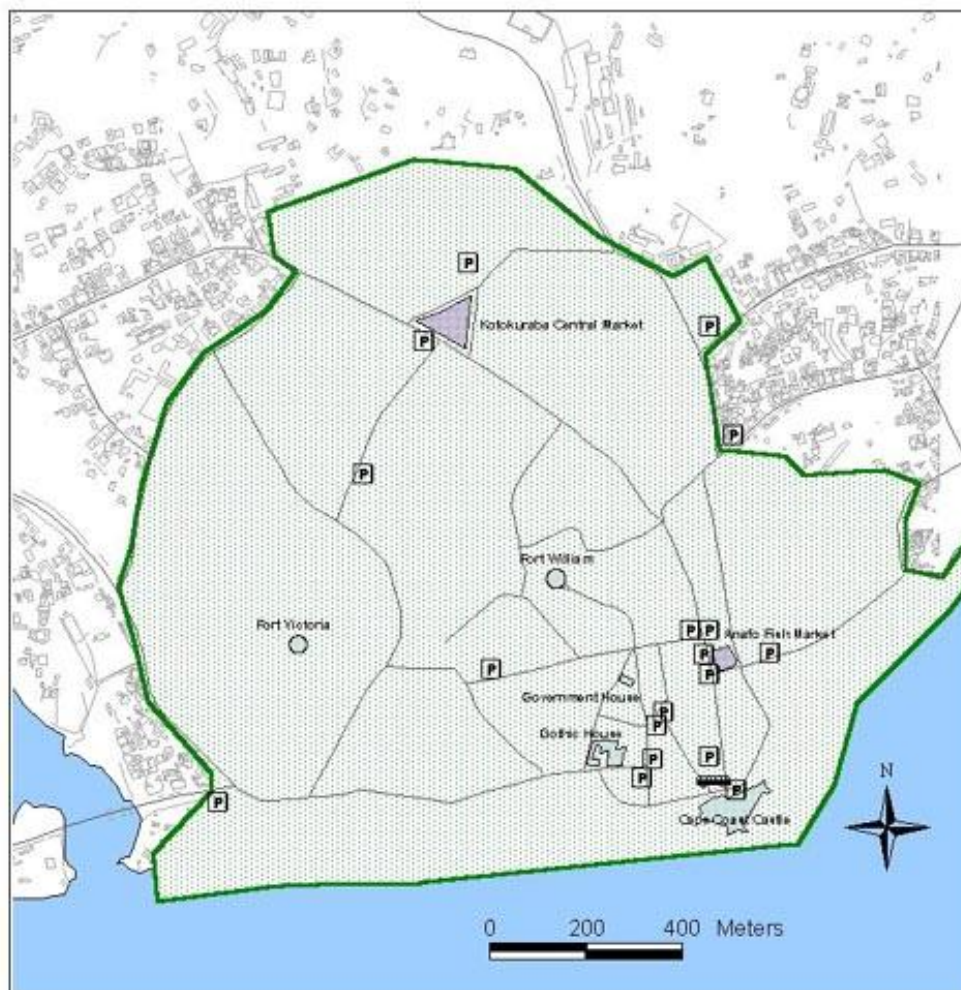
7. Fetu Afahye Parade Route

Information provided by US/ICOMOS employees in Cape Coast, Ghana



8. Parking Areas

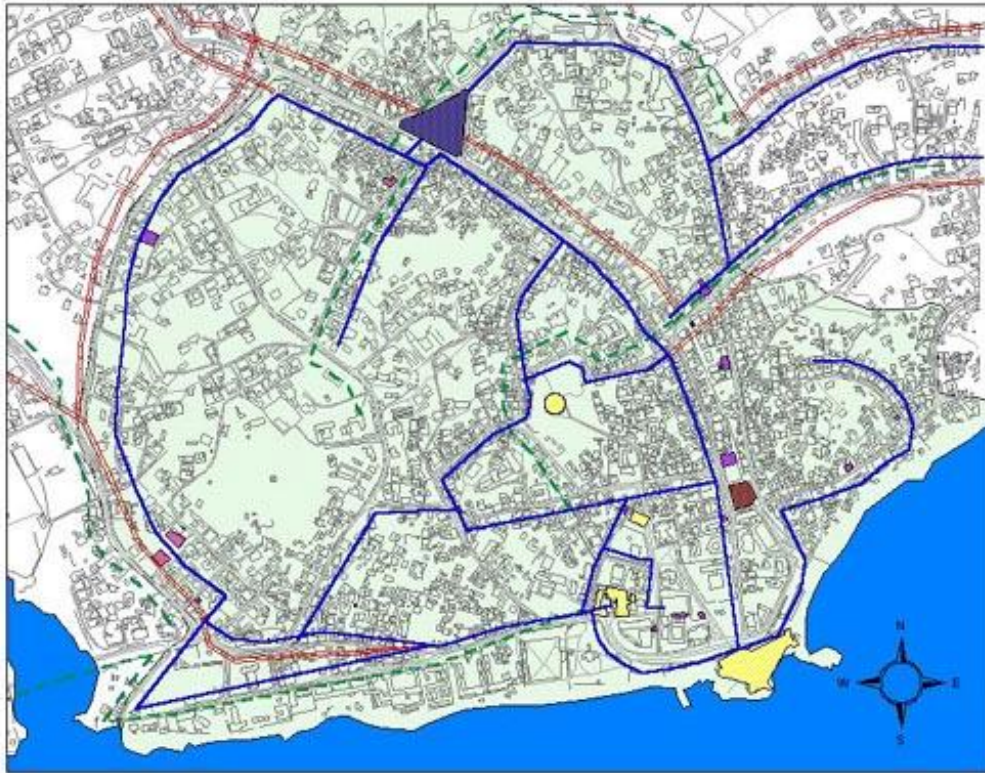
Information provided by US/ICOMOS employees in Cape Coast, Ghana. A public parking area are very small, and can accommodate only a few cars or buses each.



9. Water Lines

As presented in WB93 and UNDP94.

Water Lines Cape Coast, Ghana



100 0 100200300 Meters



10. Food and Lodging

Current food and lodging enterprises were not established with tourism in mind.

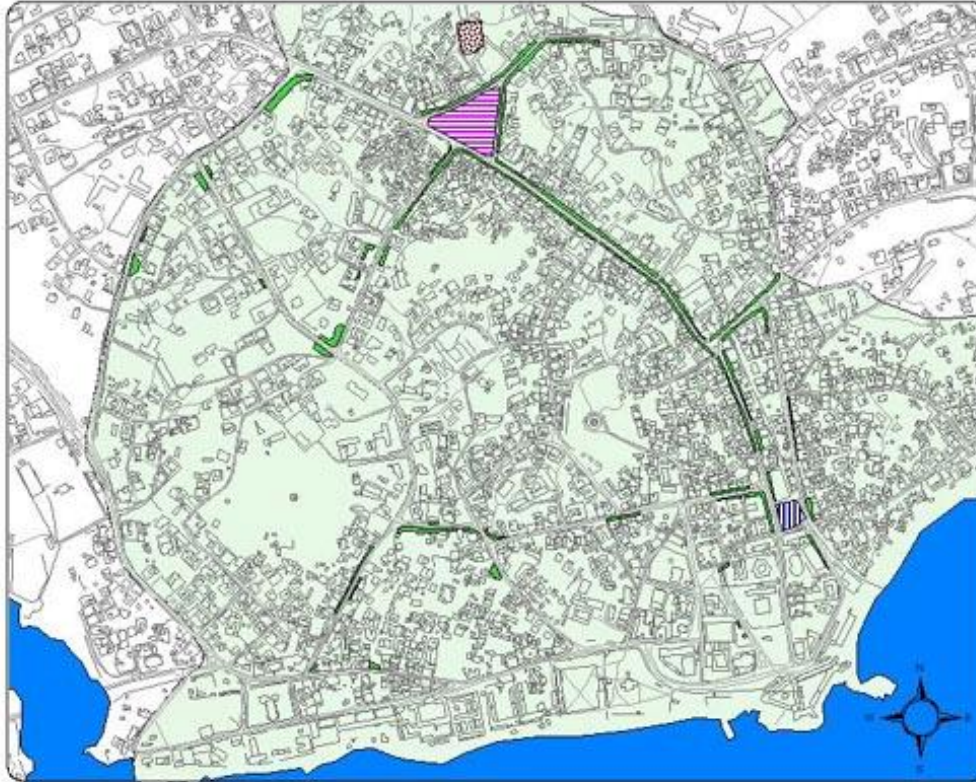
Food and Lodging Cape Coast, Ghana



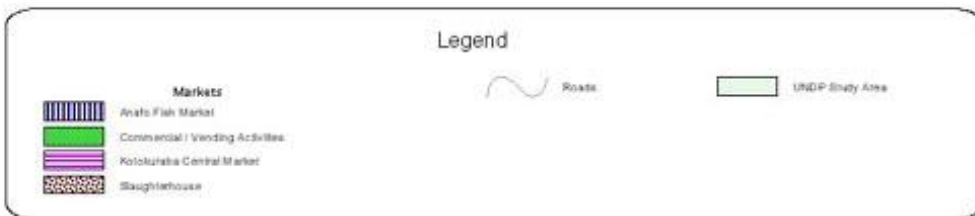
11. Markets and Commercial Areas

The traditional markets shown here could provide attractive experiences to visitors, and therefore additional income to vendors. Information provided by US/ICOMOS employees in Cape Coast, Ghana

Location of Markets and Commercial Areas Cape Coast, Ghana



100 0 100 200 Meters



12. Small-scale Industry

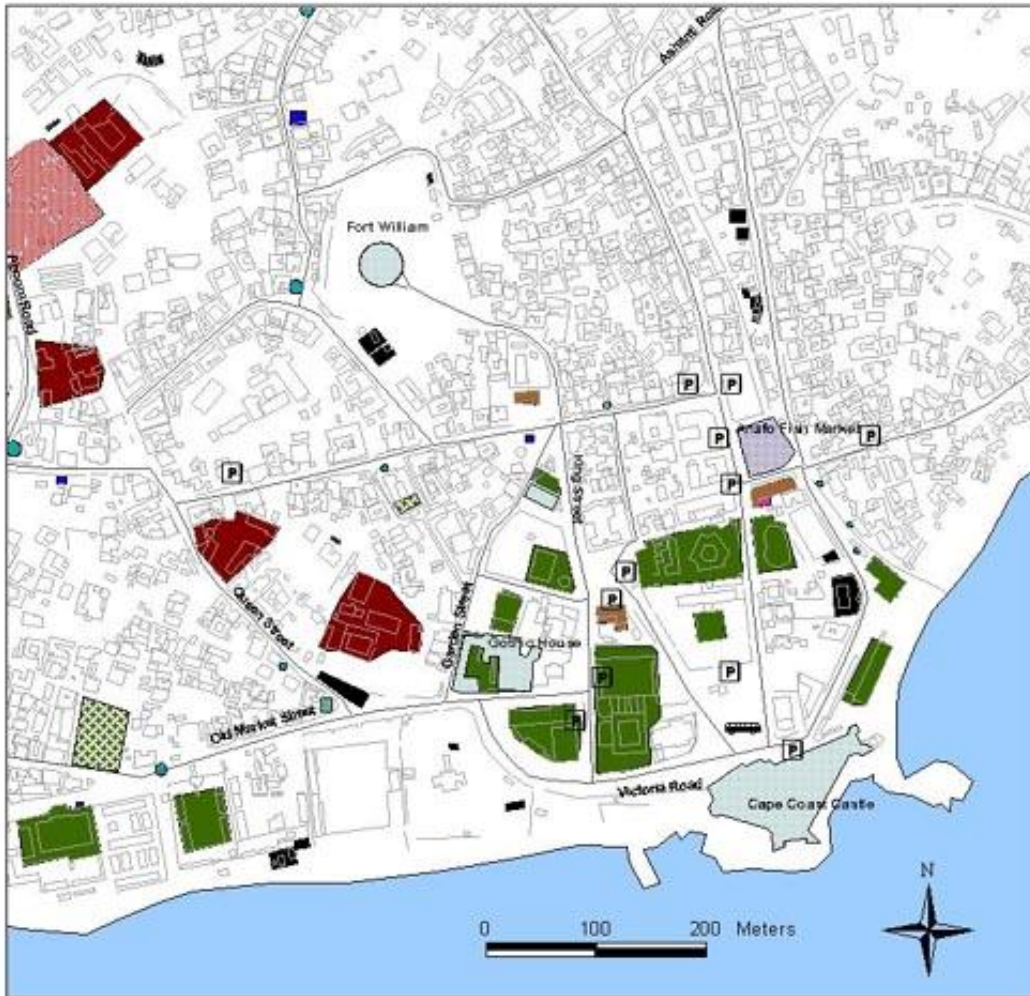
Small-scale industry is to be encouraged, and so landscape alteration should be planned in a way that will encourage such industry. Information provided by US/ICOMOS employees in Cape Coast, Ghana

Small-scale Industry Cape Coast, Ghana



13. Downtown, Cape Coast

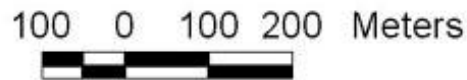
This portion of the historic core encompasses facilities of importance to both the local population and visitors. Sanitary facilities (toilets) and standing pipes (as sources of water) are used almost exclusively by local people. ATMs and pay phones are more accessible to tourists. Planning should consider whether to upgrade these facilities, provide similar facilities to visitors, or to do both. Information provided by US/ICOMOS employees in Cape Coast, Ghana



14. Fishing Related Activity Areas

Historic engravings provide evidence that specific locations have been used as landing areas for fishing boats for hundreds of years. Other traditional use areas associated with fishing include net mending, fish smoking, and fish sales areas. Information provided by US/ICOMOS employees in Cape Coast, Ghana

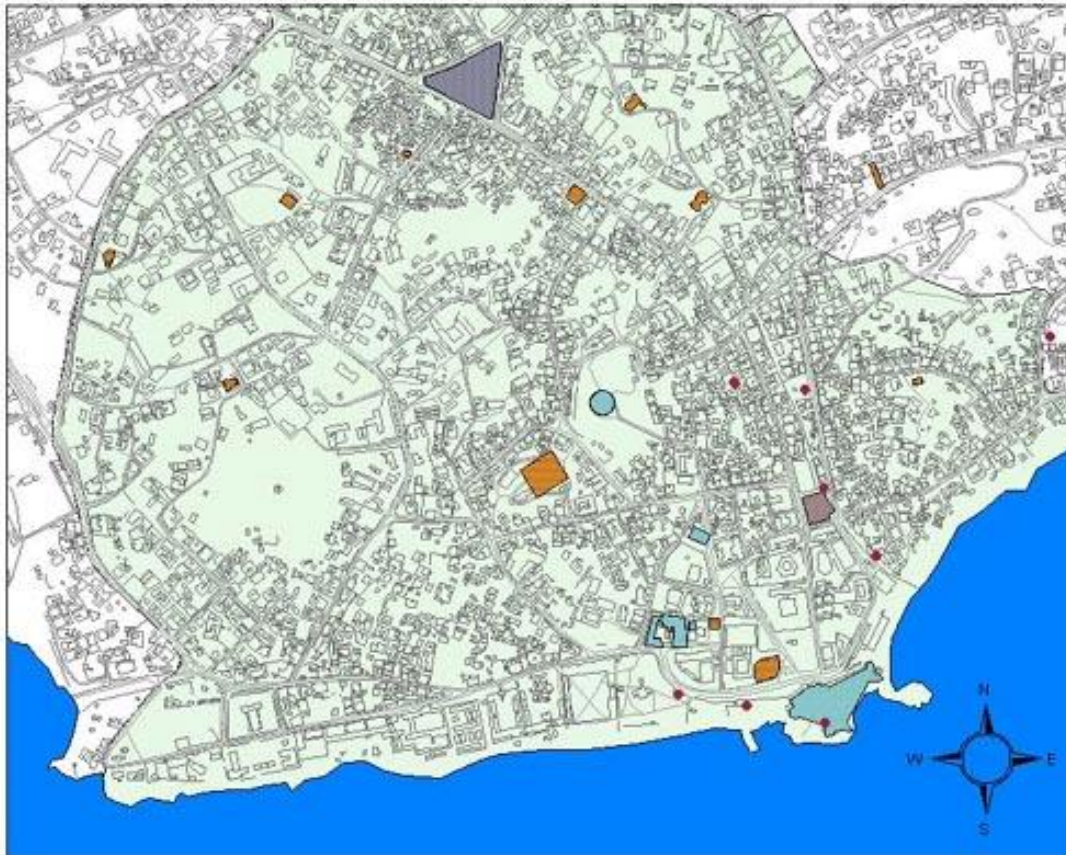
Fishing-Related Activity Areas Cape Coast, Ghana



15. Religious Areas

In addition to churches and mosques, shrines located throughout the historic core are of sacred significance to some segments of the local population. The shrines are to the ancestors of certain groups, and often refer to historical or mythological occurrences. Some shrines are of high artistic value, and it is likely that a good number of visitors would want to see and take pictures of the shrines if they are made aware of their existence. Planners should consider what might comprise appropriate access to shrines. It is possible, for example, that some should not be visited, some visited only with a guide, and that photographs should not be taken of certain shrines. Information provided by US/ICOMOS employees in Cape Coast, Ghana

Religious Areas Cape Coast, Ghana



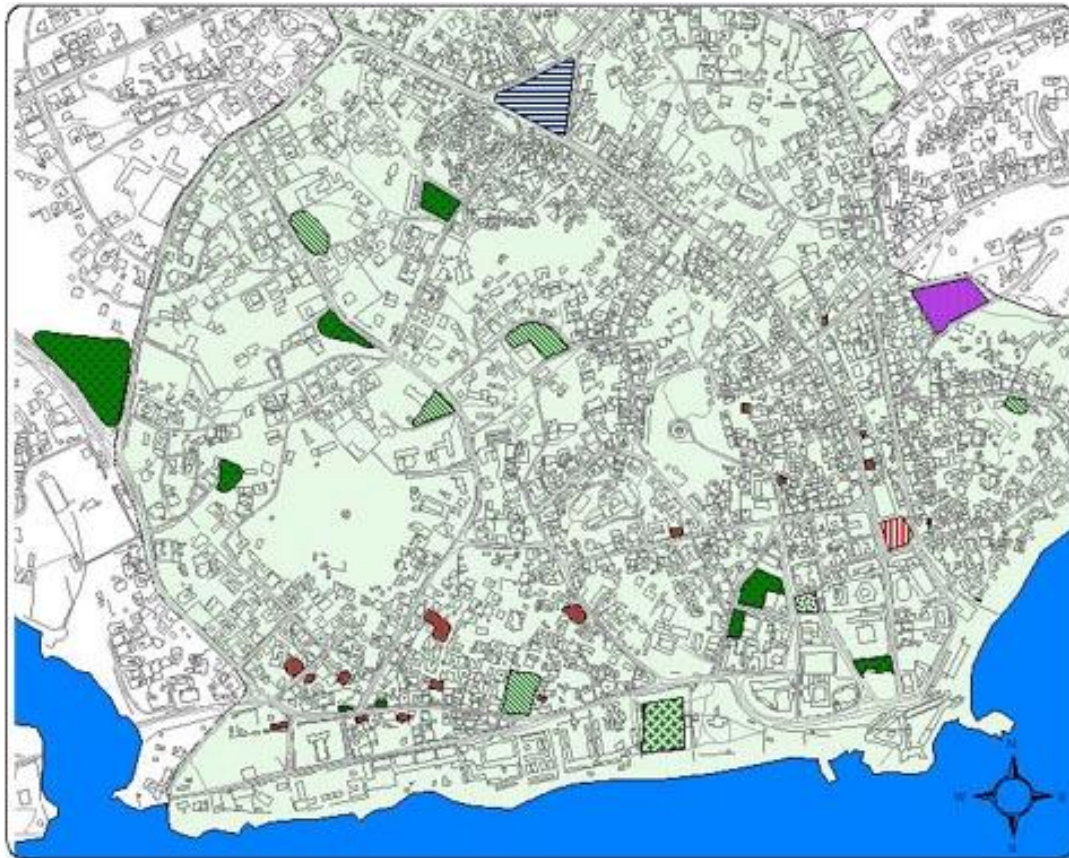
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16. Gathering Places

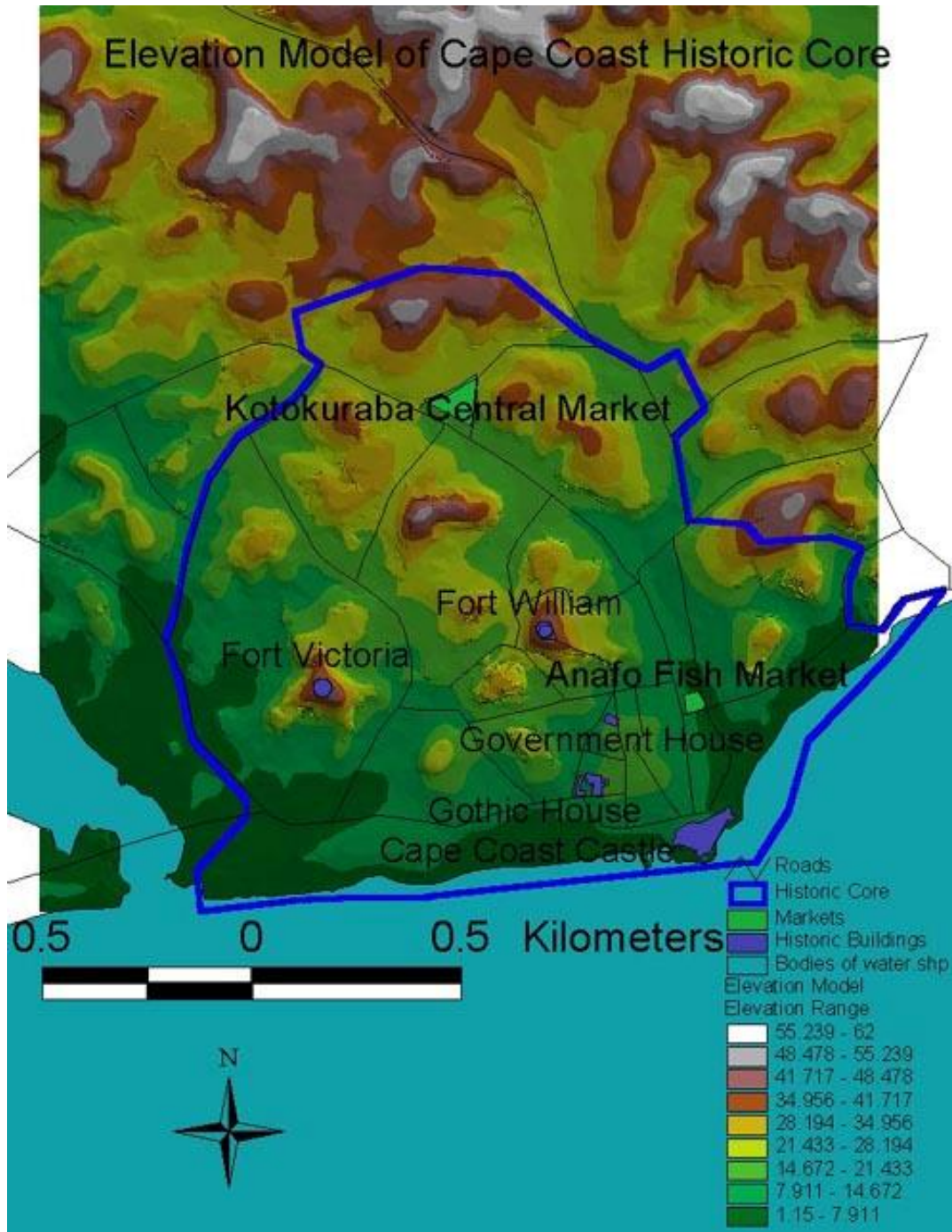
Areas indicated here are used for ceremonies, meetings, and other sorts of social gatherings; are used for recreation or for recreation and ceremonies are different times; or are open areas that might be put to such use or developed as parks. Care should be taken not to disrupt traditional uses of these areas. As with other traditional use areas, these spaces often play an important role in maintaining community cohesion. Information provided by US/ICOMOS employees in Cape Coast, Ghana

Gathering Places Cape Coast, Ghana



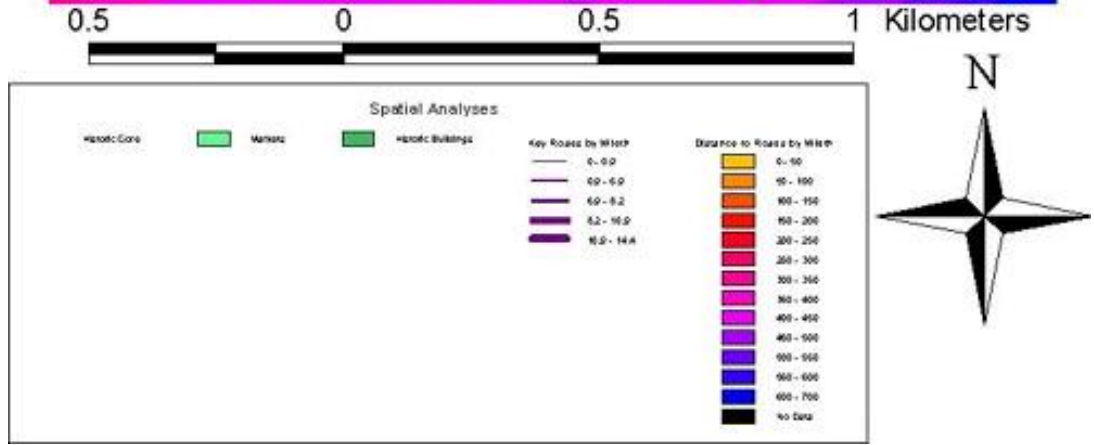
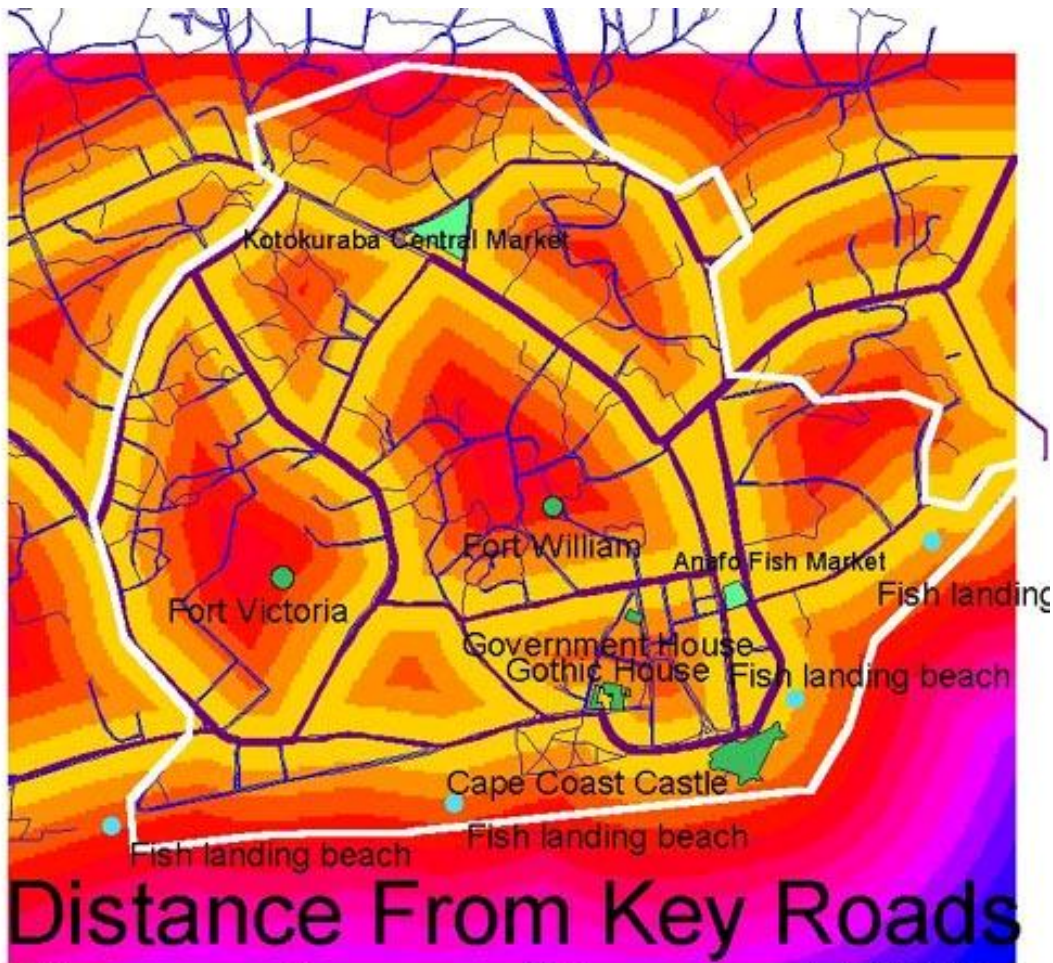
17. Elevation Model of Cape Cost Historic Core

This elevation model was constructed from hypsographical data that had been produced on contract by a Scandinavian firm for the Survey Department of Ghana from aerial stereo photography. One can see how the topography has influenced the placement of the roads and structures included on this map. Topography will of course influence site development in the future.



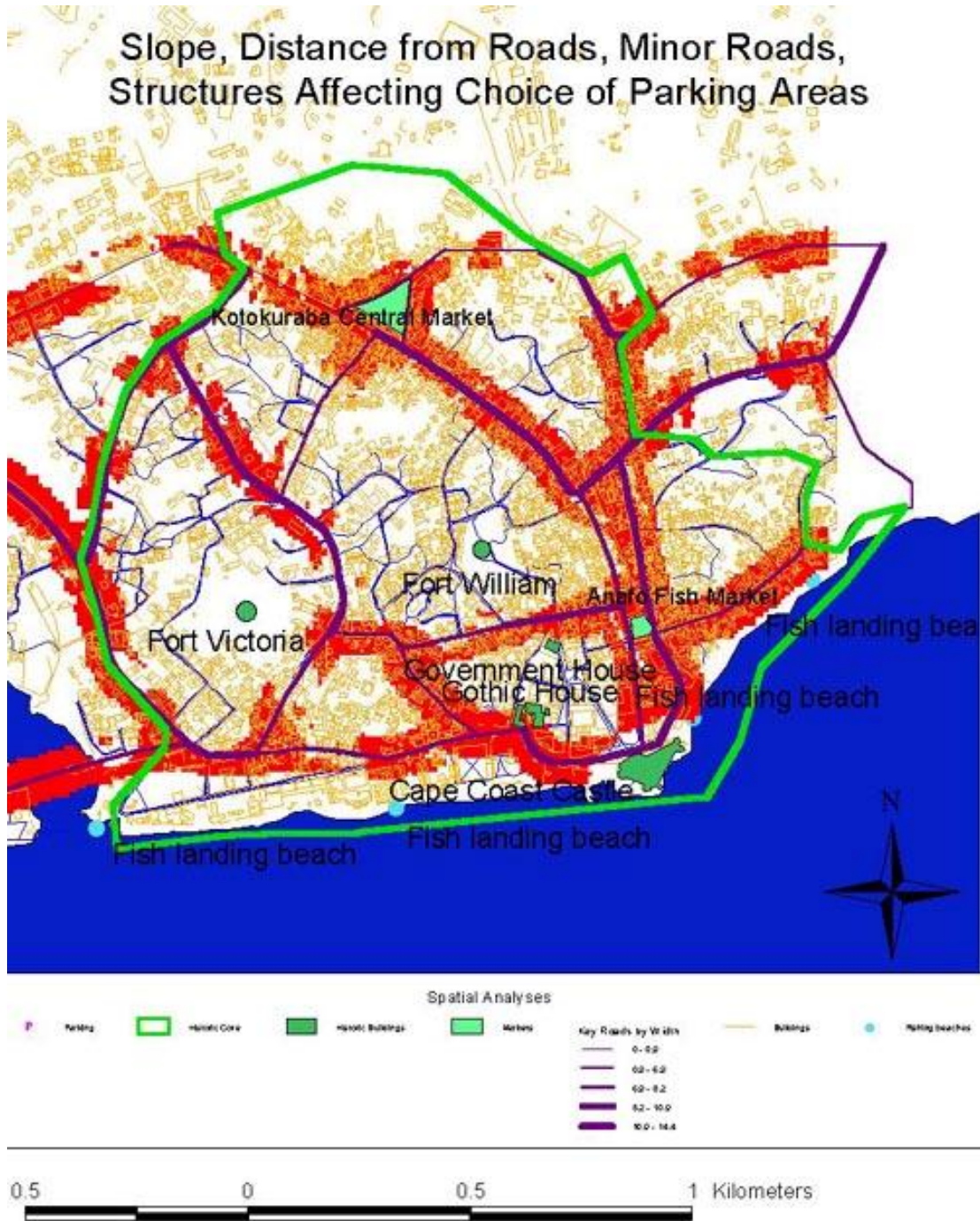
18. Distance from Key Roads

This map displays distance from key roads in 50-foot increments. Note that some attractions would be accessible from key roads, and that others would require a walk, as minor roads are often in poor repair. In order to minimize an increase in vehicular traffic, consideration might be given to construction of pedestrian walkways along wider roads, and of other walkways that would connect key roads to attractions by utilizing certain minor roads that are currently little used as walkways.



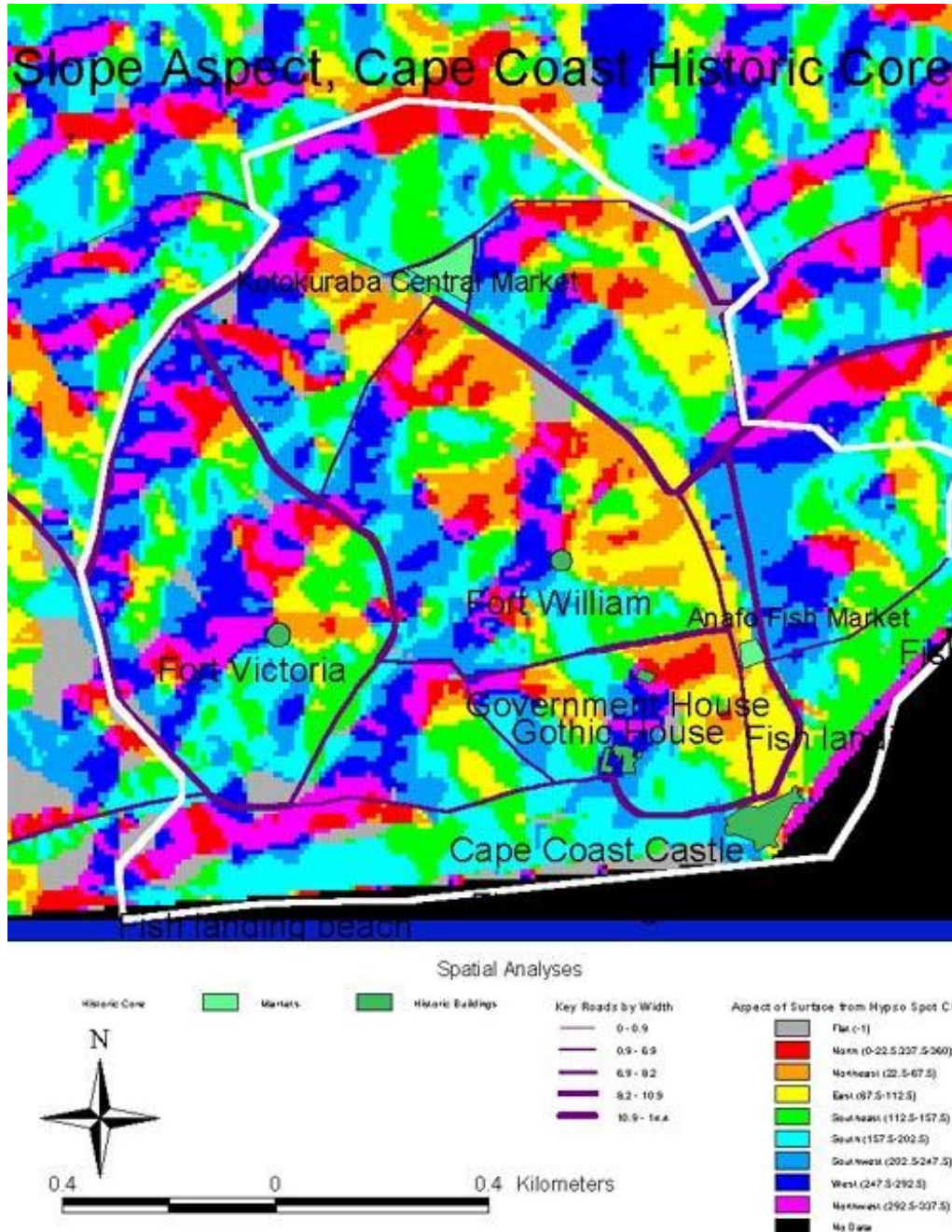
19. Slope, Distance from Roads, Minor Roads, Structures Affecting Choice of Parking Areas

Areas in red are less than 3% slope and less than 50 feet from key roads. Areas not covered by buildings (which are outlined in yellow) would be the best candidates for larger parking areas. Also, parking areas might best be kept outside the historic core, both because roads are narrow inside the core and because increased vehicle traffic inside the core is undesirable. Therefore, the bright red areas just outside the core might be considered the best locations for larger parking areas, in the absence of other factors.



20. Slope Aspect, Cape Coast Historic Core

The direction toward which any spot on the landscape of the historic core faces is indicated here by color, e.g., slopes facing north are red, slopes facing west are dark blue (see map legend). Some locations offer views in more than one direction. These are indicated where colors interface. Spots with views in 360 degrees, such as Fort William and Fort Victoria, are indicated where all of the colors used to indicate aspect converge. Aspect can be used to identify areas from which sites or activities might be viewed with minimal interference with day-to-day activities in Cape Coast.



21. Visibility from Fort William

This map demonstrates that certain viewpoints within the landscape of the Cape Coast Historic Core provide opportunities for a non-intrusive but informative visitor experience. Fort William is one of the points on the landscape from which a large portion of the town, with its historic structures and districts and its traditional use areas, can be observed. Interpretation here and at similar viewpoints in the form of signs and perhaps other informative media could provide an orientation to the historic town and suggest subsequent appropriate visitor activities. As importantly, interpretation could elevate visitor sensitivity to the local culture, and emphasize the need to respect traditional activities and sacred areas. Other points from which most of the town can be observed are Fort Victoria and the roof of the Roman Catholic Cathedral.

