Chapter 4
Analysis

4.1. Introduction

The datasets or layers of information created in the GIS database can be related to each other in a spatial context to help assess temporal changes in the study area, analyse the utilization of urban space and to assess the degree of change in the characteristics of various heritage elements over time.

Spatial analysis can easily help establish the relation between the circumstances and conditions in which the town of Muharraq evolved. It can also help to understand the factors leading to its present condition of demography, urban fabric, ethnicity and topography. These factors in turn illuminate the historical importance of various parts of Muharraq, to assess the heritage lost due to extensive development, to identify the heritage parts of the town and consequently to identify which of these are worth conserving. Assessment of the evolution of Muharraq also provides insight into the elements of historical significance that were most important in the past and which could be partly or completely restored.

This chapter is comprised of three parts. The first analyses the history of Muharraq using historical data layers and information interpreted from documents. The second part discusses the current demography, urban fabric and topography situation in the study area. The final section extends the analysis of the various parts of the study area which have been identified by the analysis of the historical and current situation within the study area. Finally the section concludes by recommending which historical buildings are in need of significant preservation.
4.2. Analysis of Muharraq History

It is essential to have a thorough understanding of the history of the place in order to really appreciate the historical significance of its urban fabric, its people and its traditional buildings. This will also help to exemplify the importance of the urban fabric, neighbourhoods and important buildings, which in turn would help in preserving these elements towards the conservation and revitalisation of the town’s heritage.

This section analyses historical data and maps to establish the history of Muharraq prior to its modernisation. Most of the facts analysed here were previously lost or were never known in relation to the origin of Muharraq. This analysis therefore attempts to establish a chronology of the town’s development, from the time of its first inhabitants.

The history of Muharraq is assessed in two parts – the first part identifies the location of the earliest historical settlements, which represent the historic cores of Muharraq. These are identified using spatial analysis and information obtained from the literature survey related to the history of the town. Secondly, the importance of the different parts of Muharraq is determined by analysing tribal settlement patterns.

4.2.1. Cores of Muharraq

Muharraq represents a typical Islamic town whereby the urban land use is organized into multifunctional cores enveloping a central mosque. A similar distribution can be observed in various Arab Islamic towns such as the old city of Cairo (Egypt), Aleppo (Syria) and Ouezzane (Morocco) (Bianca, 2000).
In Muharraq the core is determined by the location of the palace of the ruler and the grand mosque, which has to be next to the palace (Al Nabhani, 1923). The sons and the nobles stay around these structures. Next to the royal neighbourhood comes the suq or market followed by other tribes.

Analysis of information from the historical accounts, maps, sailors’ sketches, photographs, topographic maps and aerial images indicate that Muharraq was established in three stages. In other words, there appear to have been three cores to Muharraq.

**Historic settlement in Muharraq**

Muharraq was first established in 1800 (Brucks, 1825) by the people who developed the well planned and protected town of Zubara on the north-west region of Qatar. These people were half Bedouin and half sea-faring in nature (Abdul Rahman bin Barakat, personal communication). The town they built had strong fortifications with a double wall and a major fort as well as well-organized urban fabric. Because it was a flourishing town, it was threatened by other sea-faring peoples in the region: most notably the Wahaabis who wanted to take control of the town. The Wahaabis had already captured Al Ahasa on the east coast of Saudi peninsula, and Zubara was their next target. After a few failures, the Wahaabis also managed to take control of Zubara.
Map 4.1 Sequence of movement prior to first establishment of Muharraq in 1800. Al Khalifa first moved to Jaw, on main land Bahrain in 1797 where they established a town as big as Zubara. But in 1800 they moved to Muharraq, because it had better environment and was well protected as compared to Jaw (Brucks, 1825).
The tribes living in Zubara did not want to live under the control of Wahaabis so they decided to flee the town and settle in the middle of mainland Bahrain at a place they called Jaw. This place had the same environment as Zubara (Map 4.1) such as fresh water, grazing grounds for sheep, and sea for fishing (Ibn Sanad, 1897). But there was a persistent threat from the Omani rulers, who were planning to attack Bahrain. As a result, these people realized that Jaw was not a well-protected port and resolved to move to a place which could provide a naturally sheltered port and a strong defence against any attack (Al Khairi, 2005).

They moved to the island of Muharraq, which already had two abandoned forts, plenty of fresh water and good natural defences. Moreover, the island was inhabited, so it provided a good place to re-settle with proper planning and organization. This was the first core of Muharraq, which is now known as Bu Maher. There are historical records of sailors who frequented this place by ship. These accounts provide important clues in the form of- (i) historical maps, (ii) accounts of Muharraq town, (iii) its road pattern, (iv) the profile of Muharraq (Wilson, in Jarman, 1996). All of these sources suggest that before 1825 the rulers of Bahrain lived near the Muharraq fort or the present day Bu Maher on a low sandy island. Findlay (1866) and Psyche, (1817) described the location of Muharraq town in their diaries. They identified Muharraq as Arad Island in north-east Bahrain and which was almost 5 miles long and half a mile wide. On this island at the extreme south lay the town of Muharraq and the fort was about a quarter of a mile from the town.

Map 4.2 shows the fortifications of Muharraq, especially the first settlement or the first core of this town. This first core of Muharraq town was well protected from all sides, which included – first, natural protection on the west by a shallow water channel preventing approach by big ships; second, the two forts had long and short range cannons protecting the town from the south and eastern sides; and finally the northern side was guarded by the wall of Muharraq (Brucks, 1825).
Map 4.2 Fortifications and protections of the channels by the cannons atop the two forts in Muharraq. The background image in Black & White is the 1964 aerial photo, while the coloured image is the 2007 Ikonos satellite image.
These fortification elements suggest that the initial settlements and place where rulers might have lived during that time inevitably must have been in Bu Maher area owing to the fact that Bu Maher (then Muharraq) was well protected from all sides by defence structures. The wall of Muharraq must have been the preliminary defence against any incursion, while cannons provided the main defence against entry from the seaside. Another reason why the rulers might have selected this location would have been to protect against piracy and attacks from other rulers in the Gulf, a common phenomenon during that time. Compared to other parts of Bahrain, Muharraq already had a good defence structure in place (Brucks, 1825). The main reason why the rulers and tribes migrated from the tiny east coast town of Jaw in the middle of Bahrain to Muharraq in 1800, was probably because Jaw did not have a sheltered port (Brucks, 1825).

**Second Phase of Settlement**

After the establishment of the first rule by the Al Khalifa dynasty an immense threat was posed to the islands by foreign invaders. The islands were particularly appealing due to their abundance of fresh water and pearls. In about 1818, Abdullah bin Ahmed, the ruler of Bahrain from 1821 to 1842, moved to higher ground in the northern part of Arad island (now known as Muharraq) (Onley, 2004). After moving there, he built a grand mosque at the highest point in Muharraq (Wali, 1990). He also built a house for himself. This was the beginning of the second era of the establishment of Muharraq.
Map 4.3 Colour coded DTM (Digital Terrain Model) created by interpolating ground elevation points. The dark colour in the centre is the highest point in the centre of Muharraq, where the rulers first settled.
A critical reason for Sheikh Abdulla bin Ahmed to move to the higher ground close to the Al Bin Ali tribe may be that all of his sons’ mothers were from Al Bin Ali. A written account to this effect was found in a letter from S. Hennel, resident in the Gulf, to the government of Bombay on the 10th of April 1839 which says – “I believe there was originally no bad feeling between Sheikh Abdulla bin Ahmed and bin Tareef (chief of the Al bin Ali tribe), who are indeed connected by marriage, one of the wives of the former belonging to the latter’s family” (Hennel, 1832).

Analysis of the aforementioned descriptions that the rulers moved to higher grounds where there was fresh and healthy air (Billecocq, 2001), has been verified using spatial analysis using DTM. The DTM has been colour coded and underlain by the satellite image of 2004 and overlaid with locations of historical houses and the neighbourhoods (Map 4.3).

The ground elevation values in the DTM have been colour coded by using a specific classification method called Geometric Interval Classification, which helps in visualizing continuous variations of ground elevation data by changing colours at natural breaks in the ground elevation.

This classification scheme uses an algorithm which creates geometrical intervals by minimizing the square sum of elements per class. This ensures that each class range has approximately the same number of values within each class and that the change between intervals is fairly consistent. The result of using this classification enhanced the features hitherto not obvious by simply colour coding the DTM (Map 4.3).

The values in the DTM vary from -2m to 6.6m. These values are colour coded into 32 classes, revealing six mounds in the class interval of 5.5-6.0m and 6.0 to 6.6m (Map 4.3). This is exemplified by overlaying contours created from the DTM at 0.1m intervals which reveal these mounds as circles at those six places. The existence of the six
mounds was determined during the field survey while talking to an elderly person from the Ali bin Ali tribe (Abdul Rahman bin Barakat, personal communication).

Additional evidence is provided by the sketch drawn by Wilson in 1817 when compared with the 3D model of the topography of Muharraq (Fig 3.12). It also confirms that the Al Sheikh Hamad neighbourhood - the second core - occupies the highest position on the island (Abdul Rahman bin Barakat, personal communication). Al Bin Ali also occupied a strategic position on the island as they occupied land up to the coast (Hennel, 1832).

The locations of some of the important houses which were built during the early 1800s are informative. This is especially true of the location of the Al Sheikh Hamad neighbourhood. The geographical positions of the mosques shows that the rulers had chosen the highest point to settle. It can be observed from map 4.3 that the second core was established atop two mounds in the centre of the town: the map shows the approximate boundary of the second. This position can be ascertained from the picture of 1903 (fig 4.1) (Jarman, 1996). In this picture, the central region of Muharraq shows a significantly large neighbourhood surrounded by other smaller neighbourhoods. This layout could be attributed to the expansion of the core itself alongside the new settlements around the core. This core can be clearly observed in the topographic map of 1905 as shown in fig 4.2 (Jarman, 1996). It shows a big house with a central courtyard in the middle of Muharraq Island. The location of the core can be further confirmed using the map of 1931 (fig 4.4) which shows only one grand mosque in the middle of the island. Fig 4.5, the first aerial photo of Muharraq, shows the historic building at the centre of this core which is prominent on the 1947 and also the 1905 (fig 4.2) maps.

Further analysis of the 1872 sketch (fig 4.6) clearly depicts three prominent features of the area of Muharraq to Bu Maher Fort. These are the first core, the second core and Busaiteen (a village further north on the main island). The location of the second core
Third Phase of Settlement

From 1818 onwards, instability persisted in Muharraq which culminated in a civil war in 1869 between the brothers, Sheikh Muhammad bin Khalifa and Sheikh Ali bin Khalifa (Al Khalifa, 1996). During this war Sheikh Ali bin Khalifa was killed and Sheikh Mohammad bin Khalifa was arrested by the British and held responsible for the war and sent into exile in India. This left Bahrain without a ruler, so the Bahrainis asked the British to bring in Sheikh Isa bin Ali, who became the ruler of Bahrain from 1869 to 1932. He was the son of Sheikh Ali bin Khalifa, and was in Qatar during that time. The British brought him from Qatar to rule Bahrain when he was just 21 years old. At that time Sheikh Isa stayed in Manama in his father’s house but later he decided to move his seat to Muharraq. The reason for this move was that most of the royal family lived in Muharraq and that in addition he would get protection from his mother’s Al Bin Ali tribe. Moreover, an aristocratic environment had already been present in Muharraq since the establishment of the second core.

Upon moving to Muharraq he resolved to build a new house for his sons and his governors so that they could be near to him. He could not do this in the second core as it was already crowded with the houses of the various tribes. Relocation of these was impossible and he therefore decided to establish his own core. This was achieved by moving to Sheikh Hassan’s house, which was built around 1840. He later gradually expanded. These events represented the beginning of the third core of Muharraq during the regime of Sheikh Isa and lasted until 1932. During this time he rebuilt his own mosque to establish his royal Al Kharo neighbourhood. His ministers and other close associates settled around this core. Sheikh Isa continued to take part in
governmental responsibilities until his death in 1932 at the age of 84 (there are, however, some accounts that put his age at death at 90) (Guilbert, 1981).

Even though Sheikh Isa bin Ali did not originally order the construction of his house, which was named after him, he did order the construction of numerous buildings in Manama (Guilbert, 1981). This indicates a degree of political stability and prosperity in the Sheikh Isa bin Ali reign.

Once the third core was established, the city began to take shape. The innermost circle was where the royal family lived and around this area the governors and the high ranking officials were located. Other tribes went on to build their neighbourhoods around the central core. This had the effect of bringing back several of the tribes who had previously left Muharraq. Workers from Iran and Iraq began to immigrate to Muharraq to work for the wealthy people who required labour to build their houses, and as divers and sailors to support trade. Most of these people who came from Iraq and Iran were masons, goldsmiths or blacksmiths. These people began settling in Muharraq by establishing their own communities or neighbourhoods, leading to the expansion of the town northwards. Map 4.4 shows the third core which is adjacent to the second core. This core is also known as the Al Kharo neighbourhood or the Sheikh’s neighbourhood and became an important site for a date market in Muharraq.

Sheikh Isa’s house in Muharraq is the oldest building in Muharraq (Map 4.4) and for that reason it is considered to be the centre of the town. There is, however, no clear reason why that location was chosen for the erection of his house.

This part of the study attempts to analyse the reasons behind the establishment of the third core of Muharraq. It is understood that the rulers established their neighbourhoods at the highest positions in the regions. These high points cannot, however, be observed
now due to extensive urbanization, construction and land reclamation which has diluted the original identity of the islands.

As described for the second core, the DTM was analysed to determine the reasons for the establishment of the third core at its location. But it reveals that by the time of establishment of the third core most of the highest points were already occupied. It is possible to assume that this neighbourhood developed itself northwards. The second core and Ali bin Ali were already well developed locations, so the third core basically expanded the region of royals in Muharraq.

The most important result of the analysis in this area is the finding that the third core was established outside the limits of the existing Muharraq town (the town established during core two). As mentioned, core two was bounded by a wall on the North side from the east to the west coast. This can be clearly observed in fig. 4.6, which is the 1872 sketch (Jarman, 1996). It is also evident in the map of 1903 (fig 4.1) in which it is clearly depicted as a clear straight line on the northern edge of the town.
Map 4.4. Locations of the three cores of Muharraq, underlain by the colour coded DTM and the contours to demonstrate the locations of the core with respect to the overall topography of Muharraq.
4.2.2. Tribal Neighbourhoods

As previously mentioned, the term 'heritage' in Muharraq is more than just the landmark structures, such as the Sheikh Isa House, Syadi house and many other such buildings. Muharraq has been a typical Islamic town which encompasses various elements that need to be recognized as 'heritage'. These elements include the historic urban fabric, the traditional buildings and most importantly the neighbourhoods established by generations of Bahraini people.

Other than the built environment, the people who settled in Muharraq are equally important as part of the heritage. Furthermore, the concept of an Islamic town entails strong neighbourly relationships and the preservation of neighbours' rights (Mortada, 2003). It demands social closeness to increase their dependency on each other because each neighbourhood has its own space and location in the town based on its importance and its buildings.

The most important tribes lived near the core of the town, for example, the tribes belonging to the ruler's family. All the other tribes settled around the core, based on their occupation - a typical characteristic of an Islamic town. The concept of neighbourhood in Muharraq was first determined by Wali (1990) where he depicted growth in Muharraq from 1817 to 1970 as concentric circles around central nuclei or the core of Muharraq. Wali (1990) mentioned neighbourhoods as family sectors which had their own economic, religious and juridical powers. Each neighbourhood was uniquely identified by its people, their occupation and the mosque. After modernisation the morphology of these tribal locations gradually lost significance, making it difficult to accurately determine the boundaries of the neighbourhoods.

As mentioned earlier, the key elements in identification of the neighbourhoods are the mosques, as each tribe has its own mosque. In this respect a field survey was
undertaken to determine the date of establishment and tribes of each mosque in the study area (map 4.5). In addition, the data gathered from various literary sources and historical maps suggest approximate regions of settlements for each tribe. By collating information from various sources (topographic data; Mandeel, 1992; Yarwood, 1988) and data collected from field survey, the boundaries of each tribal zone have been drawn as shown in map 4.6. This map clearly depicts the concentric pattern of settlement beginning from a central core and radiating outwards. Furthermore, it also shows that these settlements began from the highest point in Muharraq.

Another important element that was analysed in order to understand the significance of different neighbourhoods and their settlement patterns is the primary occupation of these tribes (map 4.7.). Assessment of tribal occupations with respect to their location suggests that the goldsmiths and the masons lived close to the ruling tribes near the core of the town. This was probably because they used to work for the rulers of the community in order to construct important buildings and mosques and maintain these buildings. The merchant sail makers and seafaring tribes were located in the coastal areas for the obvious reasons, whereas the workers were situated farthest from the core towards the northern parts of the town (Wali, 1990).

Further assessment of the largest tribe - Al Bin Ali - suggests that they chose the north-east shore of the island because the tribe was very big (comprising more than a 1000 mean and an equal number of women and children) and was in possession of three large ships and five smaller ships (Brucks, 1842). In addition, there was not enough room to accommodate such a large number of people in Muharraq town or in the first core, so they must have lived in the north-eastern shore of the largest part of the then Arad Island. This was because the eastern side was more suitable for a port as it had natural shelter from the north-west winds and was well protected by a defensive system.
Map 4.5 Old Mosques with their name and approximate date of construction.

The mosques are the main indicators of the establishment of neighbourhoods. The background is the 2007 satellite image and colour coded digital elevation model (DTM). Correlation between locations of the old mosques (early 1800s) and the DEM suggests that the oldest tribes settled in the highest point in Muharraq or near the coast like Al bin Ali tribe, whereas the rulers settled at the highest point.
Map 4.6 Tribal neighbourhoods within the study area shown with names; the coloured polygons depict approximate duration of establishment of the areas. The second core which is in the centre named Al Sheik Hamad or the rulers tribes was established around 1800-1850 AD. The sources of information about neighbourhoods and their approximate time of establishment are Wali (1990), Mandeel (1992), Yarwood (1988) and the Topographic data.
Map 4.7 Main occupation of each tribe, giving visual clues about their pattern of settling based on their relationships with the core or the tribes belonging to the royal family. For example, the masons, goldsmith and other royal tribes settled close to the core whereas due to obvious reasons the sea traders and merchants settled near the coast.
4.3. Current Situation of Muharraq

The previous section has revealed the historical significance of the original town of Muharraq, but the discovery of oil in 1930s triggered a drastic change in the morphological and demographic characteristics of the town. These changes included rapid expansion of the towns in Bahrain, land reclamation around the town of Muharraq, and most significantly changes in the demographic characteristics of the country due to the increased influx of an immigrant work force, mostly consisting of labourers from various parts of the world.

In this section an analysis has been performed on the demographics, buildings and topographic data in order to assess their impact on the neighbourhoods, the urban fabric and the traditional buildings.

The main demographic parameters analysed are: Bahraini vs. expatriate population; employment characteristics and; age-wise distribution of population within the study area. It has been assumed that these factors played the most significant role in shaping the current situation of the town and which in turn have an impact on the heritage of the town. The assumption is based on the fact that Muharraq represents a typical Islamic town which entails cultural and social bonding between the individuals. Therefore any interference from external social elements would have a negative impact on the integrity of the historical social fabric of the town.

Furthermore, interpretations from old aerial photographs, the latest satellite images and the topographical data assist in the analysis of change in the area. These changes occurred in road characteristics, building characteristics and lost heritage elements.
4.3.1. Demographic Analysis of Muharraq

The demographic data provides crucial information for understanding the characteristics of the population in the study area. This data is available for each administrative block, containing information about the total population of Bahraini’s and non-Bahrainis, male and female counts, number of households occupied by Bahraini’s and non-Bahrainis, age-wise counts of population and employment data.

Analysing these data would help assess the impact of influx of foreigners on neighbourhoods; as has been observed in various towns across the Middle East that foreign influx adversely affects cultural heritage and traditional buildings, which are transformed into market places or apartments for economic reasons and income generation as a survival strategy by their owners (Mashary, 2007). The situation is similar in the study area, because the neighbourhoods have limited urban spaces due to the compact nature of the settlement pattern. Consequently, the occupants have no option but to transform the traditional buildings in order to increase rental space to accommodate more families or convert the buildings into commercial spaces.

The demographic data that was acquired was available in digital tabular format providing crucial demographic parameters summarized for each administrative block as shown in map 4.8. This data is used for the thematic mapping and spatial analysis by joining it to the administrative block boundary feature class using block number as the linking field.

The analysis should help assess the impact of urbanization on the overall heritage of Muharraq, the effect of the influx of expatriate workers into the country, and their settlement pattern. It should also illuminate the subsequent impact on the neighbourhoods and urban fabric. This should also provide good visual clues for
reasons for particular patterns of settlement of Bahraini and non-Bahraini peoples in the various areas of Muharraq.

Population Distribution in the Study Area

The first demographic attribute that was analysed was the general distribution of the population of Bahrain in different municipalities. In this study, the data from the 2001 census was used (CIO, 2001). From graph 4.1 it can be observed that the population distribution in Bahrain has the highest population of the total population located in Muharraq (16%), whereas Manama, which is the main commercial town in Bahrain, has only 12% of the total population. Even other towns like Jedhafs, Riffa and Hamad Town have almost 12% each.

Graph 4.1. Population count for each municipality in Bahrain (Source: Table 3.5)
Map 4.8 Total populations in different administrative blocks within the study area and their association with neighbourhoods.
This general population distribution in the country suggests the importance of the study area from the point of view of human settlement in the country. Even though the study area is no longer the capital or commercial centre of the country it still has the highest concentration of people as compared to other regions in the country. This is due to the fact that it has been the capital in the past as well as being an important part of the country and its oldest town.

The total population data is used to create a thematic map for each administrative block in the study area (map 4.8). This map only suggests a general distribution of population within various blocks within the study area. It fails, however, to suggest any impact on the neighbourhoods. As a result, this data is analysed by determining the population density in each block. Population density may impact in various parts of Muharraq. The population density is computed by dividing the population of each block by the area, as shown in Map 4.9.

It can be inferred from map 4.9 that, for example, block 216 has a very high population but still exhibits a very low population density. Block 214, however, is the opposite of block 216 and there is a high concentration of people although the block’s area is quite small.

The oldest settlements of Al bin Ali or block 208, and the second core region or block 213 shows very high population density (map 4.9) when compared to their area of land and number of houses and population, implying the most densely habited region in the area.

Analysis of the population density has determined that the study area has more than double the average population density of the world (United Nations World Prospects Report, 2004), but it is relatively close to Asian average population density. Furthermore, the data suggests that the population in the study area is almost 51% of
the total Muharraq population, whereas the geographical area of the study area is only 10% of the total area of Muharraq. Therefore to assess the impact of the population on the heritage of this area more demographic parameters need to be analysed.

**Bahraini vs. Non-Bahraini Population**

Population density only provided a general population distribution in the study area and a concentration of people in various parts of the study area. To assess the impact of population further, therefore, the information about expatriates living in the study area needs to be analysed. This will provide a distribution pattern for Bahraini and non-Bahrainis in various parts of the town, as well as the composition of the society and the dispersion of external people within the social fabric of Muharraq.

The census data contains information about male, female counts for both Bahraini and non-Bahraini people. When this data is plotted as in graph 4.2 it indicates that four out of nine blocks in the study area have a larger Bahraini than non-Bahraini population. Block 211, however, has more than double the number of expatriates, while the other four blocks are predominantly expatriate communities. Another important observation is that the non-Bahraini males stand out in most of these blocks. It is easily attributed to the low class non-Bahraini bachelors probably pertaining to the labour class who are occupying the cheap rental accommodation easily available in these older areas.

Thematic representation of the same data (map 4.10) shows the variation of Bahraini vs. non-Bahraini people with shades of green and red. Dark green denotes a high concentration of Bahrainis whereas red depicts a high concentration of non-Bahrainis. It clearly suggests that non-Bahrainis are dominant in most of the study area, especially in Bin Khater where they significantly outnumber Bahrainis.
Map 4.9 Population densities in the study area (total population per sq. km). The blue outlines are the neighbourhood boundaries, and the numbers are the administrative block numbers.
It can also be observed in map 4.10 that block 211 or the Bin Khater neighbourhood has almost three times as many non-Bahrainis as compared to the Bahraini population. As has been demonstrated in previous chapters, Bin Khater is one of the oldest settlements in Muharraq. Also, the Sheikh Hamad neighbourhood, which is the core settlement, is almost 40% occupied by non-Bahrainis. Other neighbourhoods, such as Gassaser, Al Jalama, Al Banana, Al Kharo and Al Sheikh Abdulla, have almost double the number of non-Bahrainis as compared to the Bahraini population. Some of these neighbourhoods have been established since ancient times. The other neighbourhoods of Bu Maher or the first core of Muharraq and the adjacent areas also have the number of non-Bahrainis almost equal to the number of Bahrainis.

Graph 4.2. Trend lines for the ratio of Bahrain vs. Non-Bahraini population count
(Source: Table 3.6).
Map 4.10 Ratio of count of Non-Bahraini (NB) / Bahraini (BH) in each administrative block within the study area and how it corresponds to the tribal neighborhoods. For example, Ali Bin Khater neighborhood shows a very high concentration of non-Bahraini’s whereas Ali Bin Ali shows less influence of the expatriate population.
Average Household Analysis

The ratio of Bahrainis to non-Bahrainis provides a crucial indication about the composition of the society in various neighbourhoods in Muharraq. It would be more useful, however, if houses belonging to each category could be determined but limitations in the available data do not provide discrete information about individual houses. Hence the general statistics of each block have to be analysed.

As a result, an approximation of the number of households belonging to each category has been analysed using household data for each block. This gives a count of the total Bahraini and non-Bahraini domination of Bahrainis. Otherwise most of the area has almost equal proportions of non-Bahraini and Bahraini households. More specifically, the Bin Khater, Suq, and Sheikh Abdulla neighbourhoods show a very high proportion of non-Bahraini households, suggesting a serious negative impact for heritage on these neighbourhoods. This negative impact can be attributed to the aliens, who are mostly low income bachelors renting old houses in poor conditions at cheaper rents. This in turn causes discontinuity in the urban cultural environments and adversely affects the traditional neighbourhood in general. It also leads to gradual deterioration of the buildings due to poor maintenance and support from the owners. Map 4.11 is a thematic representation of this data. It can be inferred from this map that only few areas in Muharraq have a
Map 4.11 Total household and household information of Bahraini (BH) and Non-Bahraini (NBH) population in each area. It clearly demonstrates that the number of household is almost the same for BH and NBH except for Al Bin Ali, Al Hayeyak and Al Saga neighborhoods. Whereas Al Sheikh, Al Jalalma and Suq areas show domination of Non-Bahrainis. The background colours are the administrative blocks labelled with blue colour numbers on the map.
Age-wise Population Distribution Analysis

As mentioned by Burke (2001), heritage helps people understand who they are, and where they, their family, and their country emerged from, as Burke et al (2001) described “the inheritance of environment, behaviour and attitudes that shapes the society young people lived in”. So, in this work it is significantly more important to understand the type of people of various age groups that live within the study area, which is an old heritage town with rich history. This parameter would help understand the impact of the immigrant community on the local population.

The age-wise distribution of the Bahraini population indicates blocks that are under the threat of losing traditional values, environment and behaviour due to an influx of immigrant population which are occupying houses in their territories. Information about the old population would, furthermore, indicate the existence of some traditional values. This may be because of the fact that old people tend to live as when they were young and when the traditional values were still dominant in the society. Those people could also be used as an important resource for understanding and implementing conservation measures that would be undertaken based on the recommendations at the end of this study. A declining number of young and middle age Bahrainis from Muharraq suggest gradual loss of traditional values as the younger population gets disconnected with the older generation. Hence the analysis of the age-wise distribution of Bahraini and non-Bahraini populations could help understand the deteriorating situation of heritage in different neighbourhoods of Muharraq.
The census data has been processed to extract different age group counts, which is depicted in map 4.12. This map plots different age groups, each with a range of 10 years. The age groups for non-Bahrainis are depicted with bars having blue borders.

Interpretation of the bars indicate that with increasing age there is drastic decline in the count of Bahrainis in Al Sheikh Hamad, Sheikh Abdullah and Bin Khater neighbourhoods. It can also be seen that the working-age population (between 24 to 64 years) is relatively higher for expatriate populations as compared to the local population. For other neighbourhoods, the opposite trend is exhibited in most of the age groups.

It can also be observed that the count of the very young and old Bahraini population is significantly higher as compared to the same age group of non-Bahrainis in most of the other neighbourhoods. It has been determined from the field survey that most of the neighbourhoods are inhabited by Bahraini people belonging to the respective neighbourhoods, but the situation is not so good in Al Sheikh Hamad, Sheikh Abdullah and Bin Khater and Suq areas, where the local population is on the decline. This declining population of young and old Bahrainis signifies potential loss of identity, culture, roots, and local settings or urban fabric of these neighbourhoods.
Map 4.12 Bar graphs on the map shows Bahraini (BH) and non-Bahraini (NBH) people in different age groups. The bars with the blue outline represent NBH population. It can be observed that there is a gradual decline in the numbers of BH people with increasing age, whereas the trend of NB people suggests an increase in number, especially in working age group. The background colours are the block boundaries.
Analysis of Employment Statistics

The preservation of the cultural identity of the region is directly associated with the people who belong to that society. As determined in the foregoing analysis of the age-wise distribution, some of the neighbourhoods exhibit a declining population of local people. In that analysis it was also determined that the numbers of the working age group (15-64 years) are significantly lower compared to the expatriate community. This suggests that the people are migrating out of these areas in search of work. Not surprisingly, it has been determined in various studies that migration is a common phenomenon in the Middle Eastern capital-poor regions (Blake, 1980). Muharraq was affected by the migration of local people due to the following reasons-

i. After the opening of oil refinery in 1930 near Jabal Al Dukhan in the middle of mainland Bahrain, the people had to travel a long distance from Muharraq to work in the refinery, so people started leaving Muharraq and began settling in the proximity of the refinery (Franklin, 1985).

ii. During the economic downturn of 1929, the demand for natural pearls from Bahrain declined in the world market, which affected the dominant diving community, most of which lived in Muharraq at that time.

iii. The Bahraini pearl trade experienced a further setback with the invention of artificial pearls by the Japanese, which caused merchants and divers to leave the occupation and start taking oil refinery jobs.

iv. As Manama emerged as the business centre, people preferred settling there, because the urban fabric and living conditions are modern as compared to the old and congested conditions in the old quarters of Muharraq. So, people rent out the old buildings in Muharraq to expatriate labour, who hardly maintain the buildings.
Analysing employment characteristics of the population, therefore, could suggest an impact on the cultural heritage of Muharraq. To analyse the employment characteristics of the study area, information about working people in Bahrain for different employment categories has been extracted from the census data for 2001. This data is shown in graph 4.3. It can be inferred from this data that agriculture, fishing and manufacturing are the dominant employment categories. The electrical, construction and government sectors are the second most employment rich sectors in the country. Graph 4.3 shows that 30% of all the employed people in Bahrain live in the capital town of Manama, while only 15% live in Muharraq and the remaining 40% are distributed across other municipalities.

Graphs 4.3 and 4.4 reveal that the working population in the study area is dominated by non-Bahrainis - both males and females - irrespective of their employment category. Ironically, the government sector which is supposed to employ 60% of the local population and which also dominates other categories in the study area, fails to show any effect on the dominating non-Bahrainis in the study area.

Graph 4.3: Population count for different employment categories in Bahrain (Source: Table 4.8).
Further analysis of the employment data was performed by taking the ratio of the number of employed people and the count of the working age group population, as depicted on map 4.13. It clearly suggests a very low employment among the working age group, especially in Al Gassaser, Bin Khater and AL Sheikh Hamad neighbourhoods, where the value is below 20% or 80% unemployment of the total working population in that neighbourhood; Bu Maher exhibits less than 10% employment.

The foregoing analysis conforms to the general trend observed in various Middle Eastern cities - that people migrate from old areas to urban areas or even outside the country for employment, and coincidently most of Al Gassaser, Bin Khater and AL Sheikh Hamad neighbourhoods are some of the oldest settlements in Muharraq.

4.3.2. Urban Fabric Analysis and Heritage Building

The urban fabric of Muharraq is the most crucial element of the heritage in this study due to the fact that it represents the only surviving traditional Islamic city architecture in the Middle Eastern region that still preserves most of its basic elements.
Map 4.13 Percentage of total working population (count of working population / working age-group). It can be inferred that there is high rate of unemployment in old areas of Muharraq which would have an adverse impact on the local heritage, e.g. Bin Khater, Al Jalahma, Al Gasaser and half of Al Shihab Hamad neighbourhoods, which are also historically important neighbourhoods.
The urban fabric of Islamic towns utilizes religious principles combined with strong social bonding to build a sacred space for the community. This exemplifies religious buildings or mosques at the centre of the social life. The houses are, therefore, concentrated around the centre, prohibiting an isolated or spread out urban fabric which signifies loose social bonding. It therefore produces a continuous urban fabric which is uninterrupted by massive freeways or open spaces, highlighting monuments or buildings. The mosque is therefore the main public core which is surrounded closely by the suq or the market in the proximity and together they form a coherent urban space.

Secondly, the residential areas or the neighbourhoods contain tightly spaced houses, devoid of external open spaces, built wall to wall. These houses are themselves protected against visual intrusions from the street or adjacent buildings.

Thirdly, the approach from the public area to the neighbourhood is usually very complex, comprising several hierarchical sections of streets and mostly ending with dead-end roads, increasing the privacy of the houses.

Muharraq also embodies the same urban pattern which was observed in map 4.5. This clearly shows well defined neighbourhoods demarcated by major roads with each neighbourhood containing its Mosque in the middle. The street patterns can also be observed to be conforming to the same principle of Islamic urban fabric - closely knit houses abutting each other and largely devoid of open space.

It is well established that due to rapid development in the country and modern requirements, most of the buildings and the urban fabric are undergoing transformation. This analysis therefore utilizes the latest satellite images and old aerial photographs supported by field work in order to assess the impact of on-going changes into urban fabric and building characteristics (map 4.14).
To assess the impact on urban fabric the pre-modernisation aerial photos of 1931 and 1964 have been compared visually against the latest satellite image and topographic data. The result of visual analysis and interpretations are presented in map 4.15, which depicts change between pre- and post-modernization as lost, modified or partially modified areas denoting the scale of urban fabric with respect to 1931 or 1964. It can be determined that the overall situation of urban fabric is significantly threatened in the whole study area. These changes suggest that most of the buildings in the study area have been modified or have been totally demolished for the purpose of new buildings or widening the roads.

A further assessment of the road network and open spaces or the urban fabric has been mapped (map 4.16) in order to determine the status of the road in comparison to its state in 1931 or 1964. The map shows current road network and the type of road - new or old roads.

The urban fabric as analysed using 1931 topographic maps, 1961 aerial photos and 2007 satellite images and topographic data, shows significant changes in both road fabric and open spaces in some areas. Within the study area most of the urban fabric is still preserved, but due to land reclamation around the ancient or the original island of Muharraq (map 3.1), this original fabric has lost its significance. This is due to the construction of a modern high speed road network around it.
Map 4.14 Locations of traditional buildings in Muharraq. Different colours depict the conditions of these buildings as determined during field survey and from Topographic data.
Map 4.15 This Change Analysis map has been created after visual interpretation of the satellite image of 2008 and the aerial photo of 1964 and topographic map of 1931. The changes marked with coloured polygons depict areas where heritage and traditional buildings have been totally or partially lost. The modified buildings are the traditional buildings which still retain their original shape but have been modified. The background is the 1931 and 1964 maps.
Map 4.16 The Road network in Muharraq depicted new roads and the old Major and Minor roads. The new roads were constructed after land reclamation.
In this study the ancient fabric refers to the urban road network as observed in the first large scale topographic map of 1931, which clearly displays the actual road and landmark buildings in Muharraq. The density of the urban fabric is characterized by the association of buildings abutting each other.

Visual analysis of maps from 1931 to 2007, has led to quantification of the degree of loss as:

- Road fabric lost: nil
- Road fabric modified: 17%
- Total area of study area: 2.5 sq. Km
- Area of heritage building lost: 0.2 sq. km or 8%
- Area of buildings Modified: 0.3 sq km or 12%

The visual interpretation and subsequent estimation of the area has been performed using a GIS application. From this visual assessment, it has been determined that the town still preserves the ancient road network and urban fabric. There is, however, a significant alteration in the characteristics of the buildings and the road network due to a change in the traffic conditions and modernisation of buildings. This in turn suggests that the creation of empty spaces within the neighbourhoods is endangering the cohesiveness of the social fabric, owing to the fact that it is leading to destruction of the original urban fabric, architectural discontinuities and increasing living spaces which attracts more alien population into these spaces.

The last elements assessed for heritage protection has been the individual buildings, for which a comprehensive survey of buildings was carried out in the three core regions on the following parameters – (i) heritage buildings, (ii) building height and (iii) heritage loss.

i. Heritage Buildings
The field survey conducted in three neighbourhoods and the spatial analysis of building data suggests that:

<table>
<thead>
<tr>
<th>Total buildings</th>
<th>1200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count of heritage buildings in each neighbourhood is:</td>
<td></td>
</tr>
<tr>
<td>Sheikh Abdulla</td>
<td>16</td>
</tr>
<tr>
<td>Al Kharo</td>
<td>22</td>
</tr>
<tr>
<td>Bin Khater</td>
<td>26</td>
</tr>
</tbody>
</table>

This data has been depicted on map 4.17, which shows each heritage building with its condition as determined during field survey. It suggests that almost 60% of the buildings are in fair to good condition, whereas the remaining 40% are in a poor state, requiring immediate attention to preserve them.

It also suggests some of the buildings are along the roads, implying that they could be under threat of demolition due to widening of roads. This has already happened to the buildings along those roads as shown in map 4.15.

ii. Building Heights

The building height is an important attribute as it indicates an association between heritage and modified buildings in the neighbourhoods. Analysing this attribute should indirectly suggest the percentage of buildings which might still be preserving a certain degree of traditional values.

Using the attribute of building heights as a mapping theme shows buildings with particular numbers of stories (map 4.18.). Statistical analysis indicates that almost 84% of the buildings are one to two stories high and only 16 % are high rise buildings. Furthermore, from the high resolution images and aerial photographs it has been determined that the buildings maintain the general shape and size or the fabric as it was during the 1960s.
Map 4.17. Location of old heritage buildings, such as shops, houses and famous houses, for preservation in the three neighbourhoods - Sheikh Abdullah, Al Kharo and Bin Khatar. The different colours represent the current condition of these buildings as determined from field survey. It indicates about 60% of the buildings are in Good to Fair condition, while remaining are in poor to fair state.
Map 4.18 Buildings with number of stories (as of 2007) in three neighbourhoods - Sheikh Abdulla, Bin Khater and Al Kharo. About 23% of all the buildings are single storey whereas almost 61% are two storey buildings, while remaining 16% are three and more storied.
This suggests that the majority of the buildings have been altered based on modern needs or there is an adaptive reuse of the building. There is therefore the possibility that more buildings may be preserving their heritage values, which are hitherto obscured due to alteration of buildings from the exterior.

iii. Lost and Modified heritage analysis

'Lost' and 'modified' heritage buildings in Bin Khater, Sh. Abdulla and Al Kharo neighbourhoods have been mapped by visual analysis of the satellite images of 2008 and 2007, the aerial photos of 1964, the topographic maps of 2004, 1951 and the urban fabric maps of 1931 (map 4.19a,b). The 'lost' areas are those in which heritage buildings have been totally lost. Modified buildings are those in which the original shape still persists but in which modifications from one or two to three storey buildings had taken place. The pattern of demolition observed from old aerial photos and the latest satellite images indicate that most buildings significantly altered were -

a. Buildings demolished close to the major roads
b. Buildings in congested streets
c. Old mosques which have been rebuilt
d. Courtyards which have been covered

Almost all the old mosques have been rebuilt, except for Syedi mosque, which has been preserved by the Ministry of Culture, as it was bought from the owner in the 1970’s.

The reasons attributed to this loss of heritage include:

a. Non-maintenance of buildings
b. Increased business activity demanding more shops
c. Widening of roads in congested areas to make way for increase vehicular traffic
d. Construction of apartment buildings to accommodate the increased poor expatriate labour work force
Map 4.19a. Heritage Buildings (with numbers) of Significance as determined from Field survey in Sh. Abdullah and Al Kharo neighbourhood. 'Lost' and 'Modified' Heritage mapped by visual analysis of Satellite image of 2008 and 2007, aerial photo of 1964, topographic map of 2004, 1951 and urban fabric map of 1931. The 'Lost' areas are where heritage buildings have been totally lost whereas modified buildings are those where original shape still persists but that have been modified from one or two to three storey buildings.
Map 4.19b. Heritage Buildings (with numbers) of Significance as determined from Field survey in Al Bin Khater neighbourhood. ‘Lost’ and ‘Modified’ Heritage mapped by visual analysis of Satellite image of 2008 and 2007, aerial photo of 1964, topographic map of 2004, 1951 and urban fabric map of 1931. The ‘Lost’ areas are where heritage buildings have been totally lost whereas modified buildings are those where original shape still persists but that have been modified from one or two to three storey buildings.
The open spaces mapped using images and maps from 1931 to 2007 and the statistical analysis of this information suggest that:

a. The total area of the three neighbourhoods is 214,030 sq. m.
b. The open space created since 1931 is about 22,606 sq m or approximately 10%.

Currently these open spaces are being used for parking, and that mostly these spaces are along the major roads at the zone or neighbourhood boundaries. Furthermore, open spaces show a close proximity to the heritage buildings within these neighbourhoods, suggesting an increasing threat to these buildings, due to similar reasons.

Finally, map 4.20a, b and c shows all the important heritage buildings identified from the field survey. Most of these buildings are historically very significant owing to the fact that they belonged to some important people in the region and also many of them are in a relatively good state. The following section describes each individual building as mapped in map 4.20 a, b and c based on their heritage value in terms of historical significance and architectural value.

**Heritage Buildings**

Approximately 75 buildings have been identified to be extremely high in heritage significance in terms of their Architectural and Historical context. These buildings with their significance and address have been described in Appendix A. It shows that about 25 buildings are architecturally significant and they belonged to some prominent personalities in the past. Other buildings are mostly traditional houses or shops which are worthy of preservation.
4.4. Conclusion

The analysis of historical maps, historical accounts and the latest data has revealed a significant loss of heritage in the ancient town of Muharraq, which still preserves most of the Islamic urban fabric elements. The outcome of the analysis suggests that heritage is being lost due to rapid modernisation and greater migration of local population from the town. This outflow of Bahrainis is causing an influx of the immigrant work force into the old, heritage and often cheaper quarters in Muharraq.

These low wage immigrant workers are one major cause of concern for protection of traditional urban fabric, cultural values and the traditional buildings of the town. The growing number of low wage immigrants demand cheaper accommodation, which are mostly provided by the old and sometimes heritage buildings or through destruction of these old buildings in order to make space for apartment buildings.

The analysis has also determined the significance of various parts of Muharraq based on their historical importance and the types of people who established the town. Considering all these factors it has been determined that there are at least three neighbourhoods which still contain some heritage value and which should be immediately taken into protection in order to prevent any further loss of heritage elements in Muharraq.
Map 4.20a Heritage buildings along with their recent photographs in the Al Kharo neighbourhood. The background image is the 1964 aerial photograph.
Map 4.20b Heritage buildings along with their recent photographs in the Sheikh Abdullah neighbourhood. The background image is the 1965 aerial photograph.
Map 4.20c Heritage buildings along with their recent photographs in the Bin Khater neighbourhood. The background image is the 1965 aerial photograph.