Giza Plateau Master Plan Report

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Preface

Tarek Waly Center Architecture and Heritage was commissioned by the Supreme Council of Antiquities to undertake studies, and preparation of the master plan, preliminary design development, implementation drawings and site supervision of the project to develop the archaeological area of the Pyramids of Giza plateau. The various stages of the project were carried on within the context of a technical vision that adapts to historical and archaeological sites in general, and with the Pyramids of Giza Plateau in particular as the most ancient site. Progressive presentations and continued communication and interaction have been conducted with specialized Supreme Council of Antiquities and other specialized authorities. Executive designs and graphics processing and executive documents for the project. Commencement of the project implementation took place in January 2009, and was all related works pertinent to the project were scheduled to be finished by the end of January 2012. The circumstances witnessed by Egypt throughout the past four years have caused work on the project to come to a complete halt. As the overall situation stabilized, it was anticipated to resume implementation works to complete the project according to a revised timetable. Delays in and recently began a partial and limited resumption of work on the project.
Domain of the Pyramids at the Capital of Egypt Between the River and the Mountain..

The urbanism and architecture of Egypt, may not be understood in isolation of its history and geography; as they are likely to lose much of their meaning, significance and content, in absence of their historic and geographic contexts. What is addressed here is not the urban interpretation of history or the geographical interpretation of urbanism. Rather, this approach addresses the dynamic and multi-layered inheritance, all the way to the depths of its roots and attributes. It tracks the past as it approaches the present and relates the present with the past. Further, it adds enriching experiences to the current, which result in a multiplicity of its depths, dimensions and horizons of its future both in quantity and quality. This is the approach adopted herein for in the development of historical sites. At the foremost of such sites the Giza Pyramids which forms a part of the matrix of the ancient Egyptian civilization. That had related in the spatial and temporal contexts with Memphis, the Capital of Egypt for over three thousand years. What remains, at the outset, is to develop an awareness of this meaning, and the resulting emergence of The Capital.

The Capital of Egypt has remained to fall at the junction between Geography and History at a Stance, between

An optional recluse and an inevitable take-off

Recluse within a narrow and controlled valley...
A valley which is protected by prominent hills shielding it, on both, the east and west sides.
Within the valley a sloping artery of life, originating from a remote locale in the south; its absolute, far origin.
The Nile descends through the valley of Egypt, safely and steadily from the heights of the south.
The River Nile, being tranquil despite its vitality, is received by Egypt and sanctified by the Egyptians. The outcome of the will of man, coupled with the vitality of the Nile, is the birth of civilization.
A take-off to an open and expanded Delta..

The Nile Delta portrays the culmination of the life spine, which has embraced the essence and value of civilization and, presented it to the world.

Consequently, The River declares the end of its northbound course. The Nile, then, accepts to plunge or set in an absolute faith in a transformation process from a state to another along the path of eternity. Always, there has been a sunrise following each sunset, and vice-versa. A circumnavigate around the sun, The Nile, civilization and man.

Between the River and the Mountain, the Capital of Egypt and its Pyramids Were Situated, Wisely manifested by the Inevitability of their Existence and Formulated by Knowledge and Science a Civilization was Established. It revolved around the Site, and Man.
The Capital and The River...

Urbanism of Egypt in its generality and that of the Capital in its specificity have held a cause-effect relationship with the Nile. The Nile has formed the urbanism of the Capital, in turn, via both, its valley and its estuary. An existential relationship has been established, between the offerings of nature, and the innovations of man. The ancient Egyptian had realized that the rhythms of The Nile flooding, is an annual solar phenomenon. Therefore, the calendar of the ancient Egyptians was associated with the solar year. The solar Egyptian (Coptic) year, begins in the first month of “Tute” (the 8th or 9th of September) embracing twelve months, with the length of each being thirty days, in addition to five days in three consecutive years and six days in the fourth year. Thus, the Nile and its flooding had become the pace setters for this calendar. The Capital of Egypt had been incepted with The Nile and its journey, at the end of the narrow valley, followed by a trip to its estuary. Then, at this locale, the ground fans out and expands. It is at this situation of the valley that the mountain ranges, east and west of the river, reach their limits, allowing geography to declare one of the pillars of nature. This has presented the genius of the Egyptian existence, bestowed by God and realized by the Egyptian, through either his natural instinct or knowledge. It has always

Figure 2: Nilometers locations along the River Nile
been the gateway southern gate to the north or the passage from the valley to the delta and the sea. At this location the urban capitals of Memphis and Ain Shams (Owen) were established. Here was The Fortress of Babylon, Fustat and Cairo; The Capitals of Egypt, or rather the sequence of its Capitals. Each has bordered the Nile and paralleled the mountain, particularly in the east valley, where the birth of the sun and life has always taken place. On the other hand, there is the Western plateau, where the sequential pyramids have manifested evidence of the civilization, of ancient Egypt. There, at the line of eternity in the West, the cycle of each day ends. The sun then falls lower in its journey, returning again to a sequential sunrise, and a chronological sunset. It's a daily cycle and mobility from the east to the west, as have been the annual journey of the Nile from the south to the north on a seasonal basis to pass through the gate to reach the extents of the horizon.

Here, the Capital has been established
Before its development took place
And its inhabitants dwelled

The Capital and The Mountain...

The plateau east of the Nile represents one of the components of the geographical and historical equation. The edge, cliffs and slopes of this plateau which are steep in some places and leveled at others, present a determinant for the growth of urbanization.
It is defined by various names, the most comprehensive of which are Mokkattam Mountain with the Mount Torah to the south and the Red Mountain to the north. The plateau is dissected by valleys which echo previous geological and climatic epochs. These valleys form an ascending track to reach the upper plain of the plateau. These ascending valleys include Wadi Hauf, near Helwan, the Degla valley near Maadi, and Duwaiqa to the east of The Citadel. Layers of earth that form The Mukkattam Mountain, bend in a semi-arc of an average height of about 150 to 250 meters. The northern end point of the semi-arc falls at Heliopolis, while its southern end falls at Maadi, where a plateau of an average height exists to the south with its highest peaks of Mount Hauf at a height of 375 meters.

Mokattam Hills consist of limestone (sedimentary rocks), which indicates that it had been submerged with sea water in ancient times. At both northern and southern ends of the mountain semi-arc the, plateau descends. The plateau gradually diverge to the northeast starting from Mokattam Mountain to the Red Mountain in the form of steep and sharp slopes which are evident in the areas of Al-Gouyooshy and The Citadel.

With urbanization and the establishment of civilization, Ancient Egyptians built the pyramids. At the Western Plateau from south to north, Presenting pegs, beacons or observatories.
The plateau west of The Nile, represents the horizon line demarcating the beginning of the journey of the sun into the other world at sunset. It is where and via which the edge or virtual axis of immortality is evident. On the other hand, the eastern plateau, represents the limit of the new birth or the predestined return of the sun in its daily cycle of the sunrise. Between the two extremes the Nile runs along the valley from south to north in its mobility and annual succession. The western plateau abruptly rises from the cultivated valley, to a height of about 65 meters, with its surface being almost flat. As well, this plateau may be easily reached via many valleys which form amongst themselves extending fingerlike heights which correspond to those of their counterparts in the east. However, they differ in their geological structure and in other instances in their topographical heights.

Along with the advent of the urbanization of the Capital and the evolution of civilization, at the Western plateau, the Ancient Egyptians had constructed the pyramids as pegs or beacons or observatories, in a from south to north direction. At the time their entity had been unclear in the sense of what they were, and what their role was. However, a firm certainty lies in the mind of the author, that these architectural features had played a cultural as well as that of the daily life. As well their integration with points, that had held their knowledge connotation or a well-known poles for the ancient Egyptians have been clearly evident. Unfortunately, that expertise had not been relayed to us.

Consequently, the awareness of the reality of the pyramids and the genius of their presence within that tri-polar matrix has never been reached. Assumptions or apparent results were relied on, disregarding the underlying phenomenon. Thus, the truth has been absent, or we became off track. At this dividing stance of the end of the valley, specialists categorize the pyramids to ten groups in a spatial sequence from south to north, but in a temporal context, a different succession emerges than the spatial one.

It is impossible to understand the true essence of these Pyramids, unless an in-depth study is undertaken with reference to the prevalent norms in ancient Egypt. These had been religious faith, the characteristics of science and knowledge, community and living. Those had been embodied in the Ancient Egyptian civilization with regard to beliefs of immortality and eternal existence. All such
beliefs had been summed up in one measure, pertinent to the happiness of the "Ka". This simple name with its limited formation of letters is difficult to express, in modern languages, in a single word. It embodies several connotations, including “the intact entity of man”, if it is viewed, to some extent, as a separable unit for a single person. Further, it corresponds, sometimes, to meanings of “personality”, “spirit”, “independent individual”, or "traits". Moreover, it is also possible for this word to refer to “lucky man" or “status".

In the ancient Egyptian doctrine the" Ka” united with the fixed stars in the northern hemisphere. Eternity, in the other life, had been closely linked to the doctrine of the god Osiris. Also, since ancient times, the doctrine of the sun was deeply rooted in the Egyptian civilization. That had been manifested in the temple of Heliopolis where a symbolization of the sun in the form of the obelisk, substituted by the symbol of a Phoenix bird (BNW in ancient Egypt) which had perched over what had been called the "Penpen", with a shape of a pyramid. Here, the relationship between the "Penpen" itself and the doctrine of the worship of the sun, may be deduced in a representation of the ascension of man to the sky as much as it is extrapolated to the daily cycle of the sun itself in the life of man his doctrine, and way of living.

Figure 5: Giza plateau in 1904 - photography by: Eduard Spelterinis
Giza Plateau as an archeological site: The Built Environment

The Giza pyramids have roughly two historic periods that saw a significant spike in activity on the site. The first one took place from around 2575 BCE to 2450 BCE, witnessing the flurry of construction of the 4\textsuperscript{th} Dynasty ancient Egyptians, gaining the pyramids and their complexes we know now. The other spike in activity was sparked in 1798 CE by Napoleon’s famed occupation of Egypt that threw open the doors to European curiosity of ancient Egypt, bringing with it a flurry of excavations and discoveries and an exponential rise in visits that continues to this day. And so we must take into consideration these two very different layers of activity to work towards the preservation and interpretation of both the distant and the recent past of this extraordinary site. Evidence at Giza suggests a site in continuous use for about 3200 years Most of what the site is famous for comes in the built form, and that is what hundreds of thousands of tourists have thronged to see for the last couple of centuries.

Figure 6: Selim Hussein photo during his explorations in the early twentieth century

Figure 7: Illustration drawing for the pyramids plateau in the past (for Marc Ainer)
Figure 9: The historical complexes of the Giza plateau
Sphinx Complex

The Sphinx complex comprises the colossal statue of the Sphinx itself, carved out of the bedrock, along with a trio of temples flanking its north-east and east side. Of these complexes.

Figure 10  Sphinx Complex
Khufu Complex
The Khufu pyramid has been known to be the better built of the three, and is thus in better shape, however his complex is the least preserved with his three queen’s pyramids in different states of ruin, and his satellite pyramid’s lower most course has been restored, with its capstone put on display near it. Part of the basalt flooring as well as sockets cut into the bedrock is the only remains of his pyramid temple, while only traces of the causeway exist. Khufu’s valley temple is thought to have existed in a location on the Mansouriya Canal Road, where some basalt stone blocks are now put on display after chance excavation work. Near the ruins of his pyramid temple are three pits shaped out of the bedrock to look like boats and not to be confused with the rectangular shaped pits at the southern foot of the pyramid that hosted disassembled wooden solar boats. Little of Khufu’s enclosure walls remain, although there are traces of where walls may have been built and the occasional semi-circular-topped capstone.
Khafre Complex

Khafre’s complex is the best preserved. His pyramid is the only one with any significant casing stones left in place and his valley temple is almost complete, while his causeway is well marked, although it has lost its walls and roof. The ruins of Khafre’s pyramid temple still give a sense of its scale and layout, but his satellite pyramid is in complete ruin. There are also five boat pits adjacent to the pyramid temple. Another unique feature is how the north-western corner of the pyramid is carved out of the bedrock (see next chapter), leaving the edges of the quarry to act as natural enclosure walls. There is a set of fieldstone enclosure walls to the south and east of the pyramid as well as a gallery of workshops to the west.
Menkaure Complex

Menkaure’s pyramid was never finished in antiquity, but a considerable number of the granite casing is strewn at the feet of the pyramid after attempts were made to re-use its stone in medieval times. His three ‘queen’s’ pyramids are more or less intact, although they too are believed to be unfinished, at least in the true-pyramid form. The ruins of his pyramid temple give a good sense of scale, though the mud-brick pyramid temples of the smaller pyramids have long perished. All that is left of his valley temple are the lower-most courses and they are now backfilled to preserve them, as is the part of the causeway that was actually completed in antiquity. There are ruins of fieldstone enclosure walls that ring part of the northern side as well as the western and southern sides of the Menkaure pyramid precinct, while to the south east is a set of enclosure walls with traces of workshops and ramps in what is probably the Menkaure quarry. Highlights of Menkaure’s complex are hieroglyphic scripts on the top most granite courses on the north face of the pyramid, believed to be carved in the reign of Ramses II, as well as evidence of how the granite casing was placed and then dressed, where the lower courses of granite are still rough from quarrying and thus, unfinished.
Khentkawes funerary monument
This group is located south of Central cemetery. The Queen Khentkawes ruled Egypt after Menkaure, and the group consists of the cemetery in the form of a mastaba, some believed to be the fourth pyramid but from the mastaba type consists of two parts, the lower part sculpted from natural plateau at altitudes of about four meters high, the upper part is built of stone and has a similar range of Menkaure complex. The site includes several houses foundations of residential city.
Cemetery Fields

Other than these complexes, cemetery fields of different tomb types, almost blanket the plateau. Most were built in the 80 or so years of peak activity, though there are burials from Early Dynastic times through to the Roman Age, a span of over 3000 years. Khufu’s pyramid is flanked by the Western Field and the Eastern Field, a rare unified plan of mastaba tombs is laid out in a pre-determined grid, for the most part built during his reign, though continually added to and modified by his successors, Khafre and Menkaure, with further relatively minor additions up until Roman times. An even more interesting cemetery, called the Wadi Cemetery lies to the north of the Western Field, at the lower edge of the plateau. This cemetery was partly excavated in the early 20th Century before being buried under excavation debris from work in the Western Field, and is believed to pre-date Khufu. The Central Field is a mix of both mastaba tombs as well as rock-cut tombs, mostly from Khafre’s reign, taking up the volume of what used to be Khufu’s quarry. To the south the Cemetery of the Pyramid Builders stretches on the hills just south of the Gebel El-Quibli running north south. Further south, is the Southern Field, where the earliest intact evidence of burial at Giza is found in the form of a complex of Early Dynastic burials and mastabas, the more famous one known as ‘Covington’s Tomb, as well as a 26th Dynasty mastaba and Roman burials.
Workers' city

Fossils recently uncovered the remains of the city believed to have been administered, including thousands houses of workers. The excavation work continues to complete the disclosure of the city and its history. A huge wall is located in this group of stone plateau called crow wall. There are an extension of the cemetery graves on eastern slope of the hill, and excavations still to discover the scope and its relationship workers' cemetery.

Figure 16: Workers' city
Quarries

The Giza Plateau was thoroughly and efficiently used as the source of material for almost all of the construction activity that took place. In the middle of the site, just south of Khafre’s causeway, a gaping hole stands where over 2 million cubic meters of nummulitic-limestone once existed, today it is known as the Central Field, with rock-cut tombs and mastabas. Most of the Khufu Quarry was used to feed the Great Pyramid’s core, with only the granite for its chambers and the higher quality limestone for its casings brought from elsewhere. To the north of Khafre’s causeway is the extension of this quarry. Evidence of channelling can be found at the south-west corner of Khufu’s pyramid where the original bedrock was levelled to build the pyramid. Large blocks of the bedrock had been prepped for prying by digging deep, single-person-wide channels into the bedrock. One block has been removed from this formation while the adjacent have sat idly by for the last four and a half millennia. Evidence suggests that grading work took place after construction, as large amounts of construction debris was poured into the quarry and levelled, partly recreating the original landscape.
Further quarries dot the plateau.

The Khafre Pyramid Quarry takes up the north and west edges of the pyramid, where the original slope of the plateau was carved into the first few courses of the pyramid, and the quarried stone used to build it. Just north of the northern edge of this quarry is an extension to it separated by a bedrock division forming a natural enclosure wall and is partly filled-in with ancient debris with the modern tarmac paved over it. To the north of this unnamed quarry is the so-called Schiaparelli Quarry, which takes up part of the southern edge of the Western Field while “the great wall of massive stones” bounds it from the south, though it is buried under ancient debris. It could possibly have supplied stone for the mastaba tombs of the Western Field, but there is almost no literature on it.

The Sphinx Quarry, the large basin that houses the Sphinx, was carved out to make the Sphinx, while the stone was possibly used for the Sphinx Temple and Khafre’s valley temple. To the south east of Menkaure’s pyramid and bounded to the east by the Quarry Settlement, is what is thought to be Menkaure’s Quarry.

Figure 18: Further quarries dot the plateau
Giza Plateau Site Analysis

This project forms a component of an overall strategy to maintain the archaeological and natural heritage of the plateau alike. Another objective is to enhance the quality of the experience of the site visitors, through extrapolation of the formation of the architectural heritage as it was derived from a governing geometric order. The subtle presence of that underlying Geometric Order is manifested in the controlled and codified relationship as envisioned by ancient Egyptians put. A painstaking effort is to be undertaken to decode those rules and to establish and convey sensible and liable understanding. This is to enable entry to the site architectural complex, respecting for the heritage and feeling a cautious harmony. Presenting the knowledge to contemporary generations is of equal importance, in order to raise their awareness of its original form which should be maintained.

Figure 19: Giza plateau

As architects, we have overlooked an endeavor to grasp and acknowledge the existence of such a geometric system. It draws connections some of which are visible, readily witnessed, as well as connotations which are apparent to each contemplative, sane, and open to knowledge individual. Others by generations of today. Other connections are hidden, subtle and underlying. These are limited to
researchers who have knowledge and the skills to decode the givens in quest for the truth. Between the sight and the insight, outwardly visible and the inwardly hidden, certainty of the existential of this cognitive and cultural entity, may be adopted. It is enmeshed with the ancient heritage. It presents a connection of the mobile cycle of the sun on one hand and the mobility of the Nile and its annual cycle, on the other. The end of the mobility trip of the Nile lies at this gate to complete the cultural and natural aspects of the system, between the eternity of the place on one hand and the ingenuity and creativity of man on the other.

The conscious understanding of the Plateau of the Giza Pyramids lies within the comprehensive geometric order. It presents the approach adopted in this study for the development of that region in both a totalitarian context within the order, and in the other hand within the context of the Giza Pyramids complex. Its existence may be entrusted extrapolation of the architectural geometric order, in a codified correlation, which is both secretive and controlled by ancient Egyptians. An endeavor should be undertaken to decode, the underlying order, which if accomplished, is to allow a passage leading to the uncovering of the architectural order of the site in a respectful attitude, for the heritage and a cautious harmony with it. Presenting the knowledge to contemporary generations is of equal importance, in order to raise their awareness of the original form of the inheritance, which should be maintained.

A specific objective of the project was to reach an understanding of the hidden facts that lead to the knowledge of the real role meant for the Pyramids, following the footsteps of other serious scholars. Various efforts have been channeled to detect the facts and put this cognitive hypothesis through a test for the Giza Pyramids. Of these scholars is, Dr. Abdul Rahim Rihan, who confirms that the Great Pyramid was erected as an astronomical observatory established prior to the King Cheops era. Studies of the British scholar "Richard Proctor" in 1880 refer to his belief that the Great Pyramid was established in two phases, the first phase encompassed an observatory for astronomical and astrological purposes. He believed that the observatory base was the ascending passage or the great hall heading towards the rising star Sirius, a star which the ancient Egyptians referred to as an indicator for the solar calendar calculations and the solar year for the whole world. The establishment of the observatory is estimated to have taken place on 5200 - 5600 BC. That date coincides with the date set by the priests of the sun, which commenced during the reign of King Thoth the second king of the first dynasty and the son of King Menes. He added that the Great Pyramid at that time
the elevation of the Pyramid above the surface of the earth by the equivalent of the height of the fiftieth course at a height of 43 meters, until the end of the passage and the great hall, (the surface of which was at the same level of the current floor level of the king’s room).

Such hypotheses remain to be subjected to scientific and historical auditing in order to establish the facts and filter inaccurate inherited assumptions pertinent to historical issues which are collectively adopted.

**Geometric Order of the Plateau**

The adopted approach for the development of this historical site was to rediscover the components of the site itself, the adopted guiding laws and patterns a geometric order network prevails. It excelled in producing an architectural order that lends itself to the functionality of knowledge that forms a part of the civilization of its time. Yet we believe the validity of the adopted hypothesis that the pyramids viewed as pegs, beacons or observatories are integrated and linked with specific focal points that were of cognitive implications. Unfortunately, that invaluable information was not materially conveyed, so that any proof of their existence has to be deduced. Extrapolation of such inferences leads to the formulation of the cognitive geometric order. Of this geometric order, three points are highlighted:

**First Point**: lies in the south at the remote waterfalls in Aswan and its relation with the River Nile, the source of life.

**Second Point**: in the near east at sunrise behind the Mokattam plateau and its astronomical observatories.

**Third point**: lies in the north desert urban development of Own the city that embodied knowledge, science.

Axes of life, sunrise and knowledge extend to intersect or meet in the Fourth Point in the West at the axis of immortality on top of the western plateau at the end of the valley. Its position lent itself to open the way for the establishment of civilization.

**Fourth Point**: At a rock, in the Western Plateau uniquely formed by nature and its ultimate Creator. The ancient Egyptian sculptured and shaped it as a creative witness to this geometric order. This unique point is viewed as the Birth Point for the geometric order in its entirety, which sets the guiding law for the architectural creativity of the place and its Pyramids which cater for
the requirements of the astronomical knowledge, as a complementary element completing the geometric order.

At the onset of embarking on the project for the development of the archaeological area of the Giza Pyramids Plateau, unveiling the geometric order and its ruling law was a priority. Through the delineation of the geometric order, it became possible to demarcate the current spatial boundaries of the project. It then became necessary to either remove or transfer superfluous elements that are alien or incompatible with site development, or by adding missing elements or vocabulary imposed by the meantime, the nature of current activities in harmony with the historical and architectural values of the place. The completion of appraising the region, within the contextual domain of the direct vital urbanism development, pertinent to the current situation at the twenty-first century.
Figure 22: Illustrating drawing before and after building the pyramids on the Giza plateau.
Memphis and its necropolis domain

Figure 23: Memphis and its necropolis domain as registered in the World Heritage.
Giza plateau surrounding land uses
Community (Nazlet El Semman & Kafr El Gebel)

It is said that the villagers there rely on trading antiquities and set their village up on historic ruins to dig under them for treasure, out of sight. Archaeological diaries however point to how hundreds of skilled Quft labourers, hailing from the Upper Egyptian town of Quft, were needed for the excavation work, and so were brought to Giza for excavation work, along with further forces of unskilled labour while archaeologists themselves are known to have stayed at the village. Photographic evidence shows how the village grew during the 20th century. Recently plans to develop parts of Nazlet El Semman have surfaced. One project by the National Organisation for Urban Harmony (NOUH) aimed to pedestrianize Abulhol Street with parking nearer Al Mansouriya Rd. It also envisioned re-decorating all the building facades in a Pharaonic theme fortunately this plan was halted. Another project by the ISDF aims to upgrade a portion of the village that lies on the lower slopes of the Giza Plateau. No details however are available as to the type of upgrade that may happen. A third vision, this time by the Ministry of Housing’s GOPP and is part of a larger plan called Cairo 2050 sees Nazlet El Semman replaced with a battery of hotel blocks. After the January 25 Revolution and the ensuing change in government, there has been no official statement as to the fate of this controversial development.
Figure 25: Pyramids plateau in the middle of 1930

Figure 26: Nazlet El Semman in the beginning of the century
Figure 25: Giza Plateau surrounding land uses
Figure 26: The eastern boundary of Nazlet El Semman

Figure 29: The eastern Boundary (private farms and the mountain)

Figure 30: Giza pyramids plateau form the east

Figure 31: The eastern boundary – Nazlet El Semman sanitary.
Figure 32: The northeast boundary / Mina House Hotel Golf Course

Figure 33: northern boundary - charity hospital, a school, the Entry court of Giza Plateau, Public store for monuments and El Hagana Police

Figure 34: the Northwest boundary / Mina house hotel and a land belongs to EGOTH group

Figure 35: Cairo-Fayoum highway / Hadaek El Ahram Community
Giza plateau land uses and activities

1. Entrance
2. SCA Storage
3. Mounted police
4. SCA Administrative buildings
5. Parking
6. Farouk’s Pavilion
7. Engineering Administrative Building
8. Al Sadat rest house
9. Helipad
10. Solar Boat Museum parking
11. Light & Sound Show administration
12. Light & Sound Show administration
13. Light & Sound Show restaurant
14. Light & Sound Show theatre -
15. parking
16. Selim Hassan’s rest house
17. parking
18. parking
19. Abulhol Club

Figure 36: Giza plateau land uses and activities
On-site remnants of archaeological activity at Giza are;

1. Renowned Egyptian archaeologist Selim Hassan’s rest house to the east of the central field with an assortment of storage magazines. It is in good structural shape and is unused. It is owned by the Department of Archaeology, Cairo University.

2. The building that today houses the SCA administration, to the north of the Western Field. The SCA force on site has largely outgrown it, evidenced by the various addenda built adjacent to it.

3. Various store-rooms and magazines dot the Western Field.

4. The paved roads used today on the plateau follow paths beaten by archaeologists and tourists in the early 20th century, some of which pass over or through sites of archaeological value.

5. Many of the mounds to the north and west of the Western Field, the south of the Khafre pyramid, the south of the Menkaure pyramid and the south of the Central Field are the debris tips that resulted from the excavation of the monuments at Giza. Parts of the Decauville light-railway used in these excavations have been left abandoned to the south of Menkaure’s pyramid.

Presidential Rest houses & helipad

‘Appreciating’ the pyramids became an industry in the late 19th Century when Khedive Ismail built the Pyramids Avenue connecting Cairo to the Giza pyramids. He commissioned the Mena House as a hunting lodge c.1865, locating it midway up a small valley running down from the plateau just north of The Great Pyramid. This lodge grew into the full-fledged hotel we know today, replete with swimming pool and golf course. The Khedive also built a royal kiosk at the north-east foot of that very pyramid for his own use. This kiosk would be altered over the years and then completely replaced by a Neo-Pharaonic, two storey rest house by the Architect Mustafa Pasha Fahmy, commissioned By King Farouk. This rest-house was decommissioned after the 1952 Revolution finding various uses over the years, the last of which was as head- quarters for the Giza pyramids tourist police. In the mid-2000s it was vacated because of structural failures due to drainage water seeping into the unpacked earth – mostly modern archaeological debris tips from excavating The Great Pyramid – and stands awaiting an undecided fate. Not to be outdone by the royals, two of Egypt’s presidents had rest houses built on prominent parts of the plateau. The first was commissioned for President Gamal Abdel Nasser on the highest point of the plateau on contour level 105m and was design by the architect Aly Nassar. The Socialist President never used it and so the structure went into the hands of the SCA. The second was President Sadat’s, where
two single-storey structures flanked a tarmac helipad on a bluff just west of Khafre’s complex. The main rest-house was demolished in the 1981, while the rear building was taken over by the SCA.

**Administration offices, security posts, Eng. Dept., stone crafting**

Giza site management falls under the SCA for logistics, maintenance, archaeology, ticketing and security, while the Ministry of Interior also provides security. The Sound & Light Company’s head-quarters and its Giza offices are within the contiguous security wall of the Giza site, although the S&L Company owns that land and so falls out of SCA jurisdiction.

1- SCA Giza HQ
   The SCA uses an old dig-house located on the northern edge of the Western Field that has grown to accommodate over a hundred employees. It has running water and uses a sceptic tank for drainage.

2- SCA Giza Engineering Administration
   This body administers on-site maintenance work for the roads, contemporary buildings and electrical supply. It occupies a prominent building at the highest point of the plateau that was initially built as a presidential rest-house for President Gamal Abdel Nasser in the 1960s. The building has been expanded and has running water, with a septic tank for drainage. The immediate area surrounding the building is used as a vehicle maintenance depot and is strewn with junk.

3- SCA Solar Boat Museum
   A museum was built over the pit that a solar boat was found in on the southern edge of the Khufu pyramid. It was built in 197? And has associated buildings adjacent to it built between the nearby mastabas. These buildings have running water and a drainage system that is installed beneath the tarmac leading down the plateau towards the Sphinx.
Figure 37: Solar Boat Museum parking - building no.10

Figure 38: Farouk's Pavilion - building no.6

Figure 39: Selim Hassan's rest house - building no.17

Figure 40: Al Sadat rest house - building n.8

Figure 41: Light & Sound Theater - Building no.12 - 15
Figure 43: building no.4 / SCA

Figure 27: building no.7 / Engineering Administration

Figure 45: building no.2, storage

Figure 46: building no.3 / EL Hagana stable
Figure 47: Electricity transformers

Figure 48: Electricity transformers

Figure 49: Electricity transformers

Figure 50: Stonemasonry Workshop
Tourism (access roads, parking lots, guides, services)
During the late 19th and up to the mid-20th century, tourism was light footed as much of the site was still unexposed by archaeologists and the number of visitors paled in relation to the sheer size of the desert site. Today, more than (2008) 16,000 people visit Giza a day during peak season. There are currently two main entrances to Giza with ticketing and security detection, they are the Mena House and Sphinx gates. The only vehicular access allowed from the Mena House gate.
These visitors can be divided into the following groups;

**Foreign visitors:**

- Package tours; foreign tourists in large groups, typically one to three buses – 30 to 100 people – that have their own tour-appointed guide. They are there on a whistle-stop tour of Cairo, so spend an average of 90 minutes at Giza, mostly for snapshots. They enter with their buses from the Mena house Gate.
- Adventure tours; mostly heritage-tourists. Small groups or individuals with a background in history, archaeology, art or architecture. They would be their own guide, and would walk around the Giza Plateau around half day to multiple day-long visits. They enter by privately hired car/taxi/micro-bus from the Mena House Gate, or come by taxi/public transport and enter on foot from either the Mena House Gate or the Sphinx Gate.

![Visit Route for Tourists](image_url)

Figure 52: visiting route for tourists before the project
Local visitors

- Local school trips; School buses are banned from entering the Giza Plateau, and so park in the streets of Nazlet El Seman and on the Mansouriya road, and school-children are required to walk to the Sphinx Gate where they enter. Their visit is comprised of a walk up on to the plateau, a loop around The Great Pyramid and then a walk back down the asphalt or Khafre’s casue-way to the Sphinx and exit through the Sphinx Gate.

- Leisure tours; mostly local Egyptians and some expats, would visit on weekends and spend the day strolling the site, picnicking and riding horses and camels. They enter by private car or hired taxi/micro-bus from the Mena House Gate, or come by taxi/public transport and enter on foot from either the Mena House Gate or the Sphinx Gate.

Figure 53: visiting tour for local groups before the project
Entertainment & sports events
The Giza Pyramids made for an attractive backdrop for events and celebrations, some sympathetic, others damaging to the monuments. Sports, awareness rallies and promotion mostly sports related. A number of schools run their annual marathon there, mostly on a little-used part of the road network, a remnant of Sahara City.

Until the levelling and paving of this dedicated site for the Millennium celebrations, events were held on different parts of the plateau, most notably on a low bluff 50m west of Khafre’s “workers' barracks” where a temporary stage for Opera Aida lingered for years after the month-long run because of legal issues.

In 2008 there were three areas designated for private events and the SCA affiliated Sound & Light Show.
1. Sound & Light Theatre (SLT) opposite Khafre’s valley temple.
   In 1960 the first Sounds & Light show was inaugurated and has run daily ever-since. The original theatre was built over the ‘harbour’ directly in front of Khafre’s valley temple using that temple’s facade as its backdrop. The theatre hosted shows other than the Sound & Light, most notably a rock concert by The Grateful Dead in 1978.
   The theatre was relocated 100m away from the temple in the late 1980s to where it is today and enlarged to hold 4000 seats. Even with its new setting, the holding of rock concerts there has stirred controversy, although operas and classical music concerts are also held there.
2. Sphinx Plaza (SP) opposite the Sphinx (Events there are suspended as of 2011). This area held different events including the show-start and finish of the Pharos’s Rally motor race, music concerts and private events.
3. Desert Festival Area (DFA), to the south of the Main Wadi. A squash tournament was held in the squash tournament was held in the in specially designed transparent courts. Motorsport events like the Pharaoh’s Rally have their start and finish on the plateau, although in more recent years the event is a show start and show finish with the actual racing stage start and finish in another location outside the heritage site.
Figure 54: some of the plateau events
The Bazaars and Street Vendors

The SCA permits the presence of bazaars at the panorama. It determines that there are approximately 14 bazaars, of which approximately 28 vendors are in charge of throughout the week. Given the semi organized way of displaying their goods, they receive an average number of tourists. However, the way in which the vendors treat visitors remains poor. Tens of vendors circulate the pyramids plateau of Giza; there are those who walk with a bag and those who directly display their goods. These vendors create an inconvenient environment for the visitors given that they treat them in an unpleasant way, in addition to the fact that the goods they are trying to sell them are not necessarily an integral part of their visit.

Figure 55: some of the bazaars and the vendors of the plateau before the project
The thought of riding a horse or camel across the Giza plateau has been dreamt up in many a tourist’s imagination and realised once they reached the pyramids. Even though tourism has grown exponentially over the last two decades, the number of horse and camel drivers has overshot that growth, leading many of them to fight over clients, hustle visitors and generally crowd the site.

Along with hawkers, peddlers and ‘guides’, this practice has severely impacted the visitor experience as well as the state of the monuments themselves, where a local micro-ecology based on horse and camel dung has resulted in pigeons nesting in the monuments and the sphinx, their own acidic droppings eroding the lime-stone that makes up the majority of the site.

On the other hand, neo-liberal economic restructuring in Egypt since the 1990s that promised small-sector economic growth via the so-called ‘trickle-down effect’ has effectively elbowed out lower income entrepreneurs of the $14 billion industry, forcing thousands of people to make a living only on its fringes.
Figure 56: Spots of Camels & Horse riding before the project
This study provides an Initial Environmental Examination (IEE) of an alternative visitor-management vision (the Master Plan) for the Giza Plateau proposed by Tarek Waly Center for Architecture & Heritage in order to examine the environmental load of proposed activities on the Giza Plateau site.

**Background and activity description**

The general development proposed by the Master Plan is to manage the mobility of the 16,000-20000 visitors/day and limit their impact by redistributing and redirecting their movement, consisting of the following activities (i.e. the proposed changes in layout and management):

I. **Panorama:** Four satellite tourist spots located on high land around the pyramids with distant panoramic views with their respective zones outlined.

II. **Westside Parking Area:** An entrance and parking area on the west side of the plateau with the capacity of 300 busses and 500 cars with a new visitors’ entrance.

III. **Trackless Train:** A trackless-train with its circuit.

IV. **Camels Zone:** A spot for camels and horseback riding outside of the heritage area (as relocated) with its respective zone outlined.
V. **Services:** Other spots located for services and original tourist hotspots after limiting to a capacity of 1000-500 visitors/day.

VI. **Alterations:** Necessary alterations in the layout/management to meet the requirements of the activities listed above (i.e. necessary removal, relocation, re-design, construction, or changes in management, etc.)

**Information Provided by the Client**

The Masterplan in its present status of development is currently only illustrated in a set of posters listed as follows in addition to basic information mentioned in the next section:

- Poster-1 Current Status: Shows hot spots of visitors at each pyramid and at the Sphinx, and the entrance area. A smaller map shows the main heritage sites. It also shows the three tiers of the heritage site area in different shades.
- Poster-2 Current Status: Includes photos elaborating on the environmental pressure of visitors, vehicles traffic, the asphalt road, and inadequate buildings.
- Poster-3 Current Status: Indicates all the tourist attractions and the existing new buildings.
- Poster-4 Vision (of Masterplan): Shows the general plan proposed.
- Poster-5 General Layout (of Masterplan): Shows the envisioned layout after changes, and indicating significant increase in services provided throughout the tourist’s journey, mainly along a trackless-train circuit.
- Poster-6 General Layout: Shows visitor paths and views in the panorama spots in 3-D perspective.

**Purpose and Scope**

The study shall provide a preliminary assessment of environmental impacts of the Master Plan focusing on key components and compare with the business-as-usual (BAU) scenario. It will be concluded with recommendations regarding the following key issues as highlighted by the client:

**Visitors Management Component**

- The traffic load and pattern of non-motorized transport (NMT) of visitors that the plateau can handle under the proposed plan.
- Qualitative analysis of the viability of mitigation measures suggested by the client such as laying timber board walks and designated paths.
- Mitigation measures to adverse impacts of the proposed Masterplan and/or alternatives.
**Motorized Transport Component**

- The impact of a trackless-train and its route through the site in terms of vibrations and emissions.
- Necessary specifications for such a train, pavement, and circuit layout and dimensions relative to the monuments zone.

Other necessary issues in the study are considered such as the environmental impact during the construction and start-up phase, and environmental assessment requirements by Law 4/1994 for the protection of the Environment and other relevant national regulations as needed.

**Scope of work**

The study depends to a large extent on comparative analysis with similar projects/studies, expert opinion (interviews), available data, and wherever necessary and possible, quantitative analysis has been provided. This study does not propose mitigation measures for environmental impacts other than those addressed through the proposed otherwise additional recommendations are provided if deemed necessary.

**Local Environmental Information**

An overview of the ambient and local environment is presented in this section.

**Air quality**

Most air pollution in the urban and near-urban areas of Greater Cairo is attributed to the transportation sector and the industry, followed by burning of municipal waste. Acute air pollution episodes are experienced in the autumn where light northern wind and atmospheric stability bring and magnify the air pollution impact of rice straw burning in the delta area during the rice harvest season. This adds to the local pollution in the city for the duration of the approximately two months of the “black cloud”. Otherwise, air pollution levels still remain high throughout the year. Significant impact has already been observed on buildings and monuments.

Destruction of the limestone structures such as the historical monuments is both due to salt weathering and solution of limestone under influence of Sulfur Dioxide, and other Sulfur and Nitrogen Oxides. Further quality deterioration is caused by soiling from airborne particles (mainly due to soot). Effects of air pollution on
materials include discoloration, material loss, soiling, and possibly structural failure, all of which are apparent at the Giza Plateau site, and reported in previous reports of the UNESCO and the Supreme Council of Antiquities (SCA).

Measurements of air quality levels have been conducted by DANIDA’s Environmental Information and Monitoring Program (EIMP) in EEAA in 1998. Results showed that amongst the key historical monument sites of Egypt and other tourist areas, the SO2 concentrations indicated levels that were surprisingly high only at Memphis (the village) at Sakkara and at the Sphinx. The levels were above the long term limit values (150g/m$^3$ as 24-h averages for SO$_2$ and 60g/m$^3$ as long term) as demonstrated in Table 1 below–

Table 1: Air Quality at Historical Sites near the Pyramids

<table>
<thead>
<tr>
<th>Location</th>
<th>Sampling Period</th>
<th>SO$_2$ (mg/m$^3$)</th>
<th>NO$_2$ (mg/m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memphis</td>
<td>2 May-12 May</td>
<td>64</td>
<td>22</td>
</tr>
<tr>
<td>Sakkara pyramid</td>
<td>2 May-12 May</td>
<td>174</td>
<td>20</td>
</tr>
<tr>
<td>Giza pyramid</td>
<td>2 May-12 May</td>
<td>55</td>
<td>30</td>
</tr>
<tr>
<td>Sphinx</td>
<td>2 May-12 May</td>
<td>134</td>
<td>31</td>
</tr>
</tbody>
</table>

Table 1 is only an indication of the air quality on a chosen day in the area and cannot represent long term averages since there is not enough monitoring data to date. However, in comparison with other parts of Egypt, the air quality is significantly worse at the site.

Judging from the urban sprawl encroaching from most directions, and the trends in the transportation sector (approximately 5% yearly increase in vehicle travel) and the industry (approximately linearly related to the GDP growth rate), the air pollution is not expected to experience significant reduction if any. At the local scale, plans for the construction of a fourth Metro line 4 with a first station in the
nearby Al-Rimayah Square would catalyze further urban expansion in the region (although also promising an alternative cleaner mode of transport). Furthermore, the traffic load in the Giza Plateau site is increasing according to interviews with tourist guides of the area. This adds to local air pollution, of which SO$_2$, NO$_2$, and fine Particulate Matter are of most concern.

**Other Environmental Information**

Beside air pollution, other environmental concerns that remain of concern at the site are as follows:

1. Natural factors: Ground water, air moisture, wind erosion, salt weathering, and seismic activity.
2. Sewage from nearby settlements seeping to the ground water.
3. The lack of effective controls for waste management and managing violations (such as littering).
4. Direct impact from tourists touching or climbing the monuments.
5. Ants, sparrows, bees, and rats active at certain monument sites.

Information on the environmental status and mitigation measures for the site is alarmingly scarce, and a need for surveys and environmental monitoring is needed for effective planning as suggested in the final report of the CULTNAT Strategic Approach to Egypt’s Cultural Heritage (2001), which provided an adequate review of previous projects, studies, and expert’s opinions.

**Environmental Regulations**

Law No.4 of 1994 for the protection of the Environment and the amended Executive Regulations issued by Decree 1741 of year 2005 states that new establishments or projects as well as expansions or modifications of existing establishments or projects must be subject to an Environmental Impact Assessment (EIA) before any construction works are initiated or a license is issued. The EIA report should be submitted via the Competent Administrative Authority (CAA) to the Egyptian Environmental Affairs Agency (EEAA). EEAA will review the study and prepare an opinion indicating if the project can be approved.

There are three categories for projects that require an EIA: Category A for small projects with low impact, B for medium, and C for projects with potentially high impact. The criteria according to the Executive Regulations relating to Law No. 4,
which include the type of activity and the location of the project in addition to the type of energy used and extent of natural resources exploitation.

EEAA has recently issued a brief EIA Guidebook, issued in January 2009, to replace the earlier guidebook issued in 1996 in order to conclude all developments in EIA procedures since then. The guidebook is to be formally enforced in July 2009 and therefore applies to the plans for the present project. With reference to the activities mentioned in section 2 of this report, the following is noted:

- Parking areas are not classified as projects requiring any class of EIA studies as long as no vehicle maintenance services are included in the project. If maintenance services are to be included, the project would be classified as a Class-A project (Activity No. 41 in Class-A project list of EEAA).
- Other activities enlisted in the master plan are also not explicitly classified as activity types subject to EIA studies. It is however recommended to disclose the final plans to EEAA with consideration of the emphasis mentioned in the EIA Guidebook of 2009 on the exception of cultural heritage sites as special cases, and in accordance with the provisions of Law 4/1994 authorizing EEAA to request certain studies for certain project activities if found necessary.

In conclusion, all activities of the planned may be screened as activities not subject to EIA studies requirements according to environmental law in Egypt. Due to the sensitive location however, further consultation with EEAA is advisable when the plan details may be disclosed. Furthermore, voluntarily conducting certain components of the environmental impact assessment is recommended for the success of the project, such as conducting public consultations, and establishing an environmental management system for the site. This includes mitigation measures and monitoring.

**Environmental Impact Potential**

This section provides an evaluation of the environmental impacts of each of the proposed activities of the Master Plan.

**Panoramas, Services, and Camel Zone**

1. Four satellite tourist spots are located on high land around the pyramids with distant panoramic views with their respective zones outlined. This will reduce
the impact of visitors who climb the monuments or make other violations near the sensitive areas. Maintaining original tourist hotspots with limitation to a capacity of 1000-500 visitors/day will have a similar positive impact. However, the decisive factor in reducing the impact is enforcement of regulations set to control visitors, vendors, and guides.

2. The extensive provision of services throughout the trackless train circuit as proposed will disturb the integrity of the site (visual impact) according to field visits, and according to interviews with tourist guides and stakeholders. Furthermore, the services already available (at the entrance and at the Sphinx area) are operating below their full capacity, indicating that the demand on such services is not high.

3. All proposed service buildings (toilets, restaurants, etc.) at the site should be designed as stand-alone systems (e.g. no piping work for water and sewage) except possibly for electricity. Other than visual impact, the services raise the risk of seepage of sewage water into ground water.

4. Services are proposed for camels and horseback riding outside of the heritage area (as relocated) with its respective zone outlined. This will reduce the impact of camel dung near the monuments.

**Non-Motorized Transport**

1. Under the proposed plan, due to the increased average starting distance of the visitor from the historical monuments, the impact experienced will then be significantly reduced.

2. The limiting factor to the number of visitors is not expected to be directly related to environmental impact, but rather to the capacity of the site management to manage visitors and limit violations such as climbing monuments or littering. In this respect, visitors are apparently beyond the present management capacity already.

3. Bicycles may be allowed but should only be parked in designated areas (not leaning on monuments and not on the paved roads).

4. Horse Carriages may be allowed to the Panorama Sites drawing a reasonable borderline, no significant impact is foreseen.

**Westside Parking Area**

1. An entrance and parking area on the west side of the plateau is proposed with the capacity of 300 busses and 500 cars with a new visitors’ entrance. The idea of ending the scattered onsite parking areas and replacing with the proposed
Westside parking area will significantly reduce the impact of air pollution on the monuments, especially that the predominant wind directions are northerly. It is necessary to enforce the existing regulation that drivers must turn off the motors once parked, resulting in a significantly lower impact from vehicle emissions on the long run.

**Trackless Train**

In order to evaluate the environmental impact, first a technically feasible scenario of the Master Plan is formulated as follows to fill the information gap necessary for impact assessment.

**Trackless-train and its Route**

According to tourist guides the bulk of visitors are generally of higher age groups, and ages above 60 are very common, therefore provision of vehicle transport is essential. The main circuit in the proposed plan is approximately 8.9km in length with 12 stops proposed. For the sake of approximations, the following assumptions are made to examine the technical and logistical feasibility of the proposed traffic plan concept:

- Trackless trains will accommodate half of the visitors today (i.e. 8000).
- They are two-coach trains accommodating 40 persons in total on each ride.
- The average speed is 25km/hr. between each two stops.
- They will stop 3 minutes at each of the 12 stops, and 10 minutes of boarding/dismounting at the entrance, whereas an overlap in time will allow for extra time at the entrance for rest/maintenance of trains.
- Trains will be continuously circulating and not assigned to a certain fixed group of passengers.
- The inflow and outflow of visitors is steady.

The traffic management component of the master plan will therefore imply a need for 30 trackless trains, with each single circulation taking approximately 70 minutes back to the start point.

To emphasize the large number of trackless trains needed in order to replace other onsite vehicle transportation the following is noted as an example:

To accommodate the motorized transport needs of 8000 (50% of today) - 10000 (future), then 30-37 trackless trains are needed under reasonable assumptions enlisted above. This implies that there will be 300m and 240m meters on average between trains today and in the future respectively. Estimations also indicate that
accommodating 20000 passengers (further into the future) requires 75 trains with an inconvenient average distance of 120m between trains, and thus raising concerns over noise pollution and difficulty in maintaining the required tranquil environment and comfort of pedestrians on the same paths.

The distance between trains may be regarded as a simple limiting factor when revising the plan. The number of passengers accommodated per day is directly related to the number of trains needed, therefore accurate predictions of the number of passengers expected is necessary. Estimation is provided in Fig no 49 for another circuit alternative.

Assumptions:

- Trackless trains will accommodate half of the visitors today (i.e. 8000).
- They are two-coach trains accommodating 40 persons in total on each ride.
- The average speed is 25km/hr. between each two stops.
- They will stop 3 minutes at each of the 8 stops, and 10 minutes of boarding/disembarking at the entrance, whereas an overlap in time will allow for extra time at the entrance for rest/maintenance of trains.
• Trains will be continuously circulating and not assigned to a certain fixed
  group of passengers.
• The inflow and outflow of visitors is steady.

Results:
• Number of trains needed: 25 trains.
• Distance between trains: 356 m (on the planned circuit of two-way roads).
• Duration of one cycle: 59 minutes.

Alternative assumptions:
• They are two-coach trains accommodating 50 persons in total on each ride.
• They will stop 3 minutes at each of the 8 stops, and 5 minutes of
  boarding/disembarking at the entrance, whereas an overlap in time will allow
  for extra time at the entrance for rest/maintenance of trains.

Results:
• Number of trains needed: 18 trains.
• Distance between trains: 484 m (on the planned circuit of two-way roads).
• Duration of one cycle: 54 minutes.

Train and Circuit Layout
Previous experience in using trackless trains in Egypt (Azhar Park) has indicated
that diesel trains do not meet the claimed specifications despite careful market
research for best available and accessible suppliers abroad. In the case of diesel-
fueled trackless trains, the common complaint which led to completely ending the
activity at Azhar Park was noise and visible exhaust gas emissions from diesel
trains. Furthermore, with respect to \( \text{SO}_2 \) emissions, it will actually be more than
emissions from regular traffic due to the higher sulfur content of diesel fuel
compared to gasoline, whereas sulfur is directly related to emissions regardless of
the vehicle type or age. Calculations confirm this statement. The same is also
expected for \( \text{NO}_2 \) and \( \text{PM} \) emissions although to a lesser extent. Simulation results
illustrate these conclusions – see Attachment 2. Such sub-specifications
performance (and emissions) is expected mainly due to the low quality of Egyptian
diesel fuel compared to international standards.
In the case of electric trackless trains, the common complaints which also led to completely ending the activity at Azhar Park as an example were mechanical safety concerns and lower performance on uphill climbs with time.

Regarding electric trackless trains, based on approximate calculations, a flat track is recommended (0-1% slope grade). Further research for higher specifications is unlikely to prove electric trackless trains viable for heavier duties, however custom-made trains are technically possible.

The result of the power limitation of electric trackless trains will either lead to limiting the trackless train track to the best-fit contour line (leveled track) or to extend the length of the track in order to spiral/meander with a gentle gradient to the required heights. This latter option is not viable however since the extra track length would be unreasonably long (extra paving is unfavorable) judging from the altitude differences in the suggested route reaching up to approx. 80m between extremes.\(^1\)

\(^1\) All simulation model results are provided for illustration purposes only, run on METILLIS Ver.2.02 ®

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**Figure 29: SO2 concentrations considering the parking lot and a diesel-fueled trackless train track**

**Figure 29: Predominant northerly winds considered**
Purely out of concern over visual pollution and conserving the archeological integrity of the site, the asphalt roads should be removed as recommended in a 1989 working document drafted by the advisor to the Minister of Culture, and as advised in the UNESCO 1992 Master Plan. The roadways/paths should be replaced with roads paved with a material of a convenient color matching its environment. The ongoing effort for seeking a convenient sand-based composite material (or
other alternatives) must therefore receive support for development, and should be incorporated into the suggested Master Plan –see figure 1.

Tourist guides have previously been asked to travel through the tested paved path for two days. Details of the specifications of the tested material and the status of development are thus far undisclosed.

Alterations

Necessary alterations in the layout/management to meet the requirements of the activities listed above (i.e. necessary removal, relocation, re-design, construction, or changes in management, etc.) might entail extensive construction activities and civil works. The impact foreseen in this case is not significant except for concerns over the visual impact that must be evaluated through extensive consultation with stakeholders and experts.

**Timber Boardwalks**

Timber boardwalks would have no significant environmental impacts such as any destructive vibrations on the monuments. The visual impact is however arguable. Experience from the existing timber board walk at the Great Pyramid has proven successful in improving the control of the visitors’ traffic and are more comfortable. No notable complaints about the visual impact have been made. The predominant complaints were rather about the Solar Boat Museum, which is frequently perceived as too modern for its ambient environment at the site as frequently criticized by tourists. No studies are available to assess whether the positive impact of controlling visitor’s traffic would outweigh negative visual impact.

**Conclusions**

1. A proposed diesel-fueled trackless train is likely to have a greater negative impact on air pollution (SO₂ emissions) than the present vehicle transport, and thus should be discarded as an option.
2. The topography of the site would not allow efficient operation of the proposed electric-powered trackless train. Having a leveled circuit would not reach the proposed panoramas on higher land. Further research in this respect is needed if the trackless train is deemed essential.
3. A convenient alternative for clean vehicle transport is to provide a fleet of 6-passenger or 14-passenger electric cars, and to allow cycling and a limited number of horse carriages to the panorama sites or beyond.
Figure 64: Sample specifications of alternative electric vehicles
<table>
<thead>
<tr>
<th>Specifications</th>
<th>Villager 8 Electric</th>
<th>Villager 8 Gasoline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine</td>
<td>N/A</td>
<td>Kawasaki 4 cyl. 900cc, single overhead cam, liquid-cooled, 12v, 115A alternator, spin-on oil filter</td>
</tr>
<tr>
<td>Drive Motor</td>
<td>48 volt, shunt wound</td>
<td>N/A</td>
</tr>
<tr>
<td>Horsepower</td>
<td>107 hp @ 4,000 rpm (continuous) 115 hp @ 5,800 rpm (max)</td>
<td>115 hp @ 5,800 rpm</td>
</tr>
<tr>
<td>Governor</td>
<td>N/A</td>
<td>Automatic ground speed sensing, internally geared, mechanical, lockable, in infinitely variable transmission</td>
</tr>
<tr>
<td>Governed RPM</td>
<td>N/A</td>
<td>3000 rpm, variable</td>
</tr>
<tr>
<td>Ignition</td>
<td>N/A</td>
<td>Electronic, with electronic RPM limiting</td>
</tr>
<tr>
<td>Drive Unit</td>
<td>12 to 1 direct drive, double reduction planetary gear</td>
<td>12 to 1 reverse, 14 to 1 reverse</td>
</tr>
<tr>
<td>Electrical System</td>
<td>48 volt</td>
<td>12 volt, 500 cca, trys out reserve battery</td>
</tr>
<tr>
<td>Batteries</td>
<td>Light/Heavy, 140 Ah/115 Ah @ 75 amps</td>
<td>N/A</td>
</tr>
<tr>
<td>Charger</td>
<td>Automatic, computer-controlled, 60 amp, 120V AC, 50Hz, 110V DC, 12V, and 24V DC, international, L.E.D. display available</td>
<td>N/A</td>
</tr>
<tr>
<td>Controller</td>
<td>50 amp, solid state</td>
<td>N/A</td>
</tr>
<tr>
<td>Steering</td>
<td>Self-adjusting rack &amp; pinion</td>
<td>Self-adjusting rack &amp; pinion</td>
</tr>
<tr>
<td>Front Suspension</td>
<td>Independent leaf spring with hydraulic shocks</td>
<td>Independent leaf spring with hydraulic shocks</td>
</tr>
<tr>
<td>Rear Suspension</td>
<td>Constant-velocity joint with hydraulic shocks</td>
<td>Constant-velocity joint with hydraulic shocks</td>
</tr>
<tr>
<td>Brakes</td>
<td>Four Wheel Mechanical Drum</td>
<td>Four Wheel Mechanical Drum</td>
</tr>
<tr>
<td>Park Brake</td>
<td>Foot-operated, multi lock</td>
<td>Foot-operated, multi lock</td>
</tr>
<tr>
<td>Stabilizer Bar</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Frame/Chassis</td>
<td>Aluminum tubing</td>
<td>Aluminum tubing</td>
</tr>
<tr>
<td>Front Body</td>
<td>Aluminum tubing</td>
<td>Aluminum tubing</td>
</tr>
<tr>
<td>Rear Body</td>
<td>Aluminum tubing</td>
<td>Aluminum tubing</td>
</tr>
<tr>
<td>Body Finish</td>
<td>Matching paint over molded in color</td>
<td>Matching paint over molded in color</td>
</tr>
<tr>
<td>Light Package</td>
<td>Std Light Package</td>
<td>Std Light Package</td>
</tr>
<tr>
<td>Front Tires</td>
<td>16x6.50-8.0 ply rated, premium tread</td>
<td>16x6.50-8.0 ply rated, premium tread</td>
</tr>
<tr>
<td>Rear Tires</td>
<td>16x6.50-8.0 ply rated, premium tread</td>
<td>16x6.50-8.0 ply rated, premium tread</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>Battery capacity indicator, battery warning light</td>
<td>Battery capacity indicator, battery warning light</td>
</tr>
</tbody>
</table>

**Notes:**
- **Villager 8 Electric:**
  - **Engine:** Kawasaki 4 cyl. 900cc, single overhead cam, liquid-cooled, 12v, 115A alternator, spin-on oil filter.
  - **Drive Motor:** 48 volt, shunt wound.

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Figure 65: Sample specifications of alternative electric vehicles

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Giza Plateau Master Plan Report  Page 62
Figure 66: Sample specifications of alternative electric vehicles
### Kudo Model 6156K-X14

**Descriptions:** Personal Carrier (Passenger Car)

<table>
<thead>
<tr>
<th>GENERAL SPECIFICATIONS</th>
<th>6156K (Series)</th>
<th>6156K01 (Specs)</th>
<th>6156K02 (Specs)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Battery</strong></td>
<td>T105</td>
<td>T105</td>
<td>T105</td>
</tr>
<tr>
<td>X 12 pcs</td>
<td>X 16 pcs</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Motor (hp)</strong></td>
<td>7.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Controller</strong></td>
<td>Curtis 1209</td>
<td>Curtis 1205</td>
<td>Curtis 1244</td>
</tr>
<tr>
<td><strong>Passenger Capacity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power/Voltage</strong></td>
<td>5kW/72V</td>
<td>5kW/96V</td>
<td>5kW/96V</td>
</tr>
<tr>
<td><strong>Range (loaded) (miles)</strong></td>
<td>49.71</td>
<td>82.14</td>
<td>82.14</td>
</tr>
<tr>
<td><strong>Max. Speed (mph)</strong></td>
<td>27.99</td>
<td>24.85</td>
<td>24.85</td>
</tr>
<tr>
<td><strong>Minimum turning radius (ft)</strong></td>
<td>18.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overall Dimensions (LxWxH) (ft)</strong></td>
<td>16.40 x 4.92 x 6.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Max. Climbing Ability (loaded)</strong></td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Max. Loading Weight (lbs)</strong></td>
<td>2000 lbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tare weight</strong></td>
<td>3481 lbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Qty/40’</strong></td>
<td>2 units</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONFIGURATIONS</th>
<th>REMARKS:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Body</strong></td>
<td>Steel framework + Fiberglass S</td>
</tr>
<tr>
<td><strong>Roof</strong></td>
<td>Fiberglass + ABS, with hand holder S</td>
</tr>
<tr>
<td><strong>Windscreen</strong></td>
<td>Toughened glass S</td>
</tr>
<tr>
<td><strong>Seats:</strong></td>
<td>Sponge + artificial leather S</td>
</tr>
<tr>
<td><strong>Floor</strong></td>
<td>Stainless steel S</td>
</tr>
<tr>
<td><strong>Side rear view mirror</strong></td>
<td>One piece each side S</td>
</tr>
<tr>
<td><strong>Interior rear view mirror</strong></td>
<td>One piece each cart O</td>
</tr>
<tr>
<td><strong>Overshadowing curtain</strong></td>
<td>\ O</td>
</tr>
<tr>
<td><strong>Windscreen wiper</strong></td>
<td>\ S</td>
</tr>
<tr>
<td><strong>DC-DC Converter</strong></td>
<td>\ S</td>
</tr>
<tr>
<td><strong>Lights</strong></td>
<td>Front: 2 Headlights, 2 front turn signals, 2 side turn signals; Back: 2 rear turn signals, 2 brake lights, 1 fog light S</td>
</tr>
<tr>
<td><strong>DASHBOARD</strong></td>
<td>Voltmeter, ammeter, speedometer, turn signal indicator, headlight indicator, emergency switch, fog light switch; Headlight switch, turn signal switch, wiper switch, horn button; Radio receiver and tape player S</td>
</tr>
<tr>
<td><strong>If with CD player</strong></td>
<td>Replacing original Radio &amp; Tape player O</td>
</tr>
<tr>
<td><strong>Microphone</strong></td>
<td>Wired O</td>
</tr>
<tr>
<td><strong>Horn and reverse alarm</strong></td>
<td>\ S</td>
</tr>
<tr>
<td><strong>Cup holder holder</strong></td>
<td>1 pc S</td>
</tr>
<tr>
<td><strong>Speaker</strong></td>
<td>2 pcs fixed on roof S</td>
</tr>
<tr>
<td><strong>Steering system</strong></td>
<td>Rack and pinion steering system S</td>
</tr>
<tr>
<td><strong>Brake system</strong></td>
<td>Front and rear drum hydraulic brake system S</td>
</tr>
<tr>
<td><strong>Front end and Suspension system</strong></td>
<td>Independent suspension, cylinder hydraulic vibration absorber S</td>
</tr>
<tr>
<td><strong>Rear end and suspension system</strong></td>
<td>Integrated rear end, steel plate spring suspension, cylinder hydraulic vibration absorber S</td>
</tr>
<tr>
<td><strong>Transmission system</strong></td>
<td>Clutch, 4F+1R gear box, transmission shaft S</td>
</tr>
<tr>
<td><strong>Seat belt</strong></td>
<td>2 point seat belt (10 pcs) O</td>
</tr>
<tr>
<td><strong>Tire</strong></td>
<td>145/80-R12 S</td>
</tr>
<tr>
<td><strong>Wheel</strong></td>
<td>4J’12 Steel wheel, wheel cap S</td>
</tr>
<tr>
<td><strong>ACCESSORIES</strong></td>
<td>China origin, input 110V–220V, 50Hz/60Hz, output 48V 72V, 25A, 5m DC cable, 2.5m AC cable S</td>
</tr>
</tbody>
</table>

Figure 67: Sample specifications of alternative electric vehicles
Proposed services are densely distributed. A significant reduction is recommended, and stakeholder consultation to minimize the footprint of new buildings/installations is necessary. Compared to the BAU scenario, it is sufficient (out of a functional perspective) to only provide additional services at the entrance together with an upgrade of existing services locations.

The concept of alternative visitor’s management and relocation of the main parking area and entrance will reduce the impact on the sensitive sites. The capacity limit of pedestrian visitors should rather be attributed to the capacity of site management and watch guards.

Vehicle transportation is necessary; however, the use of trackless trains needs further investigation. The diesel trains scenario will emit more than the BAU scenario (free access of common vehicles), and the common electric trains will be limited to a leveled-ground track implying that panorama’s are inaccessible.

Furthermore, calculations for accommodating 50% of visitors resulted in a scenario with a dense trail of back-to-back trains circulating at close distances (30-37 trackless trains on a 8.9km road). A similar situation is at the secondary circuit to the camel’s zone.

A convenient alternative is to diversify modes of clean transport by allowing limited access of carriages (to the panoramas) and bicycles, and providing a fleet of electric cars (6-14-passenger cars) which commonly have convenient speeds and allow a 20% grade climb. Smaller versions that are solar powered are also conceivable.

Removing the asphalt roads is recommended. New roads paved with sand composites such as that currently being tested onsite are recommended if proved to meet necessary standards of physical and chemical properties for endurance.

Concern over destructive vibrations from trackless train transport or current vehicles in the BAU scenario is unnecessary; there is no expected significant impact of such.

Timber board walks are an effective countermeasure to control visitors traffic. Further use must be done with stakeholder consultation to determine the significance of the negative visual impact trade-off. There are no concerns over other environmental impacts.
Mitigation & Monitoring

Panoramas, Services, and Camel Zone

1 If the trackless train plan is implemented to provide the main mode of transport, then the electric type is necessary, the number of trackless trains should be limited to approx. 30-40 trains of two coaches and certain areas will be inaccessible due to the steep climbs. The diesel trains should not be used. Other modes of clean transport should be promoted compensate for the limitation of flat circuits, primarily electric cars. Records of operation and maintenance schedules must be kept for monitoring purposes and further planning. The operation pattern must be further planned in consultation with the supplier.

2 In addition to limiting the visitor capacity at hotspots, re-enforcement of site management and stricter regulations are recommended to document violations from tourists, vendors, etc. This can be monitored through a system for documentation of violations of environmental and heritage protection regulations. This is recommended for planning and monitoring purposes. Training of the camel corps police, tourist guides, and watch guards is a prerequisite.

3 Extensive stakeholder consultation during the design of new installations or buildings for the proposed services is recommended with the intention to minimize the footprint and to maintain the archeological and visual integrity of the scenery.

4 An air monitoring station for measurements of meteorological data, noise, SO\textsubscript{2}, NO\textsubscript{2}, and PM\textsubscript{10} is recommended before, during, and after construction/civil works in order to monitor changes in air pollution levels and provide data for simulation modeling. Furthermore, such monitoring is necessary in anticipation of the construction phase of Metro Line-4 to be built starting at the nearby Al-Rimayah Square in the coming years. The sensitivity and importance of the site demands such level of monitoring activity.

5 Regarding the component of waste management:
   a. According to the concept paper of Zahi Hawass, A Masterplan for the Management and Conservations of the Giza Plateau, during the first phase, which has already been completed, a cleaning company has been hired to clean the site. Revision of the contractual duties of the cleaning company under the proposed master plan must be done. The recommended revision is to clearly update and define the responsibilities of the cleaning company and
to agree on clear performance indicators in order to monitor their performance and enforce their mandates.

b. The number of waste bins and the rate of collection must increase, and proper distribution is necessary, this system design can be initially approximated and then fine-tuned with trial. Furthermore, the bins must remain in the same color as present, and to additionally have means for fixation against wind and should have an attached lid, i.e. not have a separate unattached lid cover that may fall off from gusts of wind or from regular use.

6 Regarding the timber boardwalks, interview surveys are necessary to investigate and monitor whether the positive impact of controlling visitors’ traffic would outweigh the negative visual impact of the timber boardwalks.
Giza Plateau site analysis Recommendations

1-Micro recommendations 1; SCA and S&L owned Giza Heritage Site (Extent of TWC GHP)
A comprehensive plan is needed to accommodate the three massively dissimilar though inter-related stake-holders on the Giza plateau; archaeologists, visitors and the local community. Since the main element attracting all of them to the plateau are its natural and built heritage, the main objective of any management plan should be the preservation of the existing heritage.

- **Management Zones**
The SCA owned site has thus been divided into four zones with differing levels of intervention

1. The Core Heritage Zone (CHZ). It is the zone where all built monuments are as well as areas deemed of natural heritage value due to historic activity there.
2. The Buffer Zone (BZ). The area in the immediate SCA owned land just outside the CHZ. It would alleviate much of the impact on the CHZ while still requiring strict rules to activities there due to proximity to it.
3. The Environs. SCA owned land south of the first fenced area, not containing any significant archaeology and visually distance as to not cause visual harm.
4. Other considerations include the One-hundred Meter Contour (OMC). Even though it exists in the BZ and outside the CHZ, due to the fact that it is a natural landscape significant to the pyramids (Khufu’s pyramid is called ‘Khufu on the horizon’), nothing is allowed to be built that would alter this natural horizon.

- **Recommendations for physical sympathy towards natural and built heritage**
Physically sympathetic recommendations that alleviate the threat of existing activity on the physical state of the natural and built heritage and guide any new on-site interventions in the CHZ, while enforcing more relaxed rules for the BZ and Environs. These threats include; air pollution, vibration, ecological pollution (animal feed and dung):
New permanent construction is banned in CHZ, only allowing temporary construction with low-impact activity (Shading devices, seating, and services’ kiosks). BZ and environs allowed permanent construction.

New superstructure or infrastructure that would require the disturbing of bedrock is banned in CHZ.

SCA Giza offices located on northern edge of Western Field must be moved out of CHZ as daily dynamics include the parking of vehicles within the CHZ, while original structure has been added to indicating future expansion may occur.

Existing paved motor-vehicle network must be removed, and vehicles used for visitation and tourism banned from CHZ. Motorised vehicles may be used within CHZ for maintenance and management of site under strict regulations and should adhere to pre-defined paths.

Motorised vehicles may be used in BZ and environs only on specified paths.

Non-motorised vehicles should be encouraged in BZ and environs, and should not leave specified paths.

Recreation activities including horse-riding, camel-riding, horse carts and sports fields must be relocated outside the CHZ and the BZ. Regulated recreation activities allowed in environs.

Water-based toilets must be replaced with dry compost-toilets, and only on sandy areas in CHZ, while all existing sanitary infrastructure should be removed.

Walkways could be introduced in areas of high pedestrian traffic that pass over original bedrock or properly covered un-excavated archaeology to protect natural and built heritage.

Pedestrian paths must be chosen and clearly marked throughout CHZ to minimize pedestrian impact on natural and built heritage.

Site-interpretation and site-rules signage must be introduced to make visitors aware of site’s features and prevent potentially damaging actions by them.

Signage must be placed in a manner sympathetic to be built and natural heritage and never permanently impact them.
• **Recommendations for visual sympathy towards natural and built heritage**

Visually sympathetic recommendations that alleviate the impact of existing activity on the perceived state of the natural and built heritage in the CHZ, BZ and environs, and guide any new on-site interventions. These threats include; contemporary permanent or temporary buildings, signage or structures of any kind that are un-sympathetic to the natural and built heritage.

• The Solar Boat Museum must be removed as it severely affects the south face of The Great Pyramid.

• The Farouk Rest House, which is in an advance state of disrepair, creates a visual distraction to The Great Pyramid’s northern face, while its Neo-Pharaonic style confuses some visitors as to its origin. In the event it proves complicated to rescue it, it should then be demolished. In the event it can be rescued, it should be re-used to provide services to visitors and clear signage should indicate its history and origin.

• The SCA Engineering Management building must be removed as its prominent position negatively affects the skyline of the Giza Pyramids from many viewpoints in and outside the CHZ.

• Tarmac paved roads must be removed from CHZ as they negatively impact the heritage quality. Paved roads are only allowed in the BZ and must use visually sympathetic materials and colours.

• Vehicles used by site-management authorities should be painted in colours sympathetic to the built and natural heritage. Only emergency vehicles may be in contrast for safety purposes.

• Walkways that are built must be made of material and colours sympathetic to the built and natural heritage, though contrast is allowed for safety purposes.

• Walkways that are marked must be marked in a way sympathetic to the built and natural heritage, though contrast is allowed for safety purposes.

• Temporary construction in CHZ must not be more than 2.5m high and must not alter historic views, skylines and elevations. It must use materials and colours sympathetic to the natural and built heritage.
• Permanent construction in BZ and environs must not alter historic views, skylines and elevations related to CHZ. They must use materials and colours sympathetic to the natural and built heritage.
• Signage in all areas must use materials and colours sympathetic to the natural and built heritage, though can also be in contrast where required. It must only be related to site interpretation and must never include advertising of any type.

• **Recommendations towards raising the quality of visitor experience.**

The level of services provided for the visitor must be raised, while the visit itself should be approached from a heritage park point of view rather than it being simply the visitation of a monument. Thus provisions must be made for the relative length of time and effort expended on such a site, along with the relevant way-finding and interpretation.

• A visitor centre providing information, ticketing, toilets, lockers and other relevant services must be the first point of entry to the site. It must be able to introduce the site to the visitor and contain all the information that could not be placed on the site. It must also provide awareness as to the rules required to maintain while on the site.
• A site-controlled environmentally-friendly transit system must ferry visitors to the different parts of the site open for visitation and must be limited to the BZ. Stops along the route should be well-marked and provide shade, while services should be provided where the length of visit is more than 15 minutes.
• While within the CHZ visitors will rely on well-marked pedestrian routes, punctuated by points for information and low-impact services.
• Different day passes should be issued based on type of visit; leisure, tourist and adventure. This will ensure that each type of visitor experiences what they came to experience and that site-management authorities are able to spread the number of visitors on different parts of the site lowering their impact.
• Visitation times should be made to follow the length of day-time with the seasons, especially in summer when it is hot to allow for early morning and late afternoon visits.

As the Sound & Light shows are geared for evening visits, a change in pattern is recommended where limited numbers of visitors seeking to enjoy Giza at night
without being confined to the theatre, are allowed on a designated portion of the site in the region of the Sphinx.

- Visitation in relation to unique solar phenomena that is significant to the site should be planned for. The sunrises of both equinoxes are highly significant, as is the summer solstice sunrise and sunset.

2- Recommendations towards site management on SCA owned land

The current management structure is in-efficient and cannot sustain current numbers (peak of 16,000 pax/day), and therefore would be at a loss to sustain the projected increase in the number of visitors [Dorghamy, EIA, 2009]. It is therefore imperative that a professional Site Management Authority (SMA) separate from the SCA structure is planned and implemented. This structure’s tasks would be to preserve the site mainly by;

- Monitoring and controlling visitor numbers on site and distribute them according to pre-defined peak-visitation numbers. This could happen through GIS [Evans & Fielding, 2000] and can be linked to an internet portal so that tours could be pre-scheduled based on projected demand to avoid disappointing visitors.
- Managing the running and maintenance of the on-site transport system.
- Maintaining the on-site visitation services such as toilets, waste collection and disposal, food & beverage, paths, signage and seating.
- Managing the horse and camel drivers in the environs.
- Creating a feedback loop to continuously modify and upgrade the visitation structure, and explore new appropriate projects that will help fund the site.

3- Recommendations towards management of local community participation

The Giza Plateau represents the life-blood of thousands of people in Nazlet El Semman, selling souvenirs and refreshments, providing horse and camel rides and posing as site-guides. The manner in which they provide their services however rely on a certain degree of hustling and are discomforting at best to the visitors they seek to serve, driving many potential customers away.
In order to better manage their services they must create guilds or syndicates for each of the services they seek to provide. These bodies will work to protect their rights and promote their services, while also have negotiators and spokespersons which the communities appoint.

The Giza SMA will accept dialogue with the guilds and will provide them with best-practice guidelines and fund workshops to manage their activities so that they pose no negative impact to the heritage site as well as the visitor experience. The guilds will select the top performing service providers and monitor their performance. Special areas for recreation will be provided, while concessions for retail and refreshments at designated areas throughout the site should give priority to the Nazlet Semman community.

More importantly, managing the plateau to an acceptable standard will require the creation of many new jobs which the Nazlet El Semman community should also be given priority for. These jobs include visitor monitoring and management, waste collection and sorting, security, driving and maintenance of the dotto buses and maintenance of the visitor facilities, pathways and signage.

4- Micro recommendations 2; areas surrounding and affecting Giza Heritage Site

1. Nazlet el Semman and Kafr El Gebel; Impact on local business

With the change of the visitation pattern, cars and buses will stop exiting the site at Sphinx Gate and instead exit at the Cairo – Fayoum HWY. Thus all the business located in Nazlet El Semman will lose a considerable amount of their client-base.

It is recommended that an in-depth study be commissioned to document the potential change that will affect this community and provide solutions for modifying their business structure accordingly, introducing new sympathetic business models that take advantage of the proximity to the heritage site, without relying on a direct flow of visitors.

2. Nazlet el Semman and Kafr El Gebel; Impact on heritage site
An in-depth study into the physical and visual impact of the Nazlet El Semman and Mansouriya Canal and Street on the heritage site should be commissioned. However current identifiable issues include:

- Ground water seepage: Currently a ground-water reduction project is underway in the lower Giza Plateau to reduce the water-table height. This is a measure that should work over the medium long-term, however a long term solution in the form of installing waste-water infrastructure is recommended, as this will also improve the quality of life in the district.
- Visual sympathy: Current laws prohibit any new construction in Nazlet El Semman, and so it is assumed that the current heights of about three storeys will continue. It is recommended however that urban conservation rules be applied to the district where colours and materials sympathetic to the heritage site be used and eventually replace current materials and colours that negatively impact the site.
- Archaeological integrity. The ban on construction decreed for the area was put in place to stem alleged illegal exploration. This has led to the deteriorating state of many of the older houses forcing their residents to face the danger of collapse or relocate. A more acceptable measure would be to allow re-construction within the limits set by the conservation zone, but only after emergency archaeology was administered to the site and all potential finds recovered and/or recorded, while compensating the owners for the delay. This will help better understand the greater ancient Giza region more quickly, without compromising the rights of the adjacent community.

3. Hadaek Al Ahram Neighbourhood and Cairo – Fayoum HWY
   - Traffic: Public transportation networks, existing or new, should be modified to provide access to the Giza site from its new entrance point on the Cairo –Fayoum HWY. A traffic study should be commissioned to incorporate this upgrade as well as identify the potential increase in private transport traffic on the segment of Cairo – Fayoum HWY serving the Giza site. Its recommendations should be implemented before the operation of the new heritage and site-management plan in order to ensure a smooth transition.
   - Business: An urban management study should be commissioned to review the effect that the new flow of visitors to the site from the Cairo –Fayoum HWY will
have on the adjacent neighbourhood of Hadaek Al Ahram, specifically on the strip of real-estate fronting the Giza site entrances and exits, as it is projected that businesses seeking to serve visitors to the Giza site will target this area, introducing a scale and business-type the neighbourhood may be un-prepared for.

- **Visual sympathy:** It is recommended that advertising billboards on the segment of Cairo – Fayoum HYW adjacent to the site be banned in order to improve the quality of the heritage site, while the buildings of Hadaek Al Ahram on the same segment should comply to conservation area guidelines of material and colour sympathy.

4. **The Grand Egyptian Museum**

The proximity of the Grand Egyptian Museum to the site, which is within 3km of it, poses very pertinent questions about the interrelationship between them where a number of ideas have been entertained that link the two sites directly, either with a walkway or a means of transport. This interrelationship must be studied taking into consideration that these two venues require considerable visitation time, while the existence of the museum will have a strong impact on potential development in the surrounding area, mostly for tourism and entertainment purposes.

5. **Macro recommendations; Heritage sites in Egypt**

- **Propagating the practice of visitor and site management**

  Problems posed by the current structure of managing heritage sites in Egypt include the overlapping and inefficiency of many different authorities within one site. For example in Giza alone, the following authorities operate and have jurisdiction: The SCA (Antiquities Inspection, Engineering Division, Museum Division), Sound & Light Company, National Electricity Company, Giza Governorate (Waste management), Ministry of Interior (Tourism & Antiquities Police, Civil Protection Police, Central Security Forces, Mounted Police, Investigations Police, State Security, Traffic Police).

  This case may be only typical in larger sites, though smaller ones are still susceptible to this dizzying array of authority where they all compete to display their power, though none are professional in the field of visitor and site management.
It would thus seem inappropriate to suggest the addition of a further entity, although it is imperative that a central body professional in the provision of visitor and site-management services run heritage sites throughout Egypt to raise the quality of the visitor experience and better preserve our heritage.

This would entail the discharging of most of the other authorities or at least diluting and specifying their jurisdictions. The SCA would act only as owner of the site, and through a newly developed Site Management Division, would provide security, and monitor an independent Site Management Authority that could be public-private owned, that would assume responsibility of all visitor and site-management duties.

These SMAs could initially be staffed with SCA staff retrained to work in visitor and site-management duties. Eventually visitor and site-management should be incorporated into the existing archaeology and tourism schools to better prepare potential graduates for this new and growing job market that little seem to be prepared for, countering the limited scope of archaeology.

- **Visitor and site management supporting industry**
  As existing heritage sites in Egypt are further developed under visitor and site-management principles, and new ones are opened, demand will rise for; heritage planners, signage designers and makers, GIS engineers, systems’ engineers and so on.

  This industry would represent a significant addition to the economy and would be able to even be an exportable industry over time. Its main obstacle is the lack of policy that would only allow for heritage sites to be open to visitation if they are run by SMAs, while initial investment would be gained back through increased site revenue that would accompany a better visitor experience, while also ensuring Egypt’s heritage lasts much longer than current estimates indicate.

- **Nation-wide strategic plan for heritage sites & tourism**
  The SCA’s Site Management Division could prepare a database of all heritage sites in Egypt that it owns or administers, sorting them according to the nature of their heritage. There could be for example;
- Sites of archaeological and built heritage
- Sites of built heritage
- Sites of archaeological heritage

It would then study the impact of visitation on each site and would proceed to recommend sites for; Permanent Closure, Temporary Closure & Upgrade, Upgrade and Open for Visitation.

This database will also help balance tourism demand on sites, spreading and mitigating their impact, and would help create new areas of demand, thus helping adjacent communities benefit from once closed heritage sites.

It would also prepare feasibility studies for site-appropriate revenue creating activities based on potential visitor numbers throughout the year, allowing local-community entrepreneurs to better plan their businesses. For example if Giza is found to be over-supplied with horse-drivers, they would be recommended to offer their services in an under-supplied Dahshur. Appropriate numbers of bazaars would be slated for each site, while rental of concessions would be appropriate to the income generated by the businesses run by community entrepreneurs.

**Giza plateau master plan approach**

Taking into consideration the environmental study results and the site analysis recommendations, The Giza Plateau Master Plan has been designed to limit visitor-related impact to the World Heritage Site in response to repeated calls by the UNESCO and independent heritage advisors throughout the 1990s to curb accelerated monument degradation and diminished visitor experience, and is an evolution of the UNESCO 1992 Giza Master plan.

Three main issues needed to be addressed;

1- Improving the visitor experience (lack of information, harassment by camel & horse drivers and souvenir peddlers)
2- Reducing the impact of visitors to the site (pollution from vehicles, bio-threat to plateau from horse and camel dung)
3- Providing a sustainable framework for the conservation and the study of the archaeology
These issues were addressed by the following:

1- Alternative mobility strategy

Visitors would experience the site via a combination of environmentally friendly transport network and designated pedestrian routes, after leaving their vehicles in a designated car park outside, downwind and invisible form the core monument site, thus curbing rising pollution levels especially to the Sphinx.

2- Alternative recreation & commercial strategy

A designated area south of the immediate monument site and accessible via the new internal transport network as an optional leg of the visit would be provided for camel and horse rides as well as dedicated stalls for local souvenir vendors. This would alleviate the inappropriate use of the monument site as a recreational site providing a better visitor experience and curbing the deterioration of the monuments caused by animal dung.

3- Site Information Provision Strategy

Two visitor and information centers will provide the relevant experiences to both adults and school children upon entering the site and before embarkation via a mix of physical artifacts, 3D models and multimedia presentations, and printed media, as well as providing basic amenities and services. Further 3D models and information plaques would be distributed strategically across the site to guide visitors through it.

- Phase one concerns the relocation of all non-historic buildings, and their contained activities, outside of the core monument area, and is due to be completed by September 2009.
- Phase Two is the relocation of the main visitor entrance to the Cairo-Fayoum highway and is due to be completed in 2010. This phase comprises the completion of a visitor center and parking facilities and the internal dotto route. This route is divided into the main train that covers most important aspects of the site, and pedestrian routes. Smaller vehicles may be used for the elderly and the disabled to access the pedestrian zone.
Giza plateau Master plan

The master plan’s main methodology relied on dividing the site owned by the MSAA as defined by the security fence(s) into zones depending on their significance, asserting preservation and activity guide-lines for each one. Three zones came of out this plan;

- Core Heritage Zone (CHZ); comprising all built heritage and areas under excavation along with areas of the natural landscape that have witnessed significant ancient activity.

- Buffer Zone (BZ) where development and activity may physically and visually affect the CHZ.

- A Transitional Zone (TZ); where development and activity may visually affect the CHZ.

Guidelines for the preservation of the natural and built heritage of Giza fell under two categories;
Following these guidelines the heritage plan comprises the following;

**Visitor experience:**

- There will be one visitor center located in the TZ and accessed from the Cairo-Fayoum HWY. It will provide information, ticketing, toilets, food & beverage, retail and other services, as well as parking space. Visitors will then take an environmentally-friendly dotto train to different parts of the site such as: The Pyramid Precinct. Located in the heart of the CHZ, this area holds most of
Giza’s monuments and will be a pedestrian-only zone with site-sympathetic services. From here visitors can access the pyramids, sphinx, temples and tombs via well marked paths, and will be able to understand the site through interpretation boards and models.

- **Panorama viewpoints.** Three prominent hills overlooking the monuments will be accessible by visitors, providing breathtaking views of the site as well as interpretation information and models. These areas will provide excellent photo opportunities and will thus aid in relieving the CHZ from visitation traffic.

- **Riding & bazaar zone.** This area will be located in the TZ, a safe distance away from the CHZ and separated by a security fence. It is also accessible by the local community that relies on the business of horse and camel riding as well as selling souvenirs.

- **While not part of the day-time visit, the Sound & Light Theatre will be accessed in the evening from its current entrance, the Sphinx Gate. The current theatre will be moved back 100m from its current location which rests within new archaeological exploration and is within the CHZ.**

The level of services provided for the visitor must be raised, while the visit itself should be approached from a heritage park point of view rather than it being simply the visitation of a monument. Thus provisions must be made for the relative length of time and effort expended on such a site, along with the relevant way-finding and interpretation.

- **A visitor centre providing information, ticketing, toilets, lockers and other relevant services must be the first point of entry to the site. It must be able to introduce the site to the visitor and contain all the information that could not be placed on the site. It must also provide awareness as to the rules required to maintain while on the site.**

- **A site-controlled environmentally-friendly transit system must ferry visitors to the different parts of the site open for visitation and must be limited to the BZ. Stops along the route should be well-marked and**
provide shade, while services should be provided where the length of visit is more than 15 minutes.

- While within the CHZ visitors will rely on well-marked pedestrian routes, punctuated by points for information and low-impact services.
- Different day passes should be issued based on type of visit; leisure, tourist and adventure. This will ensure that each type of visitor experiences what they came to experience and that site-management authorities are able to spread the number of visitors on different parts of the site lowering their impact.

- Visitation times should be made to follow the length of day-time with the seasons, especially in summer when it is hot to allow for early morning and late afternoon visits.
  
  As the Sound & Light shows are geared for evening visits, a change in pattern is recommended where limited numbers of visitors seeking to enjoy Giza at night without being confined to the theatre, are allowed on a designated portion of the site in the region of the Sphinx.

- Visitation in relation to unique solar phenomena that is significant to the site should be planned for. The sunrises of both equinoxes are highly significant, as is the summer solstice sunrise and sunset.
Giza plateau Master plan components:

Environmentally-friendly dotto bus

An SMA-controlled dotto bus will take visitors on a specified route to the different points of interest, designed for a vehicle of 30m length, 2.5m width and with 25m turning circles, effectively accommodating large articulated buses. The route is 6m wide and is graded 2% average slopes and is paved in steel-reinforced concrete that is coloured yellow-beige for minimal visual impact.

The environmental impact assessment report concluded that the bus must be either natural gas or electrically operated. It should also be painted in a uniform shade of yellow-beige with no provision for any advertising livery.

A separate transport study will define the bus strategy and its running and maintenance.

Figure 68: Giza plateau entrances, roads, parking
Pedestrian paths and walkways
Routes will be marked in all areas open for visitation linking all pyramids, tombs, temples and ruins open for visitation to prevent any undue impact on the site. They will be coded according to a route plan that involves more than one option based on the length and scope the visitor would like to experience.
Timber and stone walkways are provided at points of high pedestrian traffic at the entrances to Khafre and Menkaure’s pyramids.

Figure 69: Pedestrian paths and walkways during the construction phase
Panoramas

Four locations were chosen for their unique views of the pyramids and the site, providing different angles of view of the pyramids. Three of these vantage points, PN1, PN2 and PN3 are located directly on the periphery of the CHZ, and are only used as vantage points. PN4 is located at the edge of the BZ and hold special events and the entrance to the Recreation Zone respectively.

Figure 30: Conceptual perspective for the panoramas
Figure 70: photo from panorama (1)

Figure 71: photo from panorama (2)

Figure 72: photo from panorama (3)

Figure 73: photo from panorama (4)
Visitor Centre

The visitor centre consists of two buildings that provide two separate secure-entrances for tourists and students.

The tourist’s entrance provides information, ticketing, refreshments, security and a site-interpretation experience using displays of finds, models of the plateau and multi-media to introduce the site and its history to visitors, and is designed to handle 3300 visitors and hour.

The student entrance accessed in the same manner is equipped with a Children’s Museum that works as an interpretation and information centre for school trips, introducing the site and the field of archaeology to young school children. It has a public library specialising in information on the site and archaeology in Egypt which is open during the site’s operating hours. It also houses a cinema and a multipurpose auditorium with a capacity of 100 seats each, or 200 standing people for the auditorium. These will hold SCA events or be rented out to events appropriate to the nature of the pyramids, and do not have to adhere to normal hours as access to the site is can be controlled form here.
Figure 31: Conceptual perspectives for Visitor Center
Figure 32: Visitor Center during construction
Figure 33: Conceptual perspectives for students’ entrance in visitors center
Visiting the site; Sound & Light
The Sound & Light show will continue in its usual form, although its theatre will be moved back 7 m to allow for more archaeological exploration of the area fronting the Sphinx, while an administrative building will be relocated to a less prominent site nearby.

Visitors will reach it from Abulhol St. in Nazlet El-Semman where the flow of traffic will be improved with widened access road and more organised parking facilities.
Site services and administration:
Two service paths for motor-vehicles ring the site, connecting three management sectors.
• Sector One: Located near the current Mena House Gate will hold the MSAA Giza offices near the already existing main Giza storage magazine and labs.

Figure 34: Conceptual perspectives for SCA during construction and photos during construction
Sector Two: Adjacent to the Cairo-Fayoum Gate to the south-west will hold the site engineering department, fire station and police station.

Figure 35: Conceptual perspectives for engineering administration and photos during construction.
Figure 79: Tourism Police conceptual perspective

Figure 36: Tourism Police building during construction

Figure 81: Fire station building conceptual perspective and photos during construction
Sector Three: To the south-east of the BZ, will hold the mounted police division for the Giza site. This zone is mostly in the TZ and contains the horse and camel riding activity as well as a bazaar area where the local community sells souvenirs.

Figure 37: the mounted police building conceptual perspective and photos during construction
Figure 38: Riding Zone location and a conceptual view