

**THIRD TOURISM DEVELOPMENT PROJECT
SECONDARY CITIES REVITALIZATION STUDY**

Madaba

Environmental assessment

Annex 4

JOINT VENTURE OF COTECNO WITH ABT ALCHEMIA CDG MGA

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Rev: **A**
Date: **24/05/05**

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1. Executive Summary

The objectives of the EA study are to assess the environmental issues of the target area and to validate the CRP as a whole from an environmental point of view, by examining the project's potential negative and positive environmental impacts.

A number of site visits by the different members of the technical team were organized during the course of the study. The visits were carried out during the months of October and December 2004. Site visits covered most of the districts of Madaba old city, proposed location for the projects, neighbourhood residential areas and other infrastructure facilities within the project areas.

The technical team undertook intensive consultations with the officials, technicians and public at the Municipality of Madaba City, Ministry of Environment, Ministry of Tourism and the local communities. Consultations were carried out through official meetings, site visits, scoping sessions and public consultations.

No industry leading to severe **air pollution** exists in Madaba. Air quality and noise are not considered to be a major problem, although, exhaust fumes from badly maintained vehicles and from traffic in narrow roads, engines that are left running for extended periods during car halt as well as horns are frequently sounded pose some nuisance to local inhabitants and visitors.

The environmental factor **flora and fauna** will not be a major issue of concern in a densely populated town with only very limited vacant area within the built-up area. However, it should be mentioned that roadside trees have been planted at a few roads as well as some older trees grow on public areas. These are valuable ecological assets in an area with only sparse vegetation, as well as they are important for landscaping aspects and for urban microclimate.

As long as **water** is concerned, it should be noted that the city is served by two well fields¹. The water is chlorinated and pumped into Madaba reservoir from where it is distributed by gravity. The water consumption in Madaba is 137 l/capita/d. Due to restrictive measures the commercial loss has been reduced (new water meters, campaign against illegal use). The leakage was reduced from approx. 60 % nine months ago to now approx. 45 %; it is estimated that the physical loss circles around 30 %. During summer time water shortage is frequent. In this case, water is supplied area-wise with a frequency of one day per week in the city and even only hours per week in the more remote rural areas. Water tankers from private enterprises sell additional water from privately owned wells. In general, drinking water resources should be responsibly managed. Clearly, excessive use of ground water for watering the vegetation should be avoided. It should be considered to investigate in measures for reduction of the usage e.g. rainwater storage tanks for irrigation of the greens and water saving trickle irrigation systems. It is proposed to investigate the potential for re-use of treated sewage water especially for municipal greens and parks in the next project phase. There is a surplus of treated effluent during the winter period. Any tourist development accompanied by overnight stays will increase high water demand in peak months. Wherever possible, new projects should implement modern water saving techniques to reduce consumption. As a modernization campaign all taps and toilets should be equipped with water saving devices within a reasonable time period.

The main features of the **historic fabric** are reflected in the early Ottoman village (1880 - 1918), and in the subsequent phases of the urban growth, which occurred until the '40s. Since the '70s, the urban settlement was no longer "self contained" but became part of a wider urban context; commercial, administrative and institutional functions concentrated along the Ring Road and along the two main radial roads, depending on the availability of an easy vehicular access. As a result a large part of the "vernacular" and "pre-modern" fabric of the Ottoman village and its former expansions was destroyed, leading also to the definite loss of the underlying historic and archaeological layers.

¹ Located in Alwala Wadi 12 km southwest of Madaba and Swaqa 40 km east of Madaba.

Within the urban fabric, the main remaining elements are: (a) the “vernacular” residential or mixed residential-commercial buildings now scattered within the target area, whose architectural characters still reflect the local typological and construction “traditions”; and (b) the central commercial spines of King Talal, Al Hashimi and Prince Hassan streets, which has dictated the development of the urban settlement through the recent history of Madaba, and still represent the most interesting and meaningful public space of the city.

Moreover, several **archaeological sites** are scattered within the urban fabric of the historic core and its immediate outskirts, representing different eras from the Iron Age up to the establishment of the modern history of Jordan. Excavations have been undertaken as early as the late 19th century till present, and further areas still need to be excavated. An Archaeological Park was established in 1992, which represents an attempt of integrating and presenting, within the urban fabric, the different layers of the ancient history of Madaba.

After examination of the current conditions of the target area; the technical, financial and social aspects of the proposed actions; and the anticipated environmental impacts on the physical, ecological and socio-economical aspects of the environment, it can be concluded that the proposed projects will have a **net positive socio-economic impacts on the residents and environment** of Madaba City. The positive impacts in the short, medium and long term exceeded the anticipated negative impacts during the construction and operation phases.

2. Introduction

According to the Terms of Reference (ToR), the scope of the whole study is to contribute to the ten-year strategy for tourism whose aim is to “*develop the potential of regional centres such as Karak, Jerash and Madaba in order to increase their contribution to the value added by the national tourism sector and benefit the population of these cities and their respective regions*”. An explicit link is proposed between the need for an urban regeneration of the city centre and the improvement of tourism facilities in order to achieve the following goals:

- Spread the impact of increased numbers of tourists having longer stays;
- Provide the opportunities for local business growth and employment;
- Benefit the local population by job creation.

Tourism is to be considered as an engine for an overall socio-economic development of the regional centres and urban regeneration is a crucial issue for such a tourism development: it is essential in order to promote the identity of each regional centre, to improve the quality of the urban fabric in the old cities, and to enrich the experience of visitors. At the same time, an enhanced urban environment and a better livelihood for both residents and visitors, are conditions to maximize the effects of public investments and favour private initiatives.

The ToR stress that “the objectives of tourism promotion should not overshadow the general analysis of the need for sustainable urban regeneration for the benefit of the local population in the living commercial and administrative centre”, and the goals of the Study are defined as follows:

- To develop a medium term development strategy for the city of Madaba, with the emphasis on the potential links between the two terms of the tourism promotion and the urban regeneration.
- To identify priority urban regeneration and tourism-related projects and cultural heritage conservation activities for the city of Madaba and its immediate attraction zone.

2.1 OBJECTIVES OF THE STUDY

The objective of this study is to reflect environmental resources of value, concern, and/or sensitivity, including sites having/needing official recognition and protection, urban practices to be changed, if any. Propose overall environmental mitigation and management activities that need to be undertaken for achieving sustainable urban regeneration and protection of natural sites. In more specific the main assignments will consist of:

- 1) **Assessment environmental issues** of the study area including sites that are/should be listed/protected, management practices to be changed, etc...
- 2) **Validation of the city revitalisation program** as a whole from an environmental point of view, by examining the project's potential negative and positive environmental impacts.

This shall be done by means of an evaluation matrix project actions/environmental impacts. The matrix shall take into account (a) the natural environment (air, water, and land); (b) human health and safety; and (c) social aspects (involuntary resettlement, and cultural property).

2.2 DELINEATION OF THE PROJECT AREA

This Report will discuss the case of Madaba City, located at around 25 km to the south-west of Amman City, and accessed through the Desert Highway that connects Amman with all the southern regions. It is an ancient city of mosaics, presenting an archaeological park and has the oldest preserved ancient mosaic map of the holy land. These proposed actions were selected based on their potentiality in terms of revitalizing the city through promoting the archaeological and historical sites.



AERIAL PHOTO OF MADABA WITH THE CPA AREA

The proposed Projects (Actions) that will be under assessment in this report are summarized in Table 1. A description of each of these actions is available at the different chapters of this Report.

NO	ACTION
1	Upgrading of the city core street network
2	The creation of a new heritage center in the Saraya building
3	The re-design of the existing bus station
4	Realization of open air leisure facilities

TABLE 1 - LIST OF PROPOSED ACTIONS

3. EIA methodology

3.1 PURPOSE AND OBJECTIVES

An Environmental Assessment and environmental validation of the proposed actions in the city of Madaba was requested by the Client, in parallel with the final design of the project and prior to the implementation. The EA will consider the potential locations used by the project.

This EA Study, commissioned on October 2004, has as its target the preparation of Environmental Impact Assessment Study Report of the third tourism development project.

In this study, there will be a focus on the following aspects:

- Research into the current environmental situation at the proposed sites for further actions and its surroundings.
- Description of the current site operation and the site conditions.
- Evaluation with regard to compatibility with minimum environment requirements.

Assessment of the sensitivity of the surroundings of the action site (nature, human welfare, land use, surface / groundwater situation).

3.2 STUDY PROCESS AND METHODS

This section covers all methods used for completing this study. Before the project was officially launched, a base line research was carried out for the proposed sites. This was followed by the site visits to the project areas. Following this, information was gathered from different ministries and other sources that would be important to the study. Next a scoping meeting was held with various stakeholders, officials and community representatives in Madaba Governorate in order to discern their opinion of the project and the potential impacts it could have. At that stage the communities were involved formally with their opinions regarding the possible effects the project that could raise on the environment.

Finally combining all this information, community consultation and field visits feedback enable the consultant to define the major environmental impacts, assessed, evaluated and mitigation measures were recommended in the form of environmental management plan.

3.2.1 STUDY AREA RECONNAISSANCE

A number of site visits by the different members of the technical team were organized during the course of the study. The visits were carried out during the months of October and December 2004. Site visits covered most of the districts of Madaba old city, proposed location for the projects, neighbourhood residential areas and other infrastructure facilities within the project areas.

The technical team undertook intensive consultations with the officials, technicians and public at the Municipality of Madaba City, Ministry of Environment, Ministry of Tourism and the local communities. Consultations were carried out through official meetings, site visits, scoping sessions and public consultations.

Officials at the MOTA and the Municipality were very cooperative and helpful to the technical team. All the meetings in Madaba were arranged with consultation of the project manager.

3.2.2 LITERATURE REVIEW

During the visits of the technical team to the concerned agencies, most of the relevant data and information were collected and reviewed. The collected data were in the form of reports,

maps, recent studies by the local agencies, public consultations, suggestions and comments of the communities and officials.

These data include but are not limited to the following:

INFORMATION GATHERED	SOURCE
Aerial photo scale 1:10 000	Royal Geographic Centre
Tourist Map scale 1: 5 000	Royal Geographic Centre
Topographic Map scale 1: 10 000	Royal Geographic Centre
Information on the History of Madaba	Department of Antiquities
Temperature, Rain and Humidity information	Meteorological Department
Information of Numbers and Nationalities of visitors to Madaba	Ministry of Tourism and Antiquities
More information regarding the proposed future actions	Study of the second tourism development project

TABLE 2 - INFORMATION GATHERED AND SOURCE

3.2.3 SITE VISITS

Site visits were conducted during the months of November and December 2004 to the proposed locations for the new actions in Madaba City in order to gain more information about the project sites. The team visited the targeted locations and surroundings, and the market nearby. The visit was very useful in clarifying the details of the project. From these visits, more information was gathered and it also became clear that the following information was needed.

- Information concerning the residential areas close to the sites,
- Information concerning the material to be used for construction,
- What facilities will be provided for visitors,
- What safety measures will be adopted,
- Parking and traffic information,
- Method of solid waste collection and disposal, and
- Drainage system capabilities.

The missing information were gathered from the different parties, MOTA, the municipality and other related organizations.

3.2.4 COMMUNITY CONSULTATION

In order to involve the communities within the targeted areas, a city consultation workshop was held at the City Hall attended by the Mayor, government officials and key representatives from the community. The workshop was held on Monday 6/12/2004. The aim of the workshop is to present a preliminary project outline and introduce the concept of the City Revitalization Pact and obtain comments and feedback. The workshop began with a presentation of the preliminary project outline and the communication was completely held in Arabic. The presentation was followed by a series of questions, discussions and feedback on the proposed actions. Another aim of the workshop was to collect information and discuss the institutional capacity of the Municipality, on the basis of the preliminary findings and results of the desk review and the desk research.

A lot of suggestions and proposals were raised concerning possible project actions, both from the public and private sectors. A specific points that were raised during the meeting and related to environmental aspects can be summarized as follows:

- Infrastructure is quite well organized however there is a need to raise awareness about traffic, parking and solid waste. Families do not want garbage containers in front of their

houses. The staff who are doing the collections are not doing a good job.

- As long as municipal infrastructures and services are concerned, the main issue are: the storm drainage network, which is not complete (houses get flooded, the worst area is near the museum); the need to organize and control circulation and parking through a comprehensive traffic management plan.
- A number of suggestions came concerning the Saraya Building: the Saraya is to be the symbol of the city (even the brand of the city) as it could be seen from far away; this could become the centre of the city; the hill will have two symbols (the Mosque and the Church) in addition to the Saraya.
- Madaba people proved to be aware of the existing study, and gave the impression of their willingness to be part of the implementation of the new project.

4. Description of site and surrounding areas

4.1 BACKGROUND TO THE PROJECT AREA

The city of Madaba has gained considerable concern by the Government of Jordan in general and the Ministry of Tourism and Antiquities in particular to enhance the urban development in order to increase Madaba's potential as a tourist destination. This concern has appeared because Madaba has major historical, religious, cultural, and medical values.

Planning for sustainable development of a community or a region generally aims at improving living conditions and quality of life for the people concerned. Social and political frameworks, within which economic development is to take place, are major determinants of the results to be expected.

From the administrative point of view, Madaba Governorate is administrated by the Governor, the highest authority at the Governorate. The Governor is connected directly with the Ministry of Interior Affairs and is responsible for ensuring the security and enforcing the laws. The services are carried out through the different governmental agencies and so the Municipality of Madaba. Other non governmental organizations are involved in the social and economical activities in the Governorate. The City resided a homogenous mixture of Muslims and Christians originated from different regions and different backgrounds, living peacefully for hundreds of years.

4.2 ASSESSMENT OF THE CURRENT PHYSICAL ENVIRONMENTAL SITUATION

The city of Madaba is located at an altitude of 750 to 800 m asl. The areas around the city are agricultural land (wheat, olive trees etc.). The suburbs are fast growing. In the industrial area of Madaba an elevator factory, paper mill, steel factory, Coca Cola factory, dairy factory and some traditional factories (weaving mill) are operating.

4.2.1 CLIMATE, AIR QUALITY AND NOISE

The climate of the Madaba region is semi arid. The mean monthly temperature ranges from 8.3° in January to 24.0°C in July. The mean yearly rainfall amounts to 358 mm, with most rainfall in the period from November to March. Even snowfall is not unknown (1,7 d/y).

No industry leading to severe air pollution exists in Madaba. Air quality and noise are not considered to be a major problem in Madaba (further information is needed to confirm this). However, exhaust fumes from badly maintained vehicles and from traffic in narrow roads, engines that are left running for extended periods during car halt as well as horns are frequently sounded pose some nuisance to local inhabitants and visitors.

4.2.2 FLORA, FAUNA AND PROTECTED AREAS

The environmental factor Flora and Fauna will not be a major issue of concern in a densely populated town with only very limited vacant area within the built-up area. However, it should be mentioned that roadside trees have been planted at a few roads as well as some older trees grow on public areas. These are valuable ecological assets in an area with only sparse vegetation, as well as they are important for landscaping aspects and for urban microclimate. The Mujib Nature Reserve established in 1987 is located on the eastern shore of the Dead Sea stretching into the sandstone mountains (approx. distance to Madaba 30 km) and is the closest protected area (elevation from 400 m bsl to 900 m asl). The reserve is habitat for a variety of protected plants and animals.

4.2.3 WATER SUPPLY

The city is served by 2 well fields (Hydan/Swaqa) that also serve Amman city. The well fields are located in Alwala Wadi 12 km southwest of Madaba and Swaqa 40 km east of Madaba. The water is chlorinated and pumped into a reservoir in Madaba (capacity 7,500 m³) from where it is distributed by gravity. The water consumption in Madaba is 137 l/capita/d. Due to restrictive measures the commercial loss has been reduced (new water metres, campaign against illegal use). The leakage was reduced from approx. 60 % nine month ago to now approx. 45 %, it is estimated that the physical loss circles around 30 %. The water supply network was installed approx. 30 years ago, and only in parts rehabilitated. It is assumed that the network will need rehabilitation.

During summer time water shortage is frequent. In this case, water is supplied area wise with a frequency of one day per week in the city and even only hours per week in the more remote rural areas. Water tankers from private enterprises sell additional water from privately owned wells. In general, drinking water resources should be responsibly managed.

Clearly, excessive use of ground water for watering the vegetation should be avoided. It should be considered to investigate in measures for reduction of the usage e.g. rainwater storage tanks for irrigation of the greens and water saving trickle irrigation systems. It is proposed to investigate the potential for re-use of treated sewage water especially for municipal greens and parks in the next project phase. There is a surplus of treated effluent during the winter period.

Any tourist development accompanied by overnight stays will increase high water demand in peak months. Wherever possible, new projects should implement modern water saving techniques to reduce consumption. As a modernisation campaign all taps and toilets should be equipped with water saving devices within a reasonable time period.

4.2.4 SEWAGE TREATMENT

The old town of Madaba is connected to the sewage system to nearly 100 %. A new wastewater treatment plant (WWTP) was put into operation in (2002). The WWTP is operated by the Water Authority of Jordan. The site is located southeast from the city at a distance of approx. 3 km to the old town.

The WWTP technical system comprises mechanical activated sludge with maturation ponds. At the moment the plant receives 3,600 m³/d, which is half of its total capacity (planned to be reached in 2010). The treated effluent (electrical conductivity circles around 1dS/m) is used in the vicinity of the WWTP for irrigation of plants grown as animal fodder. In winter excess water is discharged into ponds from where it evaporates or is soaking away. The sewage sludge is disposed of after drying.

4.2.5 SOLID WASTE AND LANDFILL

Solid waste and littering is a problem in the areas around the city and in the open spaces within the suburbs. Plastic waste littering is a widespread problem along all roads. Waste collection in the city is done with open trucks. Madaba landfill, which is located south of Madaba Wastewater Treatment

Plant, serves large areas surrounding Madaba including Greater Madaba area, Na'ur, Thiban, Jizeh, areas in Wadi Elsser, covering in total 16 municipalities.

The area of the original landfill which was functioning since 1974 until recently is 84 dunums. This landfill was closed and converted into a public park with roads and green areas.

A new site was acquired with an area of 60 dunums near the original site, and is currently being used. Disposal is by open dumping. There is no basis layer to prevent seepage into groundwater. Dried sewage sludge from the nearby WWTP is not accepted by the management to be dumped. It is assumed that also some industrial waste is dumped. The site is equipped with bulldozers, whereas no waste compactors are available.

This landfill is managed by the Joint Services Council in Madaba. It receives nearly 200 tons

of garbage per day; waste is covered with earth at the end of the working day.

Solid waste collection should be upgraded and an improved street cleansing is needed. More advanced containers with closing lids for the depositing of the household waste should be provided. A compactor waste vehicle (not foreseen so far) would allow a better operating of the landfill. The open trucks for the waste collection should be replaced by closed garbage trucks, to avoid loss of the garbage during transport. It is recommended to develop a waste management concept that can be an effective tool to reduce waste amounts responsible enhancing the use of more environmental friendly products and encourage recycling of residues.

In order to minimize potential impacts on landscape and visual environment due to erection of buildings and facilities it is recommended to restrict the building density and height at certain locations. Planting of green screens and roadside trees are appropriate mitigation measure.

Any construction phase including any demolition will require careful attention regarding nuisances for the nearby dwelling houses (dust, noise, vibration).

4.2.6 RAIN AND STORM WATER

The city of Madaba has no functioning rain or storm water drainage system. In order to reduce the risk of flooding and the potential damage to property as well as the historic sites a comprehensive storm water system is needed.

4.3 MADABA'S HISTORICAL DEVELOPMENT

The main features of the historic fabric are reflected in the early Ottoman village (1880 - 1918), and in the subsequent phases of the urban growth, which occurred until the 1940'.

After the establishment of the Emirate of Trans-Jordan in 1921, Madaba continued to act as an administrative and commercial centre. A Qaemmaqam (Hakem Idari at the Saraya) was appointed in conjunction with the new political role (Qadha), and in 1927 Madaba was given the status of a "city". At the same time, around 119 shop owners were recorded in 1925. An earthquake hampered its urban development in 1927, which demolished around 180 buildings, in addition to others that were damaged. After 1940's, urban growth is related to an increase of the population, and to the establishment of the "Camp", toward the south beyond the ancient wall threads, to accommodate the influx of Palestinian families. The Ottoman village road network was extended and new roads were opened to accommodate the new growth, which occurred in all directions around the central core.

The first Master Plan adopted in 1968, outlined the present network of roads connecting the historic core to the outer districts, and established the directions for the further urban growth. New expansions spread into the valley mainly northwards and westwards, along the new ring road surrounding the central core, and in between the main radial roads that connects Madaba to Amman and the other regional centres and form eventually the present urban area that is now spreading in all directions into the plain.

Since the '70s, the urban settlement that was formed by the "Ottoman village" and its additions around the "Acropolis" and the main commercial spines, is no longer "self contained" but becomes progressively a part of a wider urban context; commercial activities as well as administrative and institutional functions, tend to concentrate along what can be defined as a "ring road", on the edges of the historic core, and along the two main "radial" roads, depending on the availability of an easy vehicular access.

As a result a large part of the "vernacular" and "pre-modern" fabric of the Ottoman village and its former expansions was destroyed, leading also to the definite loss of the underlying historic and archaeological layers.

Conservation projects and initiatives were undertaken since the '90s, for the protection of the archaeological sites (Archaeological Park, Mosaic School, Apostles church) or the rehabilita-

tion and reuse of traditional buildings for the sake of tourism, such as the Visitor's centre, dependent on foreign aid. With the same purposes, few further private investment initiatives followed (such as Haret Jdoudna and Madaba Zaman-later Cardo restaurants) which show the potential of the traditional fabric and heritage building to be properly reused for new activities, but these examples remain until now very sporadic and isolated.

In 1995 a Development Plan for the central area was proposed by a special Committee set up by the Municipality of Madaba, in order to provide for a comprehensive planning framework for the city core. A set of measures for conservation was recommended and the development of a touristy route was proposed connecting the points of potential interest within and outside the historic centre (see the following table).

Urban regeneration policy, basically relies on a group of projects aiming at increasing the tourism accommodations and activities within the historic centre, as well as to rehabilitate some archaeological and heritage sites, in order to extend the stay in Madaba. This proposal was not reflected in the further revision of the Master Plan in 1998, which eventually led to a limited update on building regulations.

4.3.1 THE PRESENT CONDITIONS OF THE PROPOSED ACTIONS' LOCATIONS

The selected locations for the proposed actions are within the jurisdictions of Madaba Municipality. Some of these location are within the city centre where all the daily activities are existed. Other places are within the residential areas. For the locations that are located within the city centre, these are heavily occupied by commercial activities, have relatively old infrastructure, served by all services like water, wastewater collection, solid waste collection and other services. Impacts of delivering the services still not evaluated from the environmental point of view. The municipality and the other service department such as water authority and others are evaluating the services in terms of satisfying the needs and not enhancing the environment. The role of the ministry of environment still not clear with these aspects.

The other selected locations within the residential areas are also served by all infrastructure requirements such as roads, water, wastewater collection, solid waste collection and other services. These locations are heavily populated and considered part of the old city boundary. Any action such as building and demolishing should not change the heritage of these areas.

The land use of the proposed actions is strongly characterized by a mix of functions: residential, commercial activities, offices and services, religious and educational buildings make this part of the city alive and well balanced in terms of urban opportunities. However, a decrease in commercial function was observed. Several shops are unoccupied or closed.

4.3.2 THE ARCHITECTURAL HERITAGE

Within the framework of the survey on the urban fabric, more detailed information have been collected on the following architectural and urban heritage items:

- "Vernacular" residential or mixed residential-commercial buildings up to the early sixties¹, now scattered within the urban fabric, whose architectural characteristics still reflect to a certain extent the local typological and construction "traditions" described below;
- The central commercial spines of King Talal, Al Hashimi and Prince Hassan streets, which has dictated the development of the urban settlement through the recent history of Madaba, and still represent the most interesting and meaningful public space of the city.

A total amount of 87 "vernacular" or heritage buildings have been identified and surveyed, which show at least some element of cultural and architectural, as for the typology, the façade decoration, the use of local materials and their position within the urban context.

These buildings are "residual" and scattered within the "historic centre" without giving any specific character to one or another part of the urban fabric, and represent about the 10% of the whole building stock (see map below). They are of different size, use, conditions of repair

and architectural integrity and date from the late Ottoman period to the early Hashemite Kingdom.

4.3.3 THE ARCHAEOLOGICAL SITES

The current situation is characterized by several scattered archaeological sites within the urban fabric of the historic core and its immediate outskirts, representing different eras from the Iron Age up to the establishment of the modern history of Jordan. All of them have been described in detail in the Inception Report, taking as a reference the study “Madaba Heritage”, carried out by ACOR in 1996.

Excavations have been undertaken as early as the late 19th century up till present and further areas need to be excavated. An Archaeological Park was established in 1992, which represents an attempt of integrating and presenting, within the urban fabric, the different layers of the ancient history of Madaba.

Besides their cultural value and their eventual importance as tourism attractions, the whole of all the archaeological sites needs to be considered as a potential to improve urban liveability and environment.

They can also represent indeed a set of places where different activities could occur that would create new job and income opportunities – i.e. further excavations and researches, works for the protection and the presentation of the different items.

4.4 MADABA'S MASTER PLAN AND RECOMMENDATIONS FOR REVISION

The existing Master Plan of Madaba was approved in the year 1989 with a total zoned area of 16679 Dunums (16.679 Square Kilometres). This Master Plan was prepared by planning teams at the Ministry of Municipal and Rural Affairs and the Environment (recently renamed as Ministry of Municipal Affairs) with high expectations of population and economic growth. Actual growth of the population and built up area showed that, this population will not reach the bearing capacity of the zoned area under normal conditions for another 50 years. Bearing capacity is calculated as the optimal utilization of the residential zoning by a factor of 75% for all zoning categories. Since its approval, the Master Plan was revised on several occasions. The creation of the Municipality of Greater Madaba in the summer of 2001 brought new realities to Madaba's planning and municipal administration. The smaller municipalities surrounding Madaba and vast strips of agricultural lands were amalgamated with Madaba city to form the new municipality. It is understood that the planning and development contexts of the new Greater Municipality will need to be revised in light of new environmental and developmental realities.

Proximity to Amman and Madaba's location in a rapidly developing region will also need to be considered as an additional dimension.

5. Environmental assessment of the city revitalisation program

All the proposed actions will be assessed from the environmental point of view as one package, but description of each of these actions is necessary to pin point the particularities of each of these projects.



OVERALL STRUCTURE OF THE PROPOSED CITY REVITALISATION PROGRAM

5.1 ABSTRACT OF THE PROPOSED PROJECTS

In the following sub sections an abstracts of each of the proposed actions:

5.1.1 M.01 – UPGRADE OF THE CITY CORE STREET NETWORK

The project objective is that of creating a new circulation pattern within the historical city core that will rationalize the allocation of spaces dedicated to vehicular and pedestrian traffic. In particular, the project focuses on the solution of the following specific problems:

- The rationalization and beautification of the street section of King Talal street.
- The rationalization and beautification of the King Talal / Palestine street junction.
- The creation of a quality urban pedestrian plaza in front of the Saraya building.

The project proposes different levels of intervention depending on the location of the different

streets and their role within the overall circulation dynamics within the urban fabric. The project aims at creating an integrated network of pedestrian paths so as to allow for an overall upgrading of the urban environment and its quality of life.

Below grade infrastructural refurbishment will be provided in connection to the proposed road works including the provision of an efficient storm water drainage system.

Vehicular accessibility by car shall be maintained for the entire area but the necessary rationalization of vehicular movement through the historic core will be accomplished through the enforcement of traffic regulations and the careful reshaping of the street sections providing wherever possible wider sidewalks and street side parking stalls for private cars and for loading and unloading of commercial goods.

5.1.2 M.02 – THE CREATION OF A NEW HERITAGE CENTER IN THE SARAYA BUILDING

One of main emblematic buildings of the Ottoman civic architectural heritage, the Saraya is today used for administrative activities and is not valorised at all for either residents or tourists. This building is ideally suited for the creation of a cultural centre, to be one of main poles of Madaba tourist and cultural animation, and a gateway for the discovery of Madaba history, cultural heritage and past and present living traditions. Its former (and actual) is symbolic of the administrative and institutional history of Madaba, one of the planned facets of presentation in the proposed project. This project has been proposed by the Madaba Heritage Society.

5.1.3 M.03 - THE RE-DESIGN OF THE EXISTING BUS STATION

Due to its continuity role as the principal agricultural centre of the region, Madaba attracts vast numbers of local commuters who reach the city on a daily basis. Regardless of the municipality's recent realization of a new bus station on the extreme eastern periphery of the city, which is still un-utilized, the existing main bus station compound continues to be an important urban node and a gateway to the city core for visitors from the surrounding towns. The project aims at an integral refurbishment of the existing bus station building and the transformation of the related open air enclaves into quality spaces.

The project will include the rationalization of entrance and exit paths for pedestrians, private vehicles and buses, the provision of shaded stalls for buses equipped with seating facilities for passengers, decorative planting of autochthonous greeneries and trees and the rehabilitation of the existing bus station.

The project proposes to develop an information and cultural leisure centre drawing from the theme of the Mosaic Map and its potentialities and making use of new information technologies. The aim is to reinforce the present main point of interest for the tourism flows whilst reducing the interference with the religious use of the church, and to create a new pole of activities in close connection with the pedestrian of King Talal street.

5.1.4 M.04 – REALIZATION OF OPEN AIR LEISURE FACILITIES

The project aims at the creation of an outlet for citizens in the central core of the city through the renovation of a derelict area and the restoration and reuse of some buildings or building components. The project is based on the creation of a new park and structures for leisure and handicraft.

Coupled with the rehabilitation of the Hamarneh complex in the lower area, the project aims at introducing new activities and amenities within the urban fabric, regenerating what is now a derelict and marginal area.

5.2 ENVIRONMENTAL ELEMENTS IDENTIFICATION

To fulfil the World Bank requirement for project appraising, the (operational manual, Bank Procedures, BP 4.01- Annex B, January 1999) will be considered for the analysis.

The following table shows the key environmental issues, which should be studied to establish their baseline and to be assessed in the comprehensive EIA study:

ENVIRONMENTAL ISSUES	PROJECT PHASES	
Physical and ecological conditions	Construction	Operation
Water and Wastewater	X	X
Solid Waste	X	X
Air	X	X
Biodiversity		
Species (flora, fauna)	X	
Socio – Economic Conditions		
Public Health		
Dust	X	X
Noise	X	X
Solid waste	X	X
Social aspects		
Employment	X	X
Land value		X
Landscape	X	X
New business	X	X
Life quality		X
Infrastructure	X	X
Land acquisition	X	
Occupational health and safety	X	X
Cultural features		X

TABLE 3 - ENVIRONMENTAL ELEMENTS UNDER ASSESSMENT

5.3 PHASES OF THE EA STUDY

The EA study included the (construction and operation) phases throughout its stages.

STAGES OF EA STUDY

The assessment included the following stages; scoping, assessing, mitigation, monitoring, reporting, and reviewing.

ANALYSES ENTAILED

- Distinguish between positive, negative, direct, indirect impacts, reversible, irreversible, geographical extent, frequency and duration of impacts.
- Predict significance of impacts.
- Quantify impacts if possible.

IMPACT MANAGEMENT (MITIGATION AND MONITORING)

This study identified environmental issues, and propose proper mitigation and monitoring recommendations to prevent or minimize negative impacts and to protect the environment. Environmental Management Plan (EMP) shall be produced.

5.3.2 ACTIVITIES IN RELATION TO PHASES

CONSTRUCTION PHASE

The general activities that are part of most of the proposed actions entailed, but not limited to:

- Land preparation (excavations and filling, demolitions and removal of all non required elements)
- Construction of Parking area and service roads cover with bituminous asphalts
- Construction of Sidewalks tiled with concrete modular units
- Construction of Curb stones border (concrete), separating the pathways from the parking areas
- Storm water drainage
- Signage (horizontal and vertical)
- Swing bar with access control
- Construction of service buildings for caretakers and toilets
- Planting grills with agricultural soil
- Plantation: trees (ailanthus, acer, platanus, carubs, acacia, oak)
- Soft landscaped area with greenaries, evergreen grass, pebbles
- Pathways tiled with various size modular units of natural stone
- Public lighting
- Garbage cans
- Benches
- Fences with stone wall

OPERATION PHASE

- Maintenance (preventive and corrective maintenance).
- Cleaning the developed areas.
- Utilities (domestic wastewater treatment, domestic solid waste management).
- Recruitment.
- Social issues.
- Accidents due to the increase of vehicles.
- Interference with current traffic directions.
- Generation of solid waste, emissions, noise and dust.

5.4 IMPACTS IDENTIFICATIONS

The following tables 4 and 5 summarize the issues and concerns that are believed relevant to the proposed actions and of environmental importance related to the construction and operation phases respectively.

IMPACT OF

Excavation and construction works on workers working in confined space
Dust on workers and public
Local employment
Removal of present plants and habitats
Noise on workers and public
Land acquisition of private estates
Resettlement of current residents
Visual impact from access debris and piling the construction materials
Domestic solid waste impact on workers
Priority for local sub-contractors.
Interfering with paths to the archaeological sites.
Absence of safety equipments
Road accidents due to traffic interference

TABLE 4 - ISSUES AND CONCERNS IDENTIFIED FOR CONSTRUCTION PHASE ACTIVITIES**IMPACT OF**

Walking and crossing of children close to the proposed developed areas, parking areas, new buildings..etc.
Impact of noise on the public and employees
Impact of emissions and dust on public and employees
Generated waste from the newly developed areas
Equal job opportunities
Handling and disposal of generated wastes (liquid, solid, oil from maintenance operations)
Impacts on improving the tourist activities
Life quality
Impacts on delivering more fresh water to the proposed activities and the load on the collection sewer system

TABLE 5 - ISSUES AND CONCERNS IDENTIFIED FOR OPERATION PHASE**5.5 VALUED ENVIRONMENTAL COMPONENTS**

All issues and concerns identified in the previous tables were analyzed and studied. Potential interaction of these issues were specified and evaluated with respect to the following valued environmental components (VECs).

- Socio-economic conditions.
- Bio-diversity.
- Physical conditions (water, wastewater and air).
- Physical conditions (dust, emissions and noise) and generated solid waste.
- Land acquisition.

The level of significance for every issue was evaluated taking into consideration the relevant VEC and the following criteria:

- The level of impact was ranked as : 1 (low), 2 (moderate) and 3 (high).
- The likelihood and frequency of occurrence was ranked as: a (high), b (moderate), c (low).
- All interactions ranked 2a, 2b, 3a, 3b, 3c have environmental impact and will be assessed in the EIA study.

Evaluations of issues and concerns identified for construction and operation phases of the proposed actions are shown in Tables 6 and 7 respectively. Table 8 summarizes the potential anticipated interactions during accidental incidents.

IMPACT OF	SIGNIFICANCE	IMPACT	VEC
Excavation and construction works on workers working in confined space in terms of accidental injuries	2b	Yes	Occupational health and safety
Dust on workers and public	3b	Yes	Physical and Occupational health and safety
Local Employment	3a	Yes	Socio-economic
Removal of present plants and habitats	1b	Yes	Biodiversity
Noise on workers	2b	Yes	Occupational health and safety
Visual impact from access debris and storage of aggregates	2b	Yes	Socio-economic
Domestic solid waste impact on workers	2b	Yes	Occupational health and safety
Priority for local sub-contractors	2a	Yes	Socio-economic
Emissions on workers	2b	Yes	Occupational health and safety
Noise on public	1c	No	Public health
Road accidents	2b	Yes	Public health
Land acquisition	2a	Yes	Socio – economic
Resident resettlement	2a	Yes	Socio – economic

TABLE 6 - EVALUATION OF ISSUES AND CONCERNS IDENTIFIED FOR CONSTRUCTION PHASE

IMPACT OF	SIGNIFICANCE	IMPACT	VECS
Crossing the children close to the parking areas	2a	Yes	Public health
Impact of noise on the public	2b	Yes	Physical and Occupational health and safety
Impact of emissions and dust on public	3a	Yes	Physical and Occupational health and safety
Generated waste from the developed areas	1b	Yes	Occupational health and safety
Emissions and dust on employees	2b	Yes	Physical and Occupational health and safety
Noise on employees	2b	Yes	Occupational health and safety
Load on water supply and collection system	2b	Yes	Physical
Equal job opportunities	3a	Yes	Socio-economic
Improving the tourist activities due to improving the infrastructure	3a	Yes	Socio-economic
Life quality	3a	Yes	Socio-economic
Handling and disposal of waste oil from maintenance operations	2b	Yes	Occupational health and safety

TABLE 7 - EVALUATION OF ISSUES AND CONCERNS IDENTIFIED FOR OPERATION PHASE

VALUED ENVIRONMENTAL COMPONENTS (VECS)	ROAD ACCIDENTS	OCCUPATIONAL ACCIDENTS
Public health		
Occupational health and safety		/
Socio-economic conditions	/	/
Physical	/	/
Ambient air quality		/

TABLE 8 - POTENTIAL INTERACTIONS DURING ACCIDENTAL INCIDENTS

5.6 POTENTIAL IMPACTS OF PROJECTS' ACTIVITIES ON VALUED ENVIRONMENTAL COMPONENTS

The following sections summarize the issues having environmental impacts with respect to the valued environmental components. Each of these VECs will be analysed separately to show its particularities.

5.6.1 PUBLIC HEALTH

Public health may be affected through different phases as follows:

CONSTRUCTION PHASE

- Road accidents: Impacts on public in case of accidents due to the use of heavy trucks to transport construction material and workers.
- Dust and emissions: Impacts on public due construction activities, such as excavation and storage of aggregate.

OPERATION PHASE

- Injuries on children: Impacts on public in case of children playing or crossing in front of the parking areas

5.6.2 OCCUPATIONAL HEALTH AND SAFETY

Occupational health and safety may be affected through different phases as follows:

CONSTRUCTION PHASE

- Accidents on workers: Construction workers might be exposed to high risk during hand excavation.
- Dust and emissions: Workers and public will be exposed to high level of dust during construction activities.
- Domestic solid waste: generated domestic solid waste might affect workers health if not disposed properly.
- Noise: impact of noise on workers and public health due to the use of heavy machinery during construction activities (Heavy bulldozers, Hammers, vibrators and compressors).

OPERATION PHASE

- Domestic solid waste: The public and drivers may be affected due to improper collection and disposal of domestic solid waste.
- Generated wastewater from the facilities: it will be necessary to connect the sanitary facilities to the collection system.
- Dust and emissions: (Drivers) and surrounding neighbourhood will be exposed to high level of dust and emissions during operation activities.

5.6.3 PHYSICAL COMPONENTS

Physical environmental components may be affected as follows:

CONSTRUCTION PHASE

- Air quality will be affected by emissions and dust: construction activities will generate dust, which will raise the levels of dust and emissions in the ambient air.

- More load on the fresh water resources due to the need for the new development areas.
- More load on the existing wastewater collection network due to the load generated from the new development areas.
- Soil may be affected / polluted due to the solid and liquid waste dumps during construction and the possible oil spillage from trucks.

OPERATION PHASE

- Air quality will be affected negatively by the increase of dust and emissions levels during operation phase.
- Loads on the fresh water resources to deliver enough water to the proposed activities.

5.6.4 BIODIVERSITY

Biodiversity may be affected as follows:

CONSTRUCTION PHASE

- Removal of present plants and habitats: Excavations will remove soil cover and destroy flora and habitats present at the sites. This may also affect fauna and migratory birds in particular.
- Dust: construction activities will generate dust, which might affect flora and fauna.

OPERATION PHASE

- Dust on flora and fauna during operation phase.

5.6.5 SOCIO-ECONOMIC CONDITIONS

Key issues and concerns regarding socio-economic conditions are as follows:

CONSTRUCTION PHASE

- Local employment: Locals should be given a fair job opportunities and fair share of jobs during all construction activities.
- Visual impact: people might be affected socially due to disturbing the natural seen as a result of improper disposal of debris.
- Priority for sub-contractors: During executing construction phase, sub-contractors should be given fair opportunity.
- Road accidents: Roads may be affected as result of increasing transportation activities (increasing the possibility of accidents) in order to deliver building materials.
- Land acquisition: the private land owners should be compensated fairly for using their private lands. There should be other alternatives to share them in the business. Otherwise there will be negative impacts on the owners.

OPERATION PHASE

- Equal job opportunities: there would be a negative impact if locals do not have fair job opportunities.
- Improve the life quality due to the creation of new jobs and improving the tourist activities and sight seeing.

5.6.6 ARCHEOLOGY

- During the construction phase, archaeological remains (if any) might be affected by excavation, site preparation and plant construction activities.

5.7 PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY

Public and occupational health and safety were identified as a valued environmental component in the assessment; the targeted public are the populations of the cities and towns that the material trucks passes through. The following issues and interactions between project activities and public health were identified:

CONSTRUCTION PHASE

- Road accidents on public
- Dust on public and workers
- Emissions on public and workers
- Noise on public and workers
- Accidents on workers
- Domestic solid waste impact on workers

OPERATION PHASE

- Injuries of children
- Domestic waste water on drivers
- Dust and emissions on public
- Dust and emissions on drivers

This section will provide an assessment of project impacts related to accidents, and will provide some mitigation measures to prevent or minimize negative impacts and to minimize the possibility of accidents occurrence.

5.7.2 IMPACT EVALUATIONS

As a result of projects activities interaction between public and occupational health and safety, the following issues posed a significant negative impacts on public and occupational health and safety:

Road accidents: due passing through the city roads to import cement and other construction materials from the cement factories might impose an impacts on public health in the populated areas down the road. Additionally the surrounding neighbourhood might be exposed to the same situation due to increasing the traffic and the possibility of accidents occurrence.

Dust and emissions impact on public and workers: nearby residents might be exposed to high levels of dust and emissions as a result of transporting aggregates if trucks are not covered properly, and from the aggregate storage area. Most of construction activities will generate variable levels of dust, which might impose negative impact on workers health.

Noise impact on workers and public: noise during construction phase will be generated from the use of heavy machinery and from the explosive activities (if used), the generated level of noise is expected to be higher than allowable limits.

Domestic solid waste: generated solid waste can be harmful to workers and to the public. Under these conditions domestic solid waste will help increasing the growth of flies, mosquitoes, and other types of insects, which will increase the possibility of deteriorating the workers health.

Injuries of children : Children tends to play around the proposed parking areas Because of not fencing the parks in the populated areas, there were some incidents of children crossing the roads, some of them died.

Table 9 shows the VECs under this aspect and their impacts and significance.

IMPACT OF	GEOG. EXTENT	LEVEL	FREQ.	DURATION	DIRECT (D) INDIRECT (ID)	REVERSIBLE (R) IRREVERSIBLE (IR)	LIKELIHOOD	SIGN.	POSITIVE/NEGATIVE
Road accidents on public	H	M	L	L	D	IR	L	Yes	Negative
Dust and emissions on public and workers	M	M	H	L	D	IR	H	Yes	Negative
Noise on public and workers	L	H	H	M	D	IR	H	Yes	Negative
Injuries on workers and children	L	H	M	M	D	IR	L	Yes	Negative
Domestic solid waste on workers	M	M	H	H	ID	IR	L	Yes	Negative
SIGNIFICANCE CRITERIA									
Geographical Extent (Geog. Extent)	(L) Limited to activity area (M) Limited to project area (H) May reach outside the project area.								
Level:	(L) Will not change existing level (M) Will change existing level slightly (H) Will change existing level severely								
Frequency (Freq.)	(L) Occurs only once/rarely (M) Occurs during abnormal conditions (H) Occurs continuously								
Duration (Dur.)	(L) During specific activity (M) During construction phase (H) During operational phase, continuously.								
Likelihood (Lik.)	(L) Impact is not likely to occur (M) May occur (H) Will occur.								

TABLE 9 - EVALUATION OF POTENTIAL IMPACTS ON PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY

5.8 CONCLUSIONS AND RECOMMENDATIONS

After presenting the current conditions of the project area; the technical, financial and social aspects of the proposed actions; and the anticipated environmental impacts on the physical, ecological and socio-economical aspects of the environment, it can be concluded that the proposed projects will have a net positive socio-economic impacts on the residents and environment of Madaba City. The positive impacts in the short, medium and long term exceeded the anticipated negative impacts during the construction and operation phases.