

الإهداء

لأن من لا يشكر الناس لا يشكر الله...

إلى والداي وإخوتي ، إلى زملائي الذين غيبتهم السجون عن إكمال مشوارهم التعليمي ليصلوا حيث وصلتُ، إلى شهدائنا الذين استحوذوا على العلم والمجد، إلى دكاترتي ومعلمي الأفاضل، إلى أصدقائي وزملائي الذين ابتدأتُ مشواري معهم وأنهيته برفقتهم، لكم أهدى هذا العمل.

وبعدُ، فإن هذا المشروع هو حصيلة عمل دوّوب استمر لساعات وأيام، بل لشهور، وقد اجتهدتُ لأخرجه على هذه الصورة، فإن أحسنتُ فمن الله، وإن أخطأتُ فمَنّي.

لن أنسى تخصيص الشكر والعرفان للدكتور علي عبد الحميد و الدكتورة زهراء زواوي. لدعمهم المتواصل لي توجيهي.

تمارا عصام محمود اديب

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Abstract

Sustainable city means “*manage human, natural and financial resources to meet current needs while ensuring that adequate resources are equitably available for future generations*”. (Jay Burney,2014)

Just like New York City and Portland, in Palestine with our limited resources, we need to implement the sustainable concept in our life and cities, so I seek throw my project to stand a foundation for Palestinian cities to start thinking thro sustainable window and direct their decision toward sustainability.

So to reach my goal, first I select a Palestinian city to implement the sustainable concept, I chose Jericho as my sustainable model based on the three pillar of sustainability economic, environment and social, then I analyzed the city based on the three pillar of sustainability with SWOT analysis, and based on the site analysis I come up with vision for the city and then a concept plan for the three pillar of sustainability , then finalized it with master plan for Jericho to reflect the sustainability concept, based on the master plan I proposed projects to enhance the three pillar of sustainability

Economic pillar project:

- Proposed Bridge, to enhance the connectivity and mobility of the city.
- Proposed street.
- Ring road in the CBD area.
- Urban corridor.

- Agro urban park in the CBD area.
- Livestock Farm and Processing Center.
- Agriculture Research Center to improve the farmer skills in farming.
- Compost Farm Factory.
- Drinking Water Treatment Plant.

Environment pillar project:

- Streets with Trees along the main streets.
- Green Corridor along Wadi Qelt.
- Green Paved Street with Calming traffic(shared street).
- Buildings With Green Roof.
- Agro Urban Park.
- Compost Farm Factory
- Drinking Water Treatment Plan

Social pillar project:

- Jericho Women's Empowerment Center
- Rehabilitation Center for Elderly People
- Jordan Valley District Council Bringing Older and Young People Together Center.
- Collective Action for the Promotion of Rights for the Youths Living With Disabilities Center.
- Youth Players with Participatory and inclusive Leadership.
- Youth Empowerment through Civic Engagement And skills Development Center.
- Skills for Youth Employment Center.

- Community Service Center.
- Cultural Corridor.

نبذة عن المشروع

المدن المستدامة هي المدن التي تعمل على تنظيم الموارد البشرية والطبيعية والمادية من أجل تلبية الاحتياجات الإنسانية للأجيال القادمة مع التأكيد على توزيع المصادر المتاحة بشكل عادل. (جي بيرني، 2014).

كما هو الحال في مدينتي نيويورك وبورتلاند، إننا نحتاج في فلسطين للعمل على تطبيق مفهوم الاستدامة في حياتنا ومدننا، ولهذا، سعيت في مشروعني لتأسيس قاعدة للمدن الفلسطينية بهدف البدء بالتفكير ضمن إطار مستدام وتوجيه القرارات نحو الاستدامة.

ولتحقيق هذا الهدف، قمت باختيار مدينة فلسطينية لتطبيق مفهوم الاستدامة، ووقع اختياري على مدينة أريحا، لتكون نموذجاً لمدينة مستدامة بناءً على الأبعاد الثلاثة للاستدامة، وهي: البعد الاقتصادي، والبيئي، والاجتماعي. وبعد ذلك، قمت بتحليل المدينة على أساس الأبعاد الثلاثة باستخدام تحليل (سوات SWAT). بناءً على تحليل الموقع، تم وضع رؤيا مستدامة لمدينة أريحا، كما تم إرساء مخطط توجيهي لكل بعد من أبعاد الاستدامة، وتم إنهاء العمل بوضع مخطط هيكلية لمدينة أريحا لعكس مفهوم الاستدامة، وانطلاقاً من المخطط الهيكلي، تم اقتراح عدة مشاريع لدعم الأبعاد الثلاثة للاستدامة في المدينة

Chapter1

1.1 introduction

» Cities are the growth drivers of the future, yet also account for the biggest share of CO₂ emissions. Worldwide, cities are the decisive factor for our climate. Our unique environmental portfolio makes Siemens the perfect partner for sustainable urban development. « (Peter Löscher, President and CEO of Siemens AG)

The majority of the world is now urban. Cities are attracting people because they are centers for economic activity and can offer a higher quality of life: there are more jobs, more services available, transport options to move within the city, trade, knowledge exchange, and connections to other cities and countries. As a result, in 2050, two-thirds of the world population is expected to live in cities

Cities are the living space for the 21st century and beyond. People in your city – with their aspirations, needs and visions – rely on you to make the right decisions to make their city competitive and a good place to live. People turn cities into living organisms; to thrive.

Today, more than half of the world's 6 billion inhabitants live in cities. And this number is only growing. By 2050, 80% of the world's population will reside in urban centers. This is the first time in history that the majority of people on the

planet are living in cities. What does this mean for the future of our cities, environmental issues, and the quality of life for urban dwellers, here in New York and around the world? More specifically, what will these spaces and the people within them, consume? Cities require large amounts of resources that come from all over the country, the continent and the world making them huge consumers. But their high population density and effective public transportation may be our best hope of creating more sustainable communities.

With increasing resource scarcity and mounting environmental impacts, it is crucial to identify how and why urban residents use resources, which may hold the key to understanding the process of creating sustainable cities.

The essential meaning of the word sustainable is, “able to be maintained over time.” We all share a vital public interest in making our society and our city sustainable and in avoiding their failure or collapse. Unfortunately, the word is widely employed to refer merely to practices that are judged to be marginally more environmentally sound than others. Indeed, sustainable is often used so carelessly as to lead some environmentalists to advise abandoning its use.¹ Yet misuse of the word does nothing to diminish its crucial significance. No human living arrangement can be maintained forever; sustainability is a relative term. As a frame of reference it seems reasonable to use the durations of prior civilizations, ranging from hundreds to thousands of years. A sustainable city, then, should maintain itself for many centuries. Leaders and citizens of most modern cities understandably concern themselves mostly with immediate problems and assume that they will be able to continue solving problems into the

distant future. However, history and archaeology provide disturbingly numerous examples showing that short-term thinking can lead to a build-up of social, political, and environmental contradictions that end in calamity.

There has been a considerable amount of research that defines and characterises the form of the sustainable city, and which urban forms may most affect sustainability. It is a complex issue. The physical dimensions of urban form may include its size, shape, land uses, configuration and distribution of open space a composite of a multitude of characteristics, including a city's transportation system and urban design features (e.g. Handy, 1996; Llewelyn-Davies, 2000). However, its sustainability depends on more abstract issues – environmental (including transport), social and economic. Research suggests that, not one, but a number of urban forms may be sustainable (Williams et al., 2000). Yet much of the debate about the sustainability of cities and urban forms has focused on increasing the density of development, ensuring a mix of uses, containing urban 'sprawl' and achieving social and economic diversity and vitality – often characterised as the concept of a 'compact city' (see Jenks et al., 1996; Jenks and Dempsey, 2005).

1.2 Research problem

The world is urbanizing at a rapid pace. By 2050, more than 2 billion additional people will be living in cities, a 50% increase compared to today. That is equivalent to adding an urban population the size of Washington DC every month. The vast majority of this growth will be concentrated in developing countries, with nearly 90% of the increase coming from cities in Asia and Africa. As engines of economic growth, cities already produce 80% of the world's gross domestic product (GDP).

Cities consume over two-thirds of global energy supply, and are responsible for 70% of greenhouse gas emissions. Cities are also uniquely vulnerable to climate change: 14 of the world's 19 largest cities are located in port areas. Climate change adds to the urgency of sustainable urban planning and management, and to the an already broad set of challenges for many city governments revolving around providing jobs, services and housing to growing urban populations. However, if managed well, compact, resilient, inclusive and resource-efficient cities could become drivers of sustainable development, contributing to both local livability and global public goods.

Especially problems about the Palestinian situation :

- political and economic uncertainty
- Most of Palestine's economy depends on funding and donations(economically independent and is not self-sufficient)
- The lack of Palestinian experiences on the mater of sustainability(Few experiences in the Arab world)

- orientation Paucity of authorities and organizations towards sustainability
- Obstructions caused by the Israeli occupation
- Lack of experience and information
- The absence of sustainability concept
- The need for studies on the concept of sustainable cities
- The existence of the elements that supporting the transformation of Jericho city to sustainable cities\

1.3 Research significance:

The origin of some of the earliest known civilizations is traced back in the Middle East where the land of Palestine comprised of a human habitation existing even before the biblical times.

The land area of Palestine refers to the region which lies between the Syrian interior and southern Mediterranean coastal plains. The word Palestine is the derivation of “Plesheth”, which meant migratory or rolling. “The land of Palestine” was inhabited by a warrior tribe for most of the population. But in the Old Testament, the land is not called Palestine but Canaan

Palestine these days experiencing weak to keep up with word developments circle especially urban matters , suffer from a lack of resources , dependence mainly on the Israeli side in the access to non–renewable energy and suffer from economic shortage and suffer high pollution and dependence on non–renewable energy and the lack of natural resources.

If these things indicate to something it indicate to the necessary need for Palestinians to move towards sustainability to enhances the independence and increase its dependency on renewable energy sources, which automatically reflects on the lack of dependence on the Israeli side and the improvement of the economic situation and its image in front of the rest of the world and oriented it toward Self-sufficiency.

1.4 Research objectives

Main objective

Form of A sustainable city model for Palestine

Detailed objectives

1. Diagnosis the current situation of Jericho city
2. Analyze problems, challenges, strengths and weaknesses of Jericho city
3. Submit a proposal plan for a sustainable for Jericho city

1.5 Research Plan and methodology

1.1.5 Research Plan

The study includes three main axes

- The first axis: general and theoretical framework

This theme includes a preface overview of study subject by reviewing the concept of sustainable cities

- The second axis: information framework

This theme will focus on gathering information related to the case study–Jericho as a sustainable city

- the third axis: the analysis and deductive framework

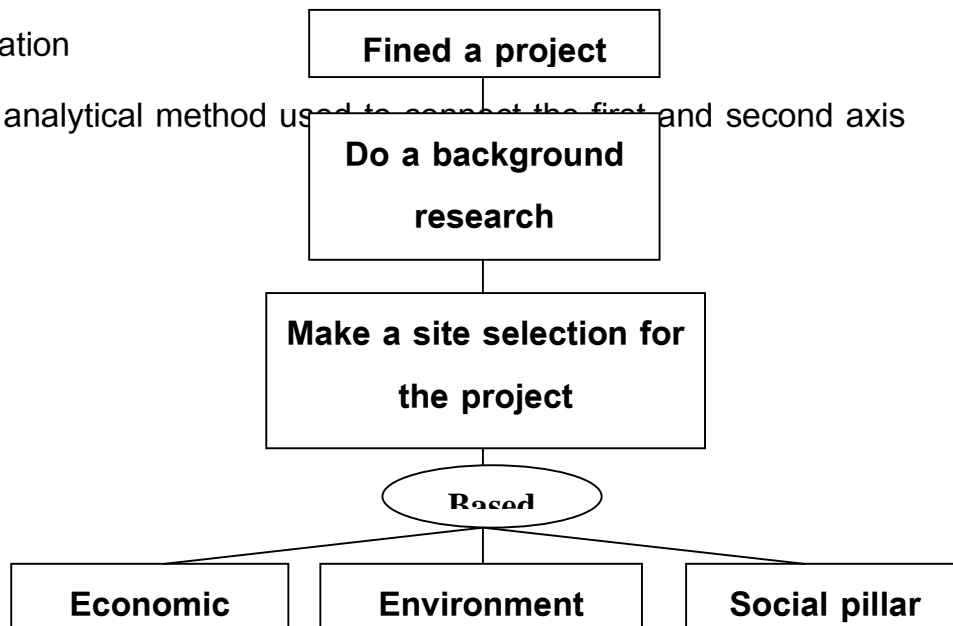
this axis focus on the link between the theoretical and information axes through analysis the Jericho case study

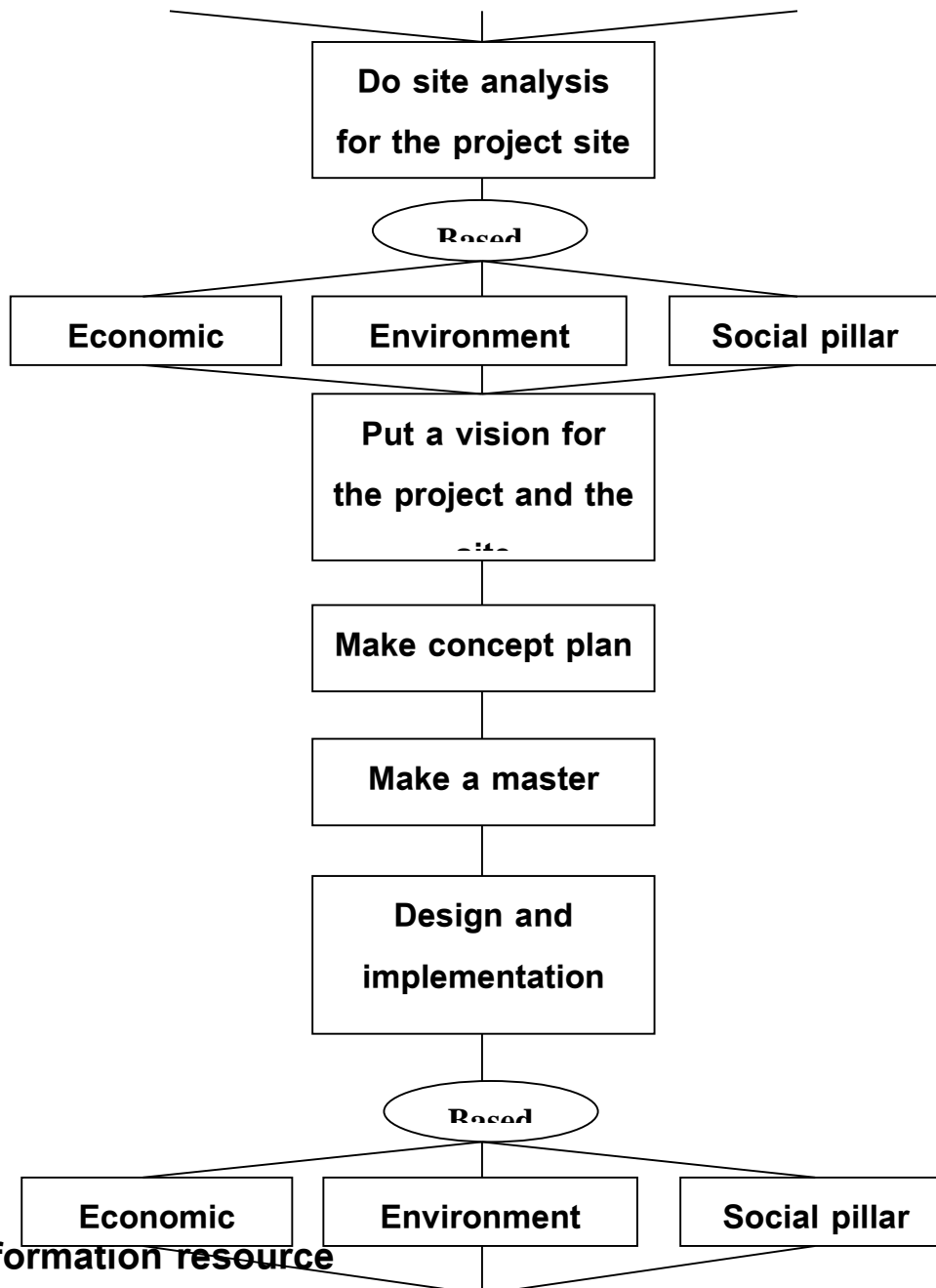
2.1.5 Methodology

This study is based on the reliance on three basic approaches:

- in the first axis–the theoretical–historical approach used, which based on a review of research and study the concept of sustainable cities .
- in the second axis –descriptive approach used to study and collect information about the case study –Jericho– and talk about the current situation

- the analytical method used to connect the first and second axis





1.6 Information resource

- Library sources: including books, journals, magazines, newspapers, etc.
- Official sources: including studies and reports
- Semi official sources: including reports, working papers

Chapter 2

1.2 What is sustainable?

There can be no sustainability without peace. (Jay Burney,2014)

– Sustainability is complicated. Learning sustainability involves understanding and protecting the interdependent relationships between environment, culture, and economics. The real bottom line is the environment. (Jay Burney,2014)

– The environment is the basis and upholder of life. Our economic system codifies the environment as an "externality", and not as the real bottom line. This means that the real costs of growth, GDP, and consumerism are hidden behind the false mask of profit takers and are handed off to the rest of the world to be borne in the costs of the destruction of the environment. This includes vanishing biodiversity and the changing of the atmosphere which have evolved together through the millennia. Our economic system which PROMOTES the environment as an externality and profit as the bottom line, legalizes pollution, treats our waters as sewers, and develops land with no concern for the quantifiable costs that come with cleaning water, air, and land. (Jay Burney,2014)

–Sustainable Development is an oxymoron. Our culture has developed a political/economic system that promotes collapse, is not sustainable and appears to be an onrushing train that will determine the fate of our species. (Jay Burney,2014)

–Nature will endure with or without the human species. Can humanity use its unique capacity to think its way out of this dilemma? We are in the throws of an emergency. Learning Sustainability may provide some basis for hope. That is unless our lack of Peace on Earth, and our economic system, which David Suzuki describes as "Brain Cancer," proves that sustainability is a myth. the

Learning Sustainability Campaign as a tool that will help guide us toward hope.
(Jay Burney,2014)

2.2 What Does Sustainability Mean?

The word "sustainability" means different things to different people. An economist or a business person may think of it quite differently than an ecologist or an environmentalist. A politician can easily find themselves stuck between a rock and a hard place. Learning Sustainability can help us to find common sense solutions. It is important to realize that fundamentally, sustainability is about relationships. (Jay Burney,2014)

Sustainability is also about the long term. That doesn't mean that we can avoid short term issues. We cannot. Every decision we make, every day effects the long term. Business and economic interests have to realize that the environment is a real bottom line when it comes to a future that works. Likewise, environmentalists have to understand that economy and business drive our decision making. Unless we can find ways to connect and work together in these sometimes divergent disciplines we are going to continue to face a troubled and unsustainable future. Our abilities to survive as a human culture, and to maintain or improve our quality of life, are predicated on our ability to learn to connect economic strategies with environmental common sense. (Jay Burney,2014)

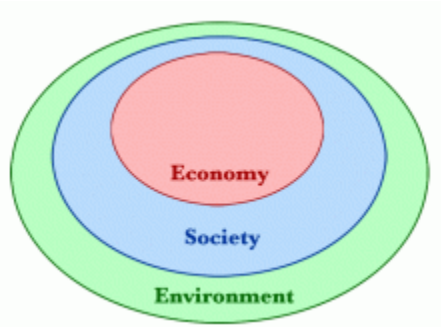


Figure 2.2. Sustainability pillar
Source: (Jay Burney,2014)

It is common practice today to identify these three overarching contexts as the essential linkages when we are trying to talk about sustainability. In his book "Natural Capitalism", Paul Hawken states that the real bottom line is the environment. Within this Environmental, Economic, and Social framework it is argued that all things are connected. It is important to base decision making on an inclusive model. In other words, thinking through the environmental and social costs when making an economic decision will help to identify the real economic costs, and visa-versa. (Jay Burney,2014)

3.2 What is a Sustainable City/Community

This can be complicated. Essentially we like the broad definitions provided by the Institute for Sustainable Cities definition. "A sustainable community is one that is

economically, environmentally, and socially healthy and resilient. It meets challenges through integrated solutions rather than through fragmented approaches that meet one of the goals at the expense of the others. This requires a long term perspective. One that is focused on both the present and future, beyond the next budget or election cycle." (Jay Burney,2014)

Sustainable communities manage human, natural and financial resources to meet current needs while ensuring that adequate resources are equitably available for future generations. (Jay Burney,2014)

- A sustainable community seeks:
- A better quality of life for the whole community without compromising the wellbeing of other communities.
- Healthy ecosystems
- Effective governance supported by meaningful and broad-based citizen participation.
- Economic security

Ultimately the bottom line in any sustainable city, region, or hemisphere, is the environment.

4.2 Five Axioms of Sustainability

As a contribution to the ongoing refinement of the concept, I have formulated five axioms (self-evident truths) of sustainability.⁶ My goal was to distill ideas that

had been proposed previously into a form that was concise, easy to understand, and capable of being tested using the methodology of science. Here they are, each followed by a brief discussion: (Richard Heinberg,2010)

1. Any society that continues to use critical resources unsustainably will collapse. (Exception: A society can avoid collapse by finding replacement resources. Limit to the exception: In a finite world, the number of possible replacements is also finite.)

This axiom defines sustainability by the consequences of its absence. Jared Diamond's popular book *Collapse: How Societies Choose to Fail or Succeed* argues that collapse is the common destiny of societies that ignore resource constraints.⁷ Historically, collapse has meant a precipitous decline in population brought about by social chaos, warfare, disease, or famine. A society that uses resources sustainably may still collapse for other reasons beyond the society's control (as a result of an overwhelming natural disaster, or of conquest by another, more aggressive society, to name two possibilities). (Richard Heinberg,2010)

This first axiom focuses on resource consumption because that is a decisive, quantifiable, and, in principle, controllable determinant of a society's long-term survival. The Exception and Limit to the Exception address the argument that resources are infinitely substitutable, and that therefore modern market-driven societies need never face a depletion-led collapse, even if consumption rates escalate.⁸ In some instances, satisfactory substitutes for resources are readily available, as was the case in the mid-19th century when kerosene from

petroleum was substituted for whale oil as a fuel for lamps. (Richard Heinberg,2010)

In other cases, substitutes are inferior, as is the case with oil sands as a substitute for conventional petroleum—since oil sands are less energy–dense, require more energy input for processing, and produce more carbon emissions. As time goes on, societies tend first to exhaust substitutes that are superior and easy to get at, and increasingly have to rely on inferior substitutes to replace depleting resources—unless rates of consumption are held in check. (Richard Heinberg,2010)

2. Population growth and/or growth in the rates of consumption of resources cannot be sustained.

Human population growth has been sustained up to the present. How can we be sure that it cannot be sustained into the indefinite future? Simple arithmetic shows that even small rates of growth, if continued, add up to absurdly large—and plainly unsupportable— population sizes and rates of consumption. For example: a one percent rate of growth in the present human population (less than the actual current rate) would result in a doubling of population each 70 years. Thus in 2075, the Earth would be home to 13 billion humans; in 2145, 26 billion; and so on. By the year 3050, there would be one human per square meter of Earth’s land surface, including mountains and deserts. Virtually no one expects this to occur: at some point, population growth will cease. Similar calculations apply to consumption rates. (Richard Heinberg,2010)

3. To be sustainable, the use of renewable resources must proceed at a rate that is less than or equal to the rate of natural replenishment.

Renewable resources are exhaustible. Forests can be over-cut, resulting in barren landscapes and shortages of wood (as occurred in many parts of Europe in past centuries), and fish can be over-harvested, resulting in the extinction or near-extinction of species (as is occurring today globally). This axiom has been stated in somewhat differing ways by many economists and ecologists, and is the basis for “sustained yield forestry” and “maximum sustainable yield” fishery management.¹⁰ The first clue that harvesting is proceeding at a rate greater than that of natural replenishment is the decline of the resource base. (Richard Heinberg,2010)

However, a resource may be declining for reasons other than over-harvesting; for example, a forest not being logged may be decimated by disease. Nevertheless, if the resource is declining, pursuit of sustainability requires that the rate of harvest be reduced, regardless of the cause of decline. Sometimes harvests must drop dramatically, at a rate far greater than the rate of resource decline, so that the resource has time to recover. (Richard Heinberg,2010)

This has been the case with regard to commercial fish species that have been over-harvested to the point of near-exhaustion, and that have required complete harvest moratoria in order to re-establish themselves— though in cases where the remaining breeding population is too small the species cannot recover. (Richard Heinberg,2010)

4. To be sustainable, the use of non-renewable resources must proceed at a rate that is declining, and the rate of decline must be greater than or equal to the rate of depletion. The rate of depletion is defined as the amount being extracted and used during a specified time interval (usually a year) as a percentage of the amount left to extract. (Richard Heinberg,2010)

Non-renewable resources include fossil fuels and minerals of all kinds. No continuous rate of use of any non-renewable resource is sustainable, unless the resource is completely recycled. However, if the rate of use is declining at a rate greater than or equal to the rate of depletion, this can be said to be a somewhat sustainable situation in that society's dependence on the resource will be reduced to insignificance before the resource is exhausted. (Richard Heinberg,2010)

11 For any non-renewable resource the "amount left to extract" is debatable, but prudence dictates adhering to conservative estimates. (Richard Heinberg,2010)

5. Sustainability requires that substances introduced into the environment from human activities be minimized and rendered harmless to biosphere functions. In cases where pollution from the extraction and consumption of resources threatens the viability of ecosystems, reduction in the rates of extraction and consumption of those resources may need to occur at a rate greater than the rate of depletion. (Richard Heinberg,2010)

If axioms 2 through 4 are followed, pollution should be minimized as a result. Nevertheless, these conditions are not sufficient to avert serious impacts. It is possible for a society to generate pollution from the unwise use of renewable resources; however, the most serious forms of pollution in the modern world arise

from the extraction, processing, and consumption of non-renewable resources. If (as specified in Axiom 4) the consumption of non-renewable resources declines, pollution should also decline. However, where the consumption of non-renewable resources has resulted in levels of pollution that threaten basic biosphere functions, heroic measures are called for. This is the situation with regard to atmospheric concentrations of greenhouse gases, especially from the burning of coal and other fossil fuels. Merely to reduce coal consumption by the global coal depletion rate would not suffice to avert a climate catastrophe. (Richard Heinberg,2010)

If reduction in pollutants can be obtained without a reduction in consumption of nonrenewable resources, for example by using technological means to capture polluting substances and sequester them harmlessly, then a reduction in consumption of such resources need only occur at the depletion rate in order to achieve sustainability. (Richard Heinberg,2010)

However, society should be extremely cautious regarding claims for untested technologies' abilities to safely sequester polluting substances for very long periods of time. (Richard Heinberg,2010)

It is essential for cities that want to be sustainable to begin with a clear definition of sustainability and a clear set of sustainability criteria and principles.

“Sustainability” is a destination, and unless a city is clear about where that destination is, it will find it very difficult getting there. The following is a summary of definitions and criteria that the City of Edmonton could begin to use in its decisions in order to foster a culture of sustainability: (Richard Heinberg,2010)

Definition: Sustainable	Able to be maintained over time
Definition: Sustainable City/Society	A city/society that can be maintained for many centuries
Definition: Sustainable Environmental Practices	Actions or practices that meet the needs (i.e., basic human needs) of the present generation without compromising the ability of future generations to meet their own basic needs
Definition: Basic human needs	A comprehensive set of fundamental human needs that are culturally and historically universal, non-overlapping, nonsubstitutable, complimentary to one another, and must be satisfied on a continual basis. They are: subsistence, protection, affection, idleness, identity, freedom, creativity, participation, and understanding.
Criteria of Sustainability recommended for use by the City of Edmonton:	<p>From The Natural Step Framework</p> <ul style="list-style-type: none"> ● In a sustainable society, nature is not subject to systematically increasing concentrations of substances extracted from the earth's crust. ● In a sustainable society, nature is not subject to systematically increasing concentrations of substances produced by society. ● In a sustainable society, nature is not subject to systematically increasing degradation by physical means. ● In that society people are not subject to

	<p>conditions that systematically undermine their capacity to meet their needs.</p> <p>From “The Five Axioms of Sustainability”</p> <ul style="list-style-type: none"> ● Population growth and/or growth in the rates of consumption of resources cannot be sustained. ● To be sustainable, the use of renewable resources must proceed at a rate that is less than or equal to the rate of natural replenishment. ● To be sustainable, the rate of use of non-renewable resources must proceed at a rate that is declining, and the rate of decline must be greater than or equal to the rate of depletion.
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5.2 Policies and Practices for Sustainable Cities

Sustainability, if rigorously defined, might appear to be an unachievable goal for a modern city. Growth in both population and consumption rates is almost everywhere taken for granted and encouraged, and the use of non-renewable resources, including fossil fuels, lies at the heart of most economic activities. Yet unless cities move in the direction of sustainability, they risk grave environmental, economic, and demographic problems. (Richard Heinberg,2010)

Fortunately, public policy can help move cities in the direction of sustainability; indeed, there is a large and growing literature on ways to promote sustainability in ways that are both effective and politically acceptable. (Richard Heinberg,2010)

With regard to population growth and sprawl, it has been shown that costs to municipalities for new infrastructure requirements often outweigh the benefits of an enlarged tax base.¹⁵ One useful tool in curbing sprawl is the creation of urban growth boundaries, as has been done in Portland, Oregon and several California cities. (Richard Heinberg,2010)

Consumption rates can be reined in with robust recycling and composting programs; with building standards that promote insulation and emphasize the use of environmentally friendly materials; and with heightened energy efficiency standards. (Richard Heinberg,2010)

Clearly, a central issue in achieving sustainability is reducing fossil fuel dependency. Cities can begin to kick the liquid hydrocarbon habit by investing in more efficient transport and transit modes (rail, light rail, streetcars, subways, and trolley bus systems), and in promoting bicycling and walking. Urban planning for density and mixed use gets people out of cars, so they can spend less time commuting and more time walking, shopping, and talking with friends. (Richard Heinberg,2010)

In cold climates like Edmonton's, reducing fossil fuel reliance requires addressing the requirement for space heating. The use of natural gas for heating can be greatly minimized with insulation and passive solar design, and with alternative heat sources such as geothermal heat pumps. In Germany, the passivhaus movement has resulted in the construction of over 20,000 buildings that require little or no energy for heating. (Richard Heinberg,2010)

Sourcing electrical power from renewable sources is also a major issue in reducing fossil fuel consumption. Often, decisions that determine the mix of energy sources used to provide electricity are made at the provincial or national level, or by private utilities. However, where cities have formed municipally owned power companies, they are better able to put these decisions in the hands of their citizens. Wind, geothermal, hydro, solar concentrating thermal, and photovoltaic power plants can all substitute for coal or gas power plants (nuclear power relies on another non-renewable resource—i.e., uranium ore). Some of these alternative energy sources are already economically competitive with fossil fuels. Choices regarding energy alternatives must be made on the basis of local potential renewable energy resources. It is noteworthy that Germany has become a world leader in installed solar photovoltaic generation capacity, even though it is situated at a latitude similar to that of Edmonton and enjoys relatively few sunny days. (Richard Heinberg,2010)

If a city is to be sustainable, its economic base must comply with the five axioms of sustainability. All communities rely on resource extraction indirectly, but some cities' economies are more directly tied to logging, mining, or fishing. Edmonton, with its considerable economic dependence on the extraction of a low-grade fossil fuel (oil sands), is vulnerable to boom-or-bust cycles caused by swings in oil prices. The best way to reduce that vulnerability would be to promote a more resilient, mixed economy based on the sustainable harvesting of renewable resources for energy, food, construction, and manufacturing. (Richard Heinberg,2010)

Agriculture must be regarded as a central component of the economic base of any resilient, sustainable community. Local producers of food can be supported by regulations that facilitate development of community gardens, farmers markets, and school gardens; by encouraging school lunch programs to source ingredients from regional producers; and by establishing municipal food policy councils that operate less in the interest of global agribusiness and more in the interests of consumers and local producers. (Richard Heinberg,2010)

In northern climes, winter food production often depends on indoor horticulture—and cities, with millions of square meters of enclosed, heated space, offer abundant opportunities for small-scale growing. Recent innovations, such as indoor vertical farming, can be encouraged with tax incentives. (Richard Heinberg,2010)

“Go Local” and “Buy Local” campaigns and organizations are appearing in cities across North America, and many of these are associated with the Business Alliance for Local Living Economies (BALLE).²³ An example is the Sonoma County GoLocal Co-op, which is a network of locally-owned businesses, non-profit organizations, government agencies, and residents working together to build a resilient local economy by supporting local, independently owned businesses and promoting sustainable practices. (Richard Heinberg,2010)

Citizen-led movements for sustainability can be at least as effective as efforts by government officials. One that deserves mention is the Transition Initiatives, which began over four years ago in England and has since taken root throughout

the U.K. and more recently in the U.S., Canada, and elsewhere. (Richard Heinberg,2010)

Transition initiatives start with a small group concerned about dealing locally with issues of resource depletion and climate change, and with this question: “For all those aspects of life that this community needs in order to sustain itself and thrive, how do we significantly increase resilience and drastically reduce carbon emissions?” Initiatives strive to maintain a positive, hopeful, and collaborative stance, based on the belief that life can be better without fossil fuels. A Canadian Transition hub is now emerging to facilitate the emergence of local initiatives, and a Transition Edmonton initiative is already in its formative stages. (Richard Heinberg,2010)

Economic indices and targets give our society direction and tell us how we’re doing at achieving our goals. The most common economic index, Gross Domestic Production or GDP (the monetary, market value of all final goods and services produced in a country over a period of a year), has been criticized as being inconsistent with three principles of good bookkeeping: it does not distinguish clearly between costs and benefits; it does not correct for changes in stocks and supplies; and it does not use accurate measures for all costs. Many economists have advocated the development of more robust indicators, such as the Genuine Progress Indicator. Implicit in alternative indices is the requirement to shift from measuring economic well-being in terms of increased consumption to counting factors of human welfare (such as education), while subtracting costs of crime, pollution, and resource depletion. (Richard Heinberg,2010)

A further examination of social sustainability—which focuses on matters such as public health, crime, and conflict resolution. Nevertheless, it is worth noting that social sustainability seems to depend to a large extent on economic equity because, as has often been noted, extreme inequality seems to make societies vulnerable to internal social and political upheaval. According to the British Medical Journal, “. . . what matters in determining mortality and health in a society is less the overall wealth of that society and more how evenly wealth is distributed. The more equally wealth is distributed the better the health of that society.”²⁹ Studies in the U.S. and elsewhere have reached the same conclusion.³⁰ Promotion of equity generally hinges on the use of taxes to create a basic safety net of public benefits and services. (Richard Heinberg,2010)

In summary: Sustainability is a challenging but essential goal for any city. Many societies in the past have failed to achieve it and suffered decline or collapse as a consequence. Fortunately, there are many things that can do to move in the direction of long term sustainability while also improving citizens’ lives in the short term. (Richard Heinberg,2010)

1.5.2 Core values for the sustainable city

For sustainable cities, ecosystem services in and outside the city are key assets that provide a wide range of values: environmental, economic, social, and cultural. High quality urban greenery and urban water bodies produce multiple benefits in biodiversity, climate regulation, improved public health, and quality of life – thereby raising both the attractiveness and sustainability of the city. In many growing cities there is a continuous conflict between conservation and

development. So decision-makers must act effectively to preserve, restore and even create urban greenery and urban water bodies. This requires them to implement tough, innovative and proactive planning, with a holistic perspective and cooperation across sectors.(WWF,2013)

- Invest in ecosystem services(WWF,2013)

A city must make an assessment of its ecosystem services, to make well balanced planning and investment decisions on the use of land, air, sea and freshwater. Cities should invest in ecosystem services and in the landscape's ecological infrastructure: for example in relation to air quality, aquatic ecosystems (e.g. seas, lakes, watercourses), farming and forestry, pollination, green corridors and migration routes, microhabitats such as edge zones and wetlands, and protection of highly vulnerable species. (WWF,2013)

- Cities as actors in conservation(WWF,2013)

Cities can assume ambitious roles in conservation by protecting animal and plant life in and around cities. They can also work actively in national and international arenas to strengthen the protection of species and for sustainable stewardship of the planet's biodiversity. (WWF,2013)

- Support and incentives from the national level(WWF,2013)

National governments should provide a strong framework for local nature conservation by, for example, increasing funding for nature conservation, introducing planning norms for minimum distances between housing and green space, and facilitating the creation of more urban national parks and other types of protected areas. They should also provide incentives to protect and develop

urban green–structure and near–urban nature. The value of urban greenery as a tool for climate adaptation and increased public health should especially be highlighted. (WWF,2013)

6.2 Sustainable Urban Forms

The form of the contemporary city has been perceived as a source of environmental problems (Alberti et al. 2003; Beatley and Manning 1997; U.S. Environmental Protection Agency [EPA] 2001; Haughton 1999, 69; Hildebrand 1999b, 16; Newman and Kenworthy 1989). The EPA (2001) concludes in *Our Built and Natural Environments* that the urban form directly affects habitat, ecosystems, endangered species, and water quality through land consumption, habitat fragmentation, and replacement of natural cover with impervious surfaces. In addition, urban form affects travel behavior, which, in turn, affects air quality; premature loss of farmland, wetlands, and open space; soil pollution and contamination; global climate; and noise (Cervero 1998, 43–48). Moreover, growing evidence from around the world indicates that, owing to our excessive use of fossil fuels, especially in affluent countries, greenhouse gas concentrations are accumulating at an alarming rate.

Prospects for the future are dire indeed, unless we act collectively to alter our energy–dependent lifestyles. Urgent changes are needed not only in our behavior but also in the design of the built form.

The emergence of “sustainable development” as a popular concept (see Jabareen 2004) has revived discussion about the form of cities. Undoubtedly, it has

motivated and provoked scholars and practitioners in different disciplines to seek forms for human settlements that will meet the requirements of sustainability and enable built environments to function in a more constructive way than at present. The concept of sustainable development has given a major stimulus to the question of the contribution that certain urban forms might make to lower energy consumption and lower pollution levels (U.K. Department of the Environment [DoE] 1996; Breheny 1992a, 138).

This challenge has induced scholars, planners, local and international NGOs, civil societies, and governments to propose supposedly new frameworks for the redesigning and restructuring of urban places to achieve sustainability. These approaches have been addressed on different spatial levels: (1) the regional and metropolitan levels, such as the Bio-Region approach (see Forman 1997; Wheeler 2000); (2) the city level (e.g., Girardet 1999; Nijkamp and Perrels 1994; Gibbs, Longhurst, and Braithwaite 1998; Roseland 1997; Engwicht 1992; OECD 1995; Jenks, Burton, and Williams 1996); (3) the community level (e.g., Nozick 1992; Paulson 1997; Corbett and Corbett 2000; Rudin and Falk 1999; Van der Ryn and Calthorpe 1991); and (4) the building level (e.g., Roelofs 1999; Edwards and Turrent 2000; Boonstra 2000; Woolley, Kimmins, and Harrison 1997).

A critical review of these approaches demonstrates a lack of agreement about the most desirable urban form in the context of sustainability (see Williams, Burton, and Jenks 2000, 347; Hildebrand 1999a; Tomita et al. 2003, 17).

Moreover, there is no common conceptual framework that allows us to compare these approaches, planning propositions, and policies. For example, there is a lack of theory that helps us to evaluate whether a given urban form contributes to sustainability or to compare different forms according to their contribution to the sustainable development objectives and agenda. Therefore, this article seeks to answer the following questions: What are the distinctive urban forms proposed by each of these approaches? And what are the design concepts and principles that these forms share? In addition, the article aims to offer a conceptual framework for assessing the sustainability of urban forms.

The remainder of this article consists of five sections. The second section focuses on the methodology of the study and its parts. The study applies thematic analysis, which is an appropriate methodology when analyzing a large body of interdisciplinary texts. In addition, it presents the operational aspects of urban form to examine it more accurately. The third section identifies and describes the design concepts of sustainable urban forms. The fourth section discusses the specific sustainable urban forms that appear in the literature. The fifth section offers a conceptual framework for assessing the sustainability of urban forms.

1.6.2 Design Concepts of Sustainable Urban Form

The thematic analysis has identified seven concepts— repeated and significant themes of urban form.

1. Compactness

Compactness of the built environment is a widely acceptable strategy through which more sustainable urban forms might be achieved. Compactness also refers to urban contiguity (and connectivity), which suggests that future urban development should take place adjacent to existing urban structures (Wheeler 2002). When the concept is applied to existing rather than new urban fabric, it refers to the containment of further sprawl, rather than the reduction of the present sprawl (Hagan 2000). Compactness of urban space can minimize transport of energy, water, materials, products, and people (Elkin, McLaren, and Hillman 1991).

Intensification, a major strategy for achieving compactness, uses urban land more efficiently by increasing the density of development and activity. The intensification of the built form includes development of previously undeveloped urban land, redevelopment of existing buildings or previously developed sites, subdivisions and conversions, and additions and extensions (Jenks 2000, 243). Four major themes are evident in current debates on compactness as an important strategy for achieving desirable urban forms (Williams, Burton, and Jenks 2000; Pratt and Larkham 1996, 279). The first, probably the longest established and most common, is that a contained and compact city has a corollary of rural protection (McLaren 1992). The second theme is related to the promotion of quality of life, including social interactions and ready access to services and facilities. The third is the reduction of energy consumption by providing building densities capable of supporting district heating or combined heat and power systems; and the fourth is the reduction of greenhouse gas

emissions by minimizing the number and length of trips by modes of transport harmful to the environment.

For many planners and scholars, compactness is the crucial typology to be implemented to achieve sustainability. For example, Dumreicher et al. (2000) argue that a sustainable city should be compact, dense, diverse, and highly integrated. They ask for an urban form that is easily walkable, small enough to eliminate even the desire for a private automobile, yet large enough to provide the variety of opportunities and services that constitute a rich urban life.

Sustainability for them “is a local, informed, participatory, balance-seeking process, operating within a Sustainable Area Budget (SAB), exporting no imbalances beyond its territory or into the future, expanding the spaces for possibilities to flourish” (p. 360). Compactness goes hand in hand with the goal of livability and works to prevent commuting, one of the most wasteful and frustrating aspects of city living today (Sherlock 1990, 53).

2. Sustainable Transport

Transport is arguably the single biggest issue for environmental debates relating to urban form (Jenks, Burton, and Williams 1996, 171). The form of our cities reflects, to a large extent, the transport technologies that were dominant at different stages of their development (Barrett 1996, 171). Interestingly, for Clercq and Bertolini (2003, 38), “sustainability is defined as diminishing both mobility and the negative of traffic.” Elkin, McLaren, and Hillman (1991, 12) argue that sustainable urban form must be a form and scale appropriate to walking, cycling,

and efficient public transport and must have a compactness that encourages social interaction.

It must enable access to the facilities and services of the city while minimizing the resulting external costs. “Sustainable transportation” is defined as “transportation services that reflect the full social and environmental costs of their provision; that respect carrying capacity; and that balance the needs for mobility and safety with the needs for access, environmental quality, and neighborhood livability” (Jordan and Horan 1997, 72). For Duncan and Hartman (1996), a sustainable urban transportation system limits emissions and waste to within the area’s ability to absorb; is powered by renewable energy sources, recycles its components, and minimizes the use of land; provides equitable access for people and their goods and helps achieve a healthy and desirable quality of life in each generation; and is financially affordable, operates at maximum efficiency, and supports a vibrant economy.

Policies for sustainable urban development should, therefore, include measures to reduce the need for movement and to provide favorable conditions for energy-efficient and environmentally friendly forms of transport. Land use planning has a key role to play in the attainment of these objectives. It is assumed that when the physical separation of activities is smaller, travel needs are likely to be lower and easily met by walking, cycling, and environmentally friendly transport. Some scholars argue that we know fairly little about how urban form shapes and affects travel behavior. Boarnet and Crane (2001) suggest that we lower our expectations about the travel-reduction benefits of urban design and expand our

understanding of the effects of other transportation policies. The influential literatures of neotraditional planning and the “new urbanism” often argue that car use will decline in neighborhoods designed with more pedestrian-friendly features, such as a connected street layout, more mixed use, high enough densities to more closely group some commercial and residential development, traffic calming, and so on.

Crane and Crepeau (1998, 18) assert that “many times, these transportation benefits have been advertised as facts rather than hypotheses, and have even been utilized or at least recommended as tools for decreasing the negative environmental impacts associated with car travel.” Robert Cervero (2003, 18) argues that “integrated transport and urbanism—despite the many barriers that must be overcome—is likely to prevail as America’s dominant paradigm of community-building in the twenty-first century.” In addition, he claims that we still have a lot to learn about how the designs of neighborhoods, communities, and regions shape travel behavior.

Restructuring of the urban and metropolitan transportation system can help conserve energy in several ways. In *The Transit Metropolis*, Robert Cervero (1998, 46) argues that “compact, transit-oriented development shortens trips, thus encouraging non-motorized travel. And conversion of low-occupancy auto trips to mass transit cuts down per capita fuel consumption.”

Newman and Kenworthy (1989) found a strong inverse relationship between urban density and energy consumption for transport. Some scholars, however, argue that there is no advantage of one form of development relative to another.

Rickaby, Steadman, and Barrett (1992) analyzed a representative sample of twenty English towns with populations between 50,000 and 150,000 residents. For each town, data were collected describing the pattern of land use and the extent and form of development. Ultimately, the study suggests that within towns of this size quite radical variations in policy toward the location of new development may have only slight implications for the use of fuel in passenger transport (p. 195).

3. Density

Density is a critical typology in determining sustainable urban forms. It is the ratio of people or dwelling units to land area. The relationship between density and urban character is also based on the concept of viable thresholds: at certain densities (thresholds), the number of people within a given area becomes sufficient to generate the interactions needed to make urban functions or activities viable. In a wider sense, sustainable cities are a matter of density (Carl 2000). Density and dwelling type affect sustainability through differences in the consumption of energy; materials; and land for housing, transportation, and urban infrastructure (Walker and Rees 1997). High density and integrated land use not only conserve resources but provide for compactness that encourages social interaction. Newman and Kenworthy (1989, 33) conclude that some policies can save significant amounts of energy, mainly by “increasing the urban density; strengthening the city center; extending the proportion of a city that has inner-area land use; providing a good transit option; and restraining the provision of automobile infrastructure.” They advocate a policy of new mass rail transit systems for the “inefficient” cities. Density is the single most important factor

associated with transit use (Transportation Research Board of the National Academy 1996). As density increases, automobile ownership declines, and automobile travel—as measured by gasoline consumption or per capita vehicle miles of travel (VMT)—also decreases. Similarly, transit use increases with density. In a sample of eleven large metropolitan areas, the density of nearby housing strongly influenced commuter mode choices. Holding constant the mix of land uses, residents of higher density areas were more likely to commute by transit, walking, bicycling, or combinations thereof, and less likely to drive, than people who live in lower-density areas (Transportation Research Board of the National Academy 1996). There is an inherent conflict between lower densities and a good transport system, where lower densities encourage car use. Freeman (1984) blames planners, architects, and local governments for reducing high urban density as well as for the low densities of suburbs. These densities make facilities difficult to provide without imposing a degree of car travel, which is environmentally damaging. Some scholars, however, call for dispersed living patterns with reduced density. Clark, Burall, and Roberts (1993, 146) have argued that sustainable development implies a “selfsupport economy” and requires “more land for outbuildings and outdoor activities . . . and a general reduction in net residential densities.” Similarly, Robertson (1990) has argued in favor of a decentralized future based upon a return to the countryside and a revival of rural values.

4. Mixed Land Uses

There is a general consensus among planners and scholars that mixed land use has an important role in achieving sustainable urban form. Mixed-use or

heterogeneous zoning allows compatible land uses to locate in close proximity to one another and thereby decrease the travel distances between activities (Parker 1994). Mixed land use indicates the diversity of functional land uses such as residential, commercial, industrial, institutional, and those related to transportation. Reducing the need for travel is on the agenda of achieving sustainable urban form, and mixed land use has a prominent role in achieving it. Mixed land use reduces the probability of using a car for commuting, shopping, and leisure trips, since jobs, shops, and leisure facilities are located nearby (Alberti 2000; Van and Senior 2000). Mixing uses ensures that many services are within a reasonable distance, thus encouraging cycling or walking (Thorne and Filmer–Sankey 2003). In addition, mixed use of space can renew life in many parts of the city and in turn enhance security in public spaces for disadvantaged groups (Elkin, McLaren, and Hillman 1991, 22).

For the past several decades, urban planning has been “unmixing” cities by the use of rigid zoning that separates single land uses into differently colored parts of the city plan. The result is a city with less diversity in local areas and more traffic, as well as reduced safety and diminished attractiveness of local streets (Newman 1997). For a sustainable urban form, mixed uses should be encouraged in cities, and zoning discouraged (see Breheny 1992b, 22). A rapidly expanding literature continues to investigate the potential for causal links between urban design and travel behavior, yet there remain many gaps and considerable disagreement (Crane 1999). The motivating question is how to design built environments to reduce automobile use. The aim is to reduce air pollution and traffic congestion,

as well as to stimulate the interaction of residents, by increasing pedestrian traffic and generally improving neighborhood charm.

Numerous studies report that higher densities, mixed land uses, more open circulation patterns, and pedestrian–“friendly” environments are all associated with less car travel. Others argue that these results are difficult either to confirm or to interpret (Rutherford, McCormack, and Wilkinson 1996).

Several studies have found that transportation–related benefits of mixed land use include a decrease in vehicle trip generation rates and the number of vehicle hours traveled and higher levels of pedestrian travel (see Institute of Transportation Engineers 1989; Ewing, Haliyur, and Page 1994). However, some urge caution because the issue is complex. Frank (2000, 12) argues that empirical research regarding the relationship between mixed land uses and travel behavior has been limited by the relative complexity of measurement, requirements for parcel or area–level data, and the difficulty in accurately translating findings into public policy. Moreover, skeptics cite a lack of control for nonurban form factors, including household income and the availability of alternative modes of transportation (Parker 1994; JHK & Associates 1995).

5. Diversity

Diversity of activity is essential to the sustainability of cities. Jane Jacobs (1961) popularized the diversity dimension, subsequently adopted and widely accepted by many planning approaches, such as new urbanism, smart growth, and sustainable development. Lack of concentrated diversity can put people into automobiles for almost all their needs. Jacobs writes, “In dense, diversified city

areas, people still walk, an activity that is impractical in the suburbs and in most grey areas. The more intensely various and close-grained the diversity in an area, the more walking. Even people who come into a lively, diverse area from outside, whether by car or by public transportation, walk when they get there” (p. 230). For Jacobs, diversity is vital; without it, the urban system declines as a living place and a place to live.

There are some similarities between diversity and mixed land uses; however, diversity is “a multidimensional phenomenon” (Turner, Robyne, and Murray 2001, 320) that promotes further desirable urban features, including greater variety of housing types, building densities, household sizes, ages, cultures, and incomes (see the Congress for the New Urbanism and U.S. Department of Housing and Urban Development 2000). Thus, diversity represents the social and cultural context of the urban form.

Diverse development contains a mixture of land uses, building and housing types, architectural styles, and rents. “If development is not diverse, then homogeneity of built forms often produces unattractive, monotonous urban landscapes, a lack of housing for all income groups, class and racial segregation, and job-housing imbalances that lead to increased driving, congestion, and air pollution” (Wheeler 2002, 328).

6. Passive Solar Design

Passive solar design is central to achieving a sustainable urban form. Generally, the idea of this design is to reduce the demand for energy and to provide the

best use of passive energy in sustainable ways through specific design measures.

This design affects the form of the built environment through, for example, the orientation of buildings and urban densities (Thomas 2003). It is assumed that design, siting, orientation, layout, and landscaping can make the optimum use of solar gain and microclimatic conditions to minimize the need for space heating or cooling of buildings by conventional energy sources (Owens 1992).

The urban area, described as the “urban microclimate,” has a different climate from the countryside (Barry and Chorley 1998). Compared to open country, built urban sites have larger areas of exposed surfaces per unit area of ground cover. Because of the larger area, potentially more solar radiation can be collected on a built urban site than on a flat, open terrain, especially in winter. In the city, a surface’s exposure to the sun at any given time is largely determined by the built form, as well as the street widths and orientation. Yannas (1998, 43) summarizes some design parameters for improving urban microclimate and achieving environmentally sustainable cities: (1) built form—density and type, to influence airflow, view of sun and sky, and exposed surface area; (2) street canyon—width-to-height ratio and orientation, to influence warming and cooling processes, thermal and visual comfort conditions, and pollution dispersal; (3) building design—to influence building heat gains and losses, albedo and thermal capacity of external surfaces, and use of transitional spaces; (4) urban materials and surfaces finish—to influence absorption, heat storage, and emissivity; (5) vegetation and bodies of water—to influence evaporative cooling processes on

building surfaces and/or in open spaces; and (6) traffic— reduction, diversion, and rerouting to reduce air and noise pollution and heat discharge.

Interaction between energy systems and urban structure takes place at all spatial scales from the regional, city, and neighborhood to the individual building (Owens 1992, 81–82). So far, sustainable forms have had a crucial role in the reduction of energy usage. Edwards (1996, xv) argues that “architects have a larger share of responsibility for the world’s consumption of fossil fuel and global warming gas production than any other professional group” and, furthermore, states that half of all energy used in the United Kingdom, and in the world at large, is related to buildings. Plainly, ecological design and mixed land use planning policies promote energy efficiency.

7. Greening

Greening of the city, or green urbanism, appears to be an important design concept for the sustainable urban form. Green space has the ability to contribute positively to some key agendas in urban areas, including sustainability (Swanwick, Dunnett, and Woolley 2003). Greening seeks to embrace nature as integral to the city itself and to bring nature into the life of city dwellers through a diversity of open landscapes (Elkin, McLaren, and Hillman 1991, 116). Greening of the city makes urban and suburban places appealing and pleasant (Van der Ryn and Cowan 1995; Nassauer 1997) and more sustainable (Dumreicher et al. 2000).

There are many other benefits from greening urban spaces (Swanwick, Dunnett, and Woolley 2003; Beer, Delshammar, and Schildwacht 2003): (1) contributions

to maintenance of biodiversity through the conservation and enhancement of the distinctive range of urban habitats (Gilbert 1991; Kendle and Forbes 1997; Niemela 1999); (2) amelioration of the physical urban environment by reducing pollution, moderating the extremes of the urban climate, and contributing to cost-effective sustainable urban drainage systems (Von Stulpnagel, Horbert, and Sukopp 1990; Plummer and Shewan 1992; Hough 1995); (3) contributions to sustainable development to improve the image of the urban area; (4) improvement of the urban image and quality of life (DoE 1996); and (5) increasing the economic attractiveness of a city and fostering community pride (Beer, Delshammar, and Schildwacht 2003). Greening also has health benefits (Ulrich 1999) and an educational function as a symbol or representation of nature (Forman 2002). Finally, greening aims also to preserve and enhance the ecological diversity of the environment of urban places.

In *Green Urbanism*, Timothy Beatley (2000) emphasizes the important roles of cities and positive urbanism in shaping more sustainable places, communities, and lifestyles. He contends that our old approaches to urbanism are incomplete and must be expanded to incorporate more ecologically responsible forms of living and settlement. In Beatley's view, a city exemplifies green urbanism if it (1) strives to live within its ecological limits, (2) is designed to function in ways analogous to nature, (3) strives to achieve a circular rather than a linear metabolism, (4) strives toward local and regional self-sufficiency, (5) facilitates more sustainable lifestyles, and (6) emphasizes a high quality of neighborhood and community life (pp. 6-8).

2.6.2 Urban Forms

This study has identified seven design concepts that are related to sustainable urban forms. The literature analysis shows that different combinations of these concepts produce a number of distinguished urban forms. Eventually, the study has identified four models of sustainable urban forms.

1. Neotraditional Development

Traditional built environments have inspired planners and architects to seek better urban forms based on some of their physical qualities, in a movement called “neotraditional town planning” (Nasar 2003, 58). The new urbanism is the best known among the neotraditional approaches to planning.

New urbanism advocates design-based strategies based on traditional urban forms to help arrest suburban sprawl and inner-city decline and to build and rebuild neighborhoods and cities. Charles Bohl (2000) argues that new urbanism is simply an approach to planning and design that draws on historical precedents for ways to blend different combinations of housing types in the form of neighborhoods, rather than superblocks, suburbs, or projects.

New urbanists believe that their residential design features can satisfy residents, encourage local walking and use, support pleasing neighborhood contacts, and bolster a strong sense of community, while increasing residential densities beyond the suburban norm (Leccese and McCormick 2000). Keys to new urbanist and neotraditional residential designs include mixing housing types for a wide range of incomes and household structures, providing for greater density and human

contact in the neighborhood and reinforcing human presence by taming the ubiquitous automobile (Audirac and Shermyen 1994; Leccese and McCormick 2000). New urbanists believe that front porches, along with narrow streets, back-alley garages, shallow setbacks, and street trees may promote small town neighborliness characteristic of the 1920s.

Wheeler (2002) argues that nineteenth-century neighborhoods with diverse building types and land uses are today among the most vibrant, attractive, and popular districts. He concludes that zoning was a major institutional force working against diversity of urban form.

Neotraditional development, or the new urbanism, emphasizes certain concepts of sustainable urban form. In transport, neotraditional development suggests pedestrian orientation and walkable villages. In density, it promotes higher residential densities than typical suburbs. In mixed land uses, it suggests a mix of residential, commercial, and civic uses. Accordingly, the ideal neotraditional town would be self-contained, tightly clustered, walkable, and patterned on the American small town of pre-World War II. It would have mixed land uses, as well as higher densities; street patterns that allow drivers and pedestrians a variety of path options (encouraging people to walk from place to place); distinct traditional architectural characters; and the encouragement of street life through such features as narrower streets, front porches, and public open space (Nasar 2003; Audirac and Shermyen 1994; Calthorpe 1993; Duany and Plater-Zyberk 1992; Fulton 1992; MacBurnie 1992; Lerner-Lam et al. 1992; Sutro 1990).

Another type of development that is also based on the neotraditional form of development is transit-oriented development (TOD). Various other terms have surfaced over the years to convey the idea of TOD, such as “transit village,” “transit-supportive development,” and “transit-friendly design,” but TOD is the most widely used term. Most definitions of TOD share several common elements: mixed-use development, development that is close to and well served by transit, and development that is conducive to transit riding (Transportation Research Board of the National Academy 2002, 5–7). Boarnet and Crane (1997) define TOD as a developing or intensifying of residential land use near rail stations. For Still (2002), it means a mixed-use community that encourages people to live near transit services and to decrease their dependence on driving.

The transit village, one of the TOD applications, is “a compact, mixed-use community, centered around a transit station that, by design, invites residents, workers, and shoppers to drive their cars less and ride mass transit more. . . .

The centerpiece of the transit village is the transit station and the civic and public spaces that surround it” (Bernick and Cervero 1997, 5).

The urban village is another model of neotraditional development that appeared first in the early 1980s in the United States and in the late 1980s in the United Kingdom (see Aldous 1992). The popular idea of sustainable development in the 1990s contributed to the formation of the goals of the urban village. According to the Urban Villages Forum, an urban village is a settlement created on a greenfield or brownfield site, or out of an existing development. Its features are high density; mixed use; mix of housing tenures, ages, and social groups; high

quality; and being based on walking (Aldous 1992). Citing examples from the United States and Canada, Kenworthy (1991) states that the urban village is a trend that attempts to respond to an emptiness in community life and fulfills deeply felt needs for convenience, efficiency, beauty, and connection to a larger portion of humanity. Other reasons for the trends toward the urban village include factors such as traffic congestion, pollution, infrastructure costs, and quality of life.

Douglas Kelbaugh (1997) suggests that urban villages and zoning reforms are good strategies for existing cities and suburbs. He believes that “Seattle’s urban villages make sense” for the following reasons: they are an effective way for the city to take its fair share of regional growth; they are economical since they use existing institutions; and they are walkable, neighborly, transit-friendly, and sustainable, offering a lively and rich environment (pp. 121–27).

Some scholars argue that there is a gap between the rhetoric of new urbanism and its reality in practice. Beatley (2000, 65) asserts that designs of new urbanism are higher in density, more compact, and more walkable than suburban places. But in many ways, their reality does not match their rhetorical aspirations. The densities are often not much higher than conventional suburban development, and they often lack the transit, mixed uses, and other ingredients that could make them fundamentally more sustainable. Beatley criticizes new urbanism projects for rarely being concerned with reducing ecological impacts or promoting more ecologically sustainable lifestyles. Thus, “what we need today are cities that reflect a different new urbanism, a new urbanism that is dramatically

more ecological in design and functioning and that has ecological limits at its core” (p. 5).

Alex Kreiger (1998, 74) argues that, to date, new urbanism projects have helped produce more subdivisions than towns; densities too low to support much mixed use, much less to support public transportation; relatively homogeneous demographic enclaves, not “rainbow coalitions”; a new, attractive, and desirable form of planned unit development, but not yet substantial infill; a new wave of determinism, implying that community can be ensured through design; and a perpetuation of the myth of being able to create and sustain urban environments amidst pastoral settings. Kreiger contends that such projects, with their evocations, provide a new legitimization of low-density, peripherally located, homedominated real estate development.

2. Urban Containment

In the early 1900s, most urban areas were compact and urban populations in the United States were concentrated within cities, but by the 1960s, this pattern began to change (EPA 2001, 4–19). During the 1970s and 1980s, more than 95 percent of U.S. population growth took place in suburban areas outside cities (Gillham 2002). In the United States today, more people live and work in suburbs than in cities.

Thus, “sprawl,” which is characterized as a chaotic mess of low-density housing and commercial strip development created by and dependent on extensive automobile use, has emerged as the dominant development pattern throughout much of the United States (Ewing 1997; Gillham 2002). The scattered, low-

density development characteristic of sprawl occupies far more land than do multistoried and higher-density urban centers and has significant effects on the land and its resources. The impacts of increased urbanization and sprawl development are also apparent in many regions worldwide (Vitousek et al. 1997; Alberti et al. 2003).

Recognition of the costs of sprawl has prompted polic makers in the United States, other developed countries, and a few developing countries to create urban containment policies that impose geographical constraints on urban growth to contain sprawl and restrain urban growth. At its heart, urban containment prevents the outward expansion of the urban field and forces the development market to look inward. It seeks to employ an array of public policy tools to manipulate “push” and “pull” factors so that the metropolitan area will take a particular and desirable geographical form. The goals of containment policy vary widely and include preservation of natural land, as well as farmland and resource extraction land, whose economic value will not be able to compete with urban development; cost-efficient construction and use of urban infrastructure; reinvestment in existing urbanized areas that might otherwise be neglected; and the creation of higher-density land use patterns that encourage a mix of uses and patronage of public transit, leading to a more efficient utilization of land in urbanized areas (Pendall, Martin, and Fulton 2004).

Urban containment policies include the enactment of regulatory urban growth boundaries, limiting utility extensions to outlying areas, delineation and acquisition of greenbelts, controls on pattern and density of development, restricting new

residential development in agricultural areas, pacing new development to match development of new infrastructure, restricting the numbers of new residential permits issued, land preservation programs, tax incentives, and a variety of other measures (Porter 1997; Razin 1998; Tjallingii 2000; Gillham 2002; Nelson et al. 2004). In general, urban containment policies seek to use at least three different types of tools to shape metropolitan growth. Greenbelts and urban growth boundaries are used to affect the “push” factors, while urban service areas are used to affect the “pull” factors.

Greenbelts are a spatial technique for containment. A greenbelt usually refers to a band drawn fairly tightly around a city or urban region that planners intend to be permanent, or at least very difficult to change. In most cases, greenbelts are created by public or nonprofit purchase of open space lands or of development rights on farmland. Greenbelts are areas of preserved open space, or areas of significantly reduced development, designed as buffers to protect areas of land or water resources from development impacts. The preservation of patches of high-quality habitat, connected by wildlife corridors, can preserve wildlife and ecosystems even in areas with significant adjoining development. Wildlife corridors can serve as “land bridges” between “habitat islands” and as dwelling habitats in their own right (Ewing 1995, 95).

Urban growth boundaries (UGBs) are limits on land development beyond a politically designated area—to curb sprawl, protect open space, or encourage the redevelopment of inner-city neighborhoods (Staley, Edgens, and Mildner 1999). A UGB is a line between urbanization and rural lands, rather than a physical

area. Some jurisdictions use the terms urban limit line (ULL), blue line, or green line to mean the actual physical boundary separating urban and rural areas.

UGBs, as they are used in the United States, are (unlike greenbelts) often deliberately designated to accommodate growth for a specified period of time (twenty to thirty years), revisited periodically, and then changed as necessary.

Jurisdictions employ a wide range of techniques to implement UGBs, many of which will be described below. But broadly speaking, UGB systems are best known for using regulatory techniques such as zoning to prevent urban development outside the growth boundary.

Washington State, for example, has attempted to deal with the issue of sprawl through the use of urban growth boundaries established on a countywide basis. In 1990, Washington State promulgated the Growth Management Act, which has a primary goal of minimizing land conversion and environmental impacts by concentrating growth in urban areas. Local jurisdictions, such as city and county governments, were required to work together to prepare comprehensive plans that balanced growth, economics, and land use, while providing affordable housing and other public services.

Local jurisdictions were also required to designate specific long-term urban growth boundaries, based on population and economic growth projections through the year 2012 (Robinson, Newell, and Marzluff 2005).

Staley, Edgens, and Mildner (1999) examined the effectiveness and limitations of growth boundaries as growthmanagement tools in different cases. The growth

boundary of Portland, Oregon, is an example of regional land use planning and is used to help reshape the metropolitan area into a higher-density, more compact, transit-oriented city. The growth boundaries of Lancaster County, Pennsylvania, are tied to an aggressive countywide effort to preserve farmland and a unique local culture. Boulder County, Colorado, is attempting to use city-level growth boundaries and highly restrictive county growth controls to slow development while bolstering its reputation as a high-income satellite community of Denver.

Urban containment overlaps to an extent with growth management, which, as defined by Nelson et al. (2002), is the deliberate and integrated use of the planning, regulatory, and fiscal authority of state and local governments to influence the pattern of growth and development to meet projected needs. Some containment policies neglect to meet projected needs, and not all growth management policies include urban containment, but a containment program that projects and plans for needed growth would qualify as a growth management program (Pendall, Martin, and Fulton 2004).

Robinson, Newell, and Marzluff (2005) examined the effects of growth management efforts on urban fringe areas in Washington State's Puget Sound region between 1974 and 1998. Their study showed that suburban and exurban landscapes increased dramatically between 1974 and 1998 at the expense of rural and wildland areas. Current growth management efforts prioritize increasing housing density within UGBs while limiting densities outside these boundaries. The study demonstrated that housing density has indeed increased within these boundaries, but at the same time, sprawling low-density housing in rural and

wildland areas constituted 72 percent of total land developed within the study area. This has implications for those urban areas, both in the United States and in other countries, considering growth management strategies.

Management programs that attempt to balance growth while fulfilling economic, social, and environmental needs are often termed smart growth programs. Such programs may include a combination of the programs listed above or may focus on a single approach (Porter 1997; Benfield, Terris, and Vorsanger 2001; Gillham 2002). Smart growth underlines some of the form concepts and disregards others. For example, it uses compactness on a different scale; that is, it prevents further expansion of the urban fringe rather than supporting extreme compactness or intensification (see Ben-Josef 2000, 122). In addition, it provides for mixed land use to create a mix of housing choices and opportunities, provides a variety of friendly transportation modes, and prevents sprawl through a strategy of compactness (Talen and Ellis 2002, 42; DeGrove 1991). In practice, smart growth discussions in the United States borrow heavily from new urbanist form principles, with an additional emphasis on urban infill development and the cost savings that can result from limiting sprawl. They also emphasize specific techniques such as UGBs, more pedestrianfriendly street design, and mixed-use zoning.

3. Compact City

Prior to the international promotion of the sustainable development agenda, the idea of a radiant city was proposed by Le Corbusier's La Ville Radieuse as a solution to the problems of the Victorian city. This was to be done through

clearance and the erection of tower blocks, allowing high–population densities within wide–open spaces. Following Le Corbusier’s ideas of the radiant city, Dantzing and Saaty (1973) proposed the compact city. Their vision was to enhance the quality of life but not at the expense of the “next generation” (p. 10)—an idea that is compatible with today’s principles of sustainable development. Generally, the idea of a compact city includes many strategies that aim to create compactness and density that can avoid all the problems of modernist design and cities.

The popularization of sustainable development has contributed to the promotion of the urban compactness idea by enhancing the ecological and environmental justifications behind it. Since the 1990s, research has generally led to the advocacy of cities that are spatially compact, with a mix of uses. Some scholars argue that compact cities offer opportunities to reduce fuel consumption for traveling, since work and leisure facilities are closer together (ECOTEC 1993; Newman and Kenworthy 1989; Hillman 1996). Compact cities are also favored because urban land can be reused, while rural land beyond the urban edge is protected. Ultimately, it is argued that a good quality of life can be sustained, even with high concentrations of people.

The compact form can be implemented on a variety of scales, from urban infill to the creation of entirely new settlements, such as the idea of urban villages in the United Kingdom and new urbanism in the United States (Breheny, Gent, and Lock 1993; Urban Villages Group 1992; Leccese and McCormick 2000).

Generally, compactness proposes density of the built environment and

intensification of its activities, efficient land planning, diverse and mixed land uses, and efficient transportation systems.

The European Commission's Green Paper (Commission of European Communities 1990) advocates very strongly the "compact city," assuming that it makes urban areas more environmentally sustainable and improves quality of life. The compact city is being promoted in the United Kingdom and throughout Europe as a component of the strategy formed to tackle the problem of unsustainability. It is proposed that in more compact cities, travel distances are reduced (thus lessening fuel emissions), rural land is saved from development, local facilities are supported, and local areas become more autonomous. Williams, Burton, and Jenks (1996, 83) argue that the actual effects of many of these claimed benefits are far from certain.

Sustainable development is often called upon to provide the basis for the argument for the compact city (Welbank 1996). Peter Newman (2000) found that the compact city emerges as the most fuel-efficient of urban forms. He concluded that urban form does matter, and not just for urban air quality. Some scholars argue that extreme compact city proposals are unrealistic and undesirable. Instead, various forms of "decentralized concentration," based around single cities or groups of towns, may be appropriate (Breheny 1992b).

The main focus has been on the impacts of different urban forms on travel behavior and transport provision, resource efficiency, social equity, accessibility, and economic viability. The outcome of this debate, particularly in Europe, the United States, and Australia, was a strong advocacy of the "compact city" model.

Essentially, this is a high-density, mixed-use city, with clear (i.e., nonsprawling) boundaries (Jenks, Burton, and Williams 1996; Williams, Burton, and Jenks 2000). This model was supported for several reasons. First, compact cities are argued to be efficient for more sustainable modes of transport. Second, compact cities are seen as a sustainable use of land. By reducing sprawl, land in the countryside is preserved and land in towns can be recycled for development. Third, in social terms, compactness and mixed uses are associated with diversity, social cohesion, and cultural development. Some also argue that it is an equitable form because it offers good accessibility. Fourth, compact cities are argued to be economically viable because infrastructure, such as roads and street lighting, can be provided cost-effectively per capita. Also, population densities are sufficient to support local services and businesses (Williams, Burton, and Jenks 2000).

4. The Eco-City

The eco-city is an umbrella metaphor that encompasses a wide range of urban-ecological proposals that aim to achieve urban sustainability. These approaches propose a wide range of environmental, social, and institutional policies that are directed to managing urban spaces to achieve sustainability.

This type promotes the ecological agenda and emphasizes environmental management through a set of institutional and policy tools.

The distinctive concepts of the eco-city are greening and passive solar design. In terms of density and other concepts, the eco-city might be conceived as a “formless” city or an ecoamorphous city. There are some approaches that emphasize the passive solar design, such as the Ecovillage, Solar Village (Van

der Ryn and Calthorpe 1986), Cohousing (Roelofs 1999, 240–42), and Sustainable Housing (Edwards and Turrent 2000; Boonstra 2000). There are others that emphasize the concepts of greening and passive energy design, among them the Environmental City, Green City, Sustainable City (Girardet 1999; Nijkamp and Perrels 1994; Gibbs, Longhurst, and Braithwaite 1998), Eco–City (Roseland 1997; Engwicht 1992), Ecological City (OECD 1995), Sustainable Urban Living (Girardet 1992), Sustainable Community (Nozick 1992; Paulson 1997), Sustainable Neighborhood (Rudin and Falk 1999), and Living Machines (Todd and Todd 1994).

It is remarkable that the core of many approaches is the management of the city, rather than the suggesting of any specific urban form; it is believed that not the physical shape of the city and its built environment that is important; it is how the urban society is organized and managed that counts most. Similarly, Talen and Ellis (2002, 37) argue, “Social, economic, and cultural variables are far more important in determining the good city than any choice of spatial arrangements.”

Therefore, the city is managed to achieve sustainability through different land use, environmental, institutional, social, and economic policies (Robinson and Tinker 1998; United Nations Conference on Environment and Development 1992; United Nations Framework Convention on Climate Change 1992; Council of Europe 1993; European Commission 1994). For example, the well-known Agenda 21 (UNCED 1992) proposes integrated management at the urban level to ensure that environmental, social, and economic factors are considered together in a framework for the sustainable city.

In practice, many local governments, planning consultants, landscape architects, and so on are grappling much more specifically with aspects of ecological, pedestrian-oriented, or otherwise sustainable urban form. I strongly encourage the reader to look at examples from practice.

Table 2.1. Sustainable urban form matrix: Assessing the sustainability of urban form.

Source: (Yosef Rafeq Jabareen, 2006)

Design Concepts (Criteria)	Neotraditional Development	Compact City	Urban Containment	Eco-City
Density	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Diversity	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Mixed land use	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Compactness	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Sustainable transportation	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Passive solar design	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Greening—Ecological design	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High	1. Low 2. Moderate 3. High
Total score	15 points	17 points	12 points	16 points

7.2 How to measure sustainability in city

There are different ways to measure sustainability in this paper we will view the most common way.

1.7.2 Indicators for Sustainability

The Indicators for Sustainability report (Dekker et al., 2012) from Sustainable Cities International took a different approach to the development of an indicator

set compared to the other frameworks mentioned so far. (European commission ,2015)

It began with case studies of several international cities of varying size. From this information they chose indicators that were common to several cities, easy to understand and implement, and covered multiple related sustainability goals. The result is a core indicator set that is flexible, easy to implement and relevant to cities regardless of size or location. The indicators cover a broad range of sustainability targets. Little weight is given to indicators of health and governance. (European commission ,2015)

Table 2.2. Sustainable Cities International’s indicator list

Source: (European commission ,2015)

Sector	Indicator	Measures
Economy	Unemployment rates/ Jobs	Underemployment/employment/ unemployment rates; Percentage of green jobs in the local economy; Average professional education years of labor force
	Economic growth	Annual GDP growth rate; Annual GNP growth rate; Net Export Growth rates (% increase of country’s total exports minus the value of its total imports per annum; Foreign Direct Investments (Capital/ Earnings accrued from listed FDI’s per annum)
Environment	Green spaces	Percentage of preserved areas/

		reservoirs/ waterways/parks in relation to total land area; Percentage of trees in the city in relation to city area and/or population size
	Reduce greenhouse gases/ Energy efficiency	Total amount of GHG emissions per city and per capita; Percentage of total energy consumed in the city that comes from renewable sources
	Mobility	Transportation mode split (Percentage of each mode of transportation, i.e. private, public, bicycles, pedestrians); Average commute time and cost
	Water quality/ Availability	Total amount of water availability; Water quality index/score; Proportion of population with access to adequate and safe drinking water
	Air quality	Levels of Particulate Matter (PM10 – mg/ m3); Levels of Particulate Matter (PM2.5 – mg/m3)
	Waste/ Reuse/ Recycle	Recycling rate (Percentage diverted from waste stream); Volume of solid waste generated
Social	Complete neighborhood/ Compact city	Access to local/ neighborhood services within a short distance; Crime rates; Measures of income distribution and inequality
	Housing	Percentage of social/ affordable/

		priority housing; Breakdown of housing sector by property type (owner occupied/ rental, single occupant/couples/family/multifamily etc.)
	Quality public space	Percentage of roadways in good condition; Percentage of green space (public parks) coverage in relation to city area and/or population size
	Education	Number of schools with environmental education programs; Adult literacy rate
	Sanitation	Percentage of population with access to water-borne or alternative (and effective) sanitary sewage infrastructure
	Health	Mortality rate/ Life expectancy; Percentage of population with access to health care services

Chapter 3

1.3 Tbilisi, Georgia

DETERMINED TO BECOME A LOW-CARBON CITY, TBILISI INNOVATES TO REDUCE POLLUTION(world bank group,2015).

Georgia's capital has taken concrete steps to become a low-carbon city by 2020, striving to meet European Union objectives to reduce CO2 emissions. The World Bank has been supporting the city for the last two decades in its municipal infrastructure rehabilitation, energy-efficiency, traffic management, transport planning, and formulation of a participatory city development vision 2030. (world bank group,2015).

Pledging to become a low-carbon city by 2020, Tbilisi has joined the European Union Covenant of Mayors and aims to meet the EU objectives to reduce CO2 emissions by 20%. The city submitted its 2011–2020 policy document on sustainable energy, which identifies activities in multiple sectors that would allow the city to meet its carbon-reduction target.(world bank group,2015).

The City has already completed many energy efficiency activities, including retrofitting residential buildings and upgrading its urban transport fleet. (world bank group,2015).

With annual co-financing from the city totaling 25 million Georgian lari (US\$10 million), the residents' condominium associations are repairing building roofs, elevators, entrances, windows, plumbing, and installing sensor lighting. (world bank group,2015).Residential buildings have been fully equipped with advanced heating systems. Energy efficiency activities have been launched in kindergartens. Tbilisi's old landfill was closed and replaced, the street lighting

system has been upgraded with energy efficient bulbs and the city's water system is shifting from pumping into gravity. (world bank group,2015).

With an eye toward improving air quality and cutting vehicle greenhouse gas emissions, the city is expanding its public transportation system through gradual replacement of old buses fleet, upgrading and expanding Metro rail system, installing new cable car lines and studying plans for light-rail transit. Tbilisi plans to be a more compact city, and is aligning its planning and infrastructure routes accordingly. (world bank group,2015).

Technical assistance has helped Tbilisi design a new traffic management strategy to reduce congestion and it increased its bus fleet from 50 buses in 2004 to 934 as of 2009. To consolidate the bus system, the City reduced the number of old, polluting minibuses from 2,400 to 1,700 between 2006 and 2012. The city is also making their transport system more reliable and user-friendly. Display boards at major bus stops now inform passengers of impending bus arrivals. Passengers can obtain information on bus timetables by SMS or online. The city has introduced a traffic light management system, and a traffic management center has already been established. These measures combined reduce both traffic congestion and the culture of high dependence on automobile transport, contributing to emission targets. (world bank group,2015).

The World Bank has been providing capital investments and technical assistance throughout the city's reform process under a series of municipal development projects. The Bank has assisted Tbilisi to recognize that integrated improvements in public and private transport, public lighting, solid waste management, and

municipal buildings are critical for the city to enhance its performance in energy-efficiency. (world bank group,2015).

Through its energy assessment of Tbilisi, the World Bank recommended that the city better integrate land use and transport planning to improve access to jobs and education. It encouraged use of public and non-motorized transport, through such means as traffic or parking restraints to limit private vehicle use, and improving public bus service by upgrading buses, adjusting routes, and establishing dedicated bus lanes. (world bank group,2015).

Tbilisi has embedded the World Bank's advice and support in the Tbilisi 2030 City Development Strategy (CDS), which was funded by the Cities Alliance and the Bank. Stakeholders defined the city's long-term vision as "Tbilisi 2030 is a hub for global supply chains – creating a bridge between different civilizations in the competition for talent, technology and markets. Tbilisi is the place where various cultures, history and modernity collide to inspire innovation and the entrepreneurial spirit. Tbilisi is always warm and welcoming to citizens and visitors alike." (world bank group,2015).

The strategy's initiatives include revitalizing downtown areas, development of green and recreational areas and the revitalizing of rivers (including Mtkvari River) in and around Tbilisi. The city is focused on becoming an international events center, hosting sporting, cultural and economic events. The city assigned responsibilities to institutions in the design, planning, implementation, monitoring and evaluation of the strategy and in setting benchmarks. (world bank group,2015).

1.1.3 ACHIEVEMENTS: (world bank group,2015).

- The city has prepared a city development strategy with a clear vision 2030 and action plan.
- Tbilisi has taken actions to completely revamp its municipal infrastructure and contribute toward reducing carbon emissions by 20%. This includes energy efficiency initiatives for the city's water system shifting from pumping into gravity; residential buildings refurbishment; swapping out an old landfill for a new, lower methane reducing landfill; and installing energy efficient bulbs in street lighting systems.
- Tbilisi has improved the living conditions of its citizens by curbing sprawl and developing more vibrant central areas. The city has sought to improve public bus and metro service provision, improving bus reliability with new technology and improving existing metro infrastructure. It now plans to expand cable car lines and is pursuing light-rail transit.

2.3 Jordan

JORDAN: CULTURAL HERITAGE, TOURISM, AND URBAN DEVELOPMENT PROJECT(world bank group,2015).

Jordanian historic cities became more livable for their citizens and more attractive for tourists, with a joint effort of the Government and the World Bank Group(world bank group,2015).

The World Bank Group helped Jordan with an integrated project targeting five historic downtowns. The project enhanced livability for local communities, strengthened social cohesion, and improved city competitiveness, creating an enabling environment for local businesses to grow, with a particular focus on businesses working in cultural heritage and sustainable tourism. (world bank group,2015).

Tourism rooted on cultural assets has indeed always been important to Jordan's economy. However, starting in the late 1990s, the country begun lagging behind other regional destinations in growth rate, market share and, even more importantly from a poverty reduction perspective, length of stay and per capita spending. Till that time, tourism development strategies had focused mainly on Petra, Jordan's premier attraction, and few other sites. (world bank group,2015).Jordan changed its direction with the 2004 National Tourism Strategy, a pioneering effort that resulted in broadening the country's tourism appeal, improving quality, and increasing employment, business turnover and earnings. The country's medium-term objective was to bring tourists beyond traditional sites, to bring their spending where poverty is and extend their stay. Additionally, the strategy recognized the need for a greater integration of

elements of the sustainable tourism model now used widely (with communities and tourists at its foundation), giving value to both domestic and international tourism, priority to local economic development, social cohesion, improving cultural and natural heritage sites, rehabilitating historic city cores, and raising the living standards of local communities living in or close to tourism attraction. (world bank group,2015).

The project supported by the Bank consisted in an investment of US\$ 56 million, implemented from 2007 to 2014, which provided technical and financial resources to the historic downtown areas of five historic cities—Jerash, Karak, Madaba, Salt, and Ajloun. These cities, before the project, all suffered from high urban poverty, but showed potential as new tourist destinations. Activities were selected through extensive local consultation and engaging with citizens in an innovative manner, through dedicated decentralized units at municipal level, emphasizing the correlation between livability of downtown areas and location of service-oriented firms. To facilitate the project, the Culture and Sustainable Development Global Partnership Program was called in, and it became an active partner of the project, providing support for project preparation with a first grant of US \$350,000 and a second grant of US \$300,000 for an economic impact assessment at project closure and a feasibility study for follow-up investments. (world bank group,2015).

At project closure, the economic impact assessment conducted by Australia's Maquarie University found out that the project exceeded its targets, creating more than 1,000 jobs, enhancing living conditions for 1 million residents, benefiting 200

businesses, and enhancing the experience of more than 4 million domestic and international tourists. (world bank group,2015).

1.2.3 ACHIEVEMENTS: (world bank group,2015).

- Clear majorities of businesses (85% in Madaba and 65% in Salt) reported that they think the upgraded city cores are now attractive places for customers.
- About three-quarters of the respondents agreed that the improved core now “gives a sense of Jordanian cultural identity.”
- Cultural institutions are growing, with the average number of employees per institution rising between 2007 and 2013 in Madaba from 1 to 8, and in Salt from 12 to 16.
- 80% of stakeholders in Madaba and Salt agreed or strongly agreed that the project had a positive impact in terms of visitors, both Jordanian and foreign.
- 70% of visitors in Madaba and 80% in Salt agreed that conservation and upgrading works improved livability.

DEVELOPMENT RESULTS AND SOCIAL MEDIA: 10,000 “LIKES” FOR SALT’S WORK ON FACEBOOK

In July 2014, the Salt municipality erected a giant screen at the Saha (one of the project sites, photos below) for local communities to watch the World Cup in

Brazil. Pictures appeared on Facebook along with the following comment: “Little did we know that in the process of rehabilitating Sahat Al Ain in Salt that this reclaimed public space will be fully populated as an open theater on one summer night and by that creating a rare social scenery in Jordan. The Government, the World Bank and the municipality totally got it right”. The post received about 10,000 likes, proving the appreciation for the project. (world bank group,2015).

3.3 Southern West Bank,

Palestinian Territories

WORLD BANK HELPS SOUTHERN WEST BANK TURN AROUND FAILING WASTE MANAGEMENT SYSTEM(world bank group,2015).

A new solid waste management system in the Southern West Bank includes better trained professionals, the rehabilitation and closure of unsanitary dumpsites and a new model to work with the private sector in implementing a sanitary landfill. (world bank group,2015).

As of 2014, more than 4 million people live within 1,000 square miles in the Palestinian territories, where the amount of solid waste threatens both the environment and health. Furthermore, more than 2,500 tons of waste are produced each day. 34% of which is generated in the Hebron and Bethlehem governorates in the Southern West Bank. (world bank group,2015).

The solid waste management system in the Palestinian territories was plagued in recent years by poor service planning, low collection and disposal capacity, inadequate fee collection, and insufficient national and local funding for upgrades. Medical waste and household waste were disposed of together in uncontrolled dumpsites, and solid waste was randomly dumped in open lots, along roadsides and in more than 19 unsanitary dumpsites spread across villages. Waste burning was also common. (world bank group,2015).

These practices threatened public health through both pollution of the groundwater aquifers that are the main local water source and because of air pollution from the burning of waste. They were also a major barrier to tourism. (world bank group,2015).

Local governments in the Southern West Bank implemented a number of transformative solid waste management projects with World Bank support. (world bank group,2015).

One, the Southern West Bank solid waste management project, serves more than 800,000 people in the Bethlehem and Hebron governorates. The project includes strengthening local waste disposal management capabilities, providing a sanitary landfill facility, a public awareness campaign to promote minimizing waste, and resource and cost recovery. (world bank group,2015).

The 2009 \$20 million investment, which included a \$12 million World Bank grant, financed infrastructure and equipment and provided technical assistance to improve waste management. Given the complexity of managing a sanitary

landfill—especially in terms of meeting environmental and financial safeguards—the project team enlisted the International Finance Corporation Transaction Advisory Group to help find an international private sector firm to manage the landfill. The task presented potential candidate companies with substantial risk, due to the lack of previous public–private partnerships in the sector, the Southern West Bank’s fragile political and social situation, and the absence of an adequate fee collection mechanism to guarantee payments to the private sector firm. (world bank group,2015).

The team also arranged an \$8.25 million performance–based grant for a 4–year period to reward local governments’ improvement in solid waste management, fee collection, and street cleanliness. It was expected that better fee collection and service performance would strengthen the ability of local governments to continue to pay for landfill operation after the World Bank project was closed. This also made it more favorable for a private landfill operator to enter a public–private partnership arrangement with the local governments. The first public–private partnership contract in the West Bank was signed in 2014 with an international company and the sanitary landfill has since become operational. (world bank group,2015).

The Southern West Bank sanitary landfill, as well as one achieved through a previous World Bank engagement in the Northern West Bank, was the first of their kind in the Middle East. Altogether 19 unsanitary dumpsites were rehabilitated and closed in the Southern West Bank. These initiatives have created sustainable and innovative livelihoods for the project–affected parties,

such as waste pickers. The following highlights the components of the solid waste management system achieved in the Southern West Bank. (world bank group,2015).

1.3.3 ACHIEVEMENTS:

A sustainable solid waste management system to improve living conditions, especially those of the poor, was instituted. This system includes: (world bank group,2015).

- A new specialized institution (the Joint Service Council) with a focus on consolidated waste management solutions in the Southern West Bank, similar to those established earlier in Jenin (Northern West Bank) and Gaza;
- Bylaws that govern and regulate waste management at the national, regional and local levels;
- A team of qualified Palestinian specialists in waste management;
- A well-established public awareness program supported by a good system for citizen engagement;
- A well-equipped and properly managed sanitary landfill and transfer stations;
- A waste recovery scheme that is yielding good results and already generating revenues;
- A proper system and arrangement for monitoring of waste management and reporting on misconduct for immediate actions;

- A concrete, successful model for partnering with the private sector at the international, as well as local levels, despite the fragile country context;
- A gradual change in cultural behavior that dictates that polluters must pay;
- Better management of the already scarce land resources;

Chapter 4

1.4 Location and Physical Characteristics

Jericho is the only city in Jericho Governorate and located to the south. Jericho is bordered by the Jordan River to the east, An Nuwei'ma town and 'Ein as Sultan camp to the north, 'Ein ad Duyuk al Foqa town to the west, and Aqbat Jaber camp and An Nabi Musa to the south (ARIJ-GIS Unit, 2010).

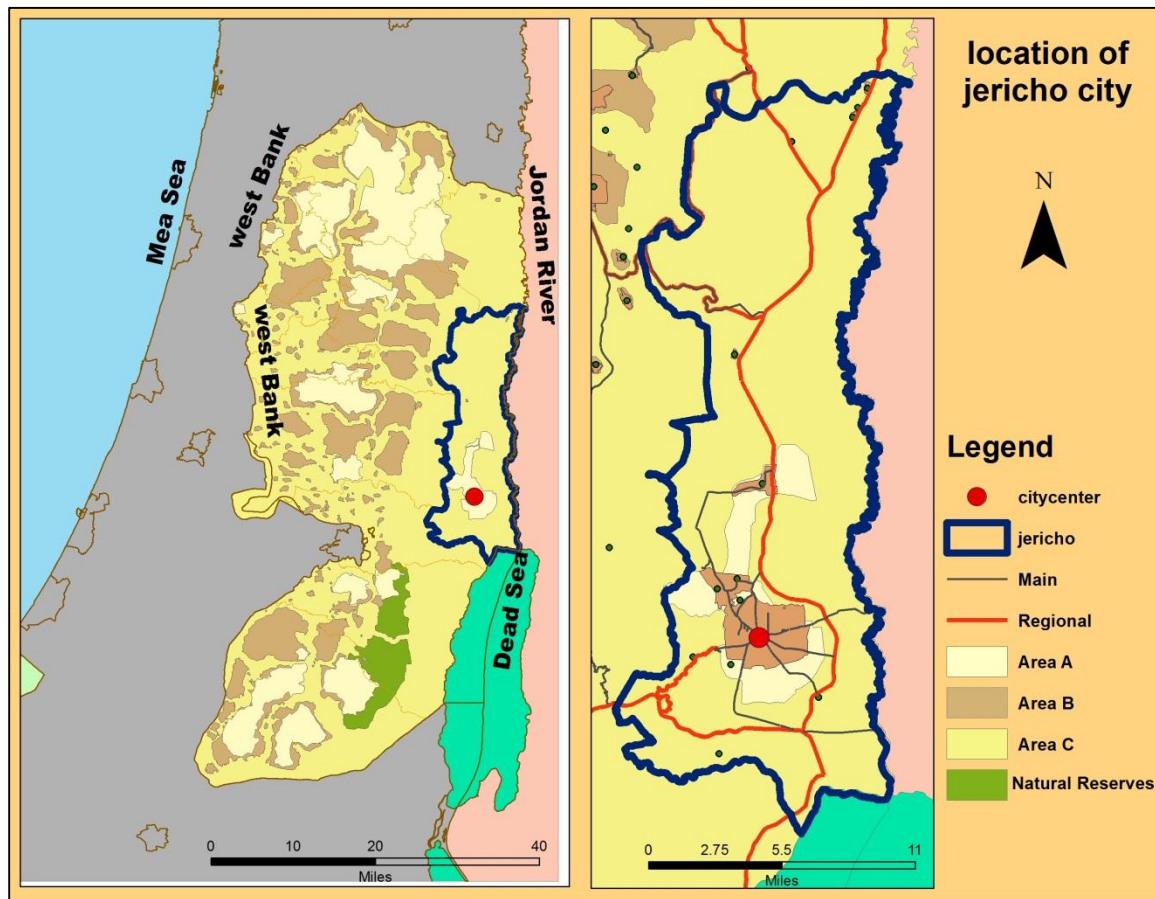


Figure4.3. Jericho location and

Jericho is located at an altitude of 273m below sea level with a mean annual rainfall of 133mm. The average annual temperature is 24oC, and the average annual humidity is approximately 49.3% (ARIJGIS Unit, 2010). Since 1930,

Jericho has been governed by a Municipal Council, which is currently administrated by 14 members appointed by the Palestinian National Authority, in addition to 297 permanent employees. The Municipal Council which is located within the Joint Services Council of Jericho and owns a permanent headquarters, but does not own a vehicle for the collection of solid waste. However, it does possess 15 tractors, 5 pick-up cars, 2 bulldozers, 3 small hammers, and one metal detecting device (Jericho Municipal Council, 2011).

2.4 Overview of History

Being endowed with spring and surface water, fertile soil, and warm climate, the city has a history extending back to the most ancient human habitations as indicated in the ancient archeological remains, Tel es-Sultan, which are located in the northwest of the city. It was built by the accumulation of remains and ruins over many years of its habitation at a location where a dependable and prolific water source is available from local springs.(Arij, Jericho Profile, 1997).

The history of Jericho city is summarized in chronological order¹ as follows. (Arij, Jericho Profile, 1997).

Human inhabitation (8000 B.C. –)

Humans started to inhabit Tel es-Sultan about 8,000 B.C., which is the oldest history of human inhabitation in the world. The Pre-Stone Age – the Late Neolithic Age (Between 6800 – 4000 B.C.) The ancient city was inhabited by different peoples whose lives depended on collecting wild seeds. (Arij, Jericho Profile, 1997).Those inhabitants dug canals and made use of water from Ain es–

Sultan to irrigate their lands. In the Late Neolithic Age (5000–4000 B.C.), people from outside immigrated and settled in the land. (Arij, Jericho Profile, 1997).

The First Bronze Age (4000 – 2300 B.C.)

At the end of the Neolithic Age, a hiatus occurred in human occupation lasting until 3200 B.C. when defensive fortifications appeared in the town after people returned. These defensive walls were repaired and rebuilt sixteen times during the First Bronze Age which lasted for 600 years. (Arij, Jericho Profile, 1997) Those walls were frequently destroyed by earthquakes, infiltration of water into their foundations, or enemy attacks. Continuous improvements in civilization and construction were observed in this period when people started to use copper in large quantities in order to manufacture weapons and tools. (Arij, Jericho Profile, 1997).

The Middle Bronze Age (2300 – 1900 B.C.)

New inhabitants settled in the city and resided in ramshackle homes on the top of the hill. The spread of these homes extended onto the hill slopes since there was no defensive wall in that interval. (Arij, Jericho Profile, 1997). It is probable that these new inhabitants were the Amorites who occupied most of the Middle Eastern countries, including Iraq and Egypt during the period. (Arij, Jericho Profile, 1997).

The Hyksos period (1750 – 1580 B.C.)

Jericho was one of the strong-holds of the Hyksos or Shepherd Kings (1750–1580 B.C.). Their houses were well built and covered the entire top of the hill. (Arij, Jericho Profile, 1997).

The Canaanites period

Canaanites emigrated from Arabia to Syria. Jericho was one of their most important cities in 1400 B.C. (Arij, Jericho Profile, 1997).The Canaanites excelled in the sculpture of statues and in pictorial sculpture. (Arij, Jericho Profile, 1997).The styles of that period were exactly similar to the contemporary head dress now worn by Palestinian women. (Arij, Jericho Profile, 1997) .It is known by its popular name, “Al–Wiqahyah” (The protector), or “As–Samada” or “Al– 'Usabh al–kan'aniyyah “(The Canaanite Turban). (Arij, Jericho Profile, 1997).

The Roman period

In the early stage of the Roman period (4th century B.C.), the city moved from Tell es–Sultan to the Al Qilt valley, which is currently known as Tell al Abu Al Oleig. (Arij, Jericho Profile, 1997).The city expanded with canals, pools, castles, palaces and other structures. Jericho acquired a great importance in the time of Christ, as Jesus Christ Himself visited the city. In 325 A.D. Jericho became the center of a bishopric. (Arij, Jericho Profile, 1997).

The Muslim period

In the seventh century, Jericho city entered into the rule of the Arab Moslems and the city's prosperity increased due to its prominence for soldiers and the cross

relationship with the Ummayed Caliphs in Damascus. (Arij, Jericho Profile, 1997).The Ummayeds paid special attention to Jericho due to its location as well as its loyalty to the Ummayed family. King Hisham built a palace as a winter resort, which is located in the north of the city. Aqueducts and canals fed by Doyuk spring spanned over the valley and irrigated the palace's gardens and lands. (Arij, Jericho Profile, 1997).

At the last stage of Islamic caliph period, Jericho was ruled by the Ottoman emperor until 1917 and then the British mandate lasted until 1948. (Arij, Jericho Profile, 1997).

Between 1948 and 1967, the population of Jericho district grew to 80,000 persons but then more than 85% of the population became refugees just after the 1967 war. The refugees were forced to leave for Jordan and other Arab countries. (Arij, Jericho Profile, 1997).

3.4 Site selection

I chose my project site depends on the three pillar of sustainability environment, economic and social, Based on that I chose Jericho as my model for sustainable city.

1.3.4 Why Jericho from Economic pillar perspective:

- Crossroads of corridor

Historically, Jericho was in function as an oasis city of the Jericho rift valley for the people to move and rest. The people started to cultivate for agriculture activities in Jericho with the spring water, and warmer weather, and a city was formed. Corridor network was developed toward north-south, and east-west, and Jericho was serving as an international for culture and trades. Jericho was then developed as cross-point of the people and goods. The two corridors were developed and strengthened linkage from/to Jericho, the Middle East, the

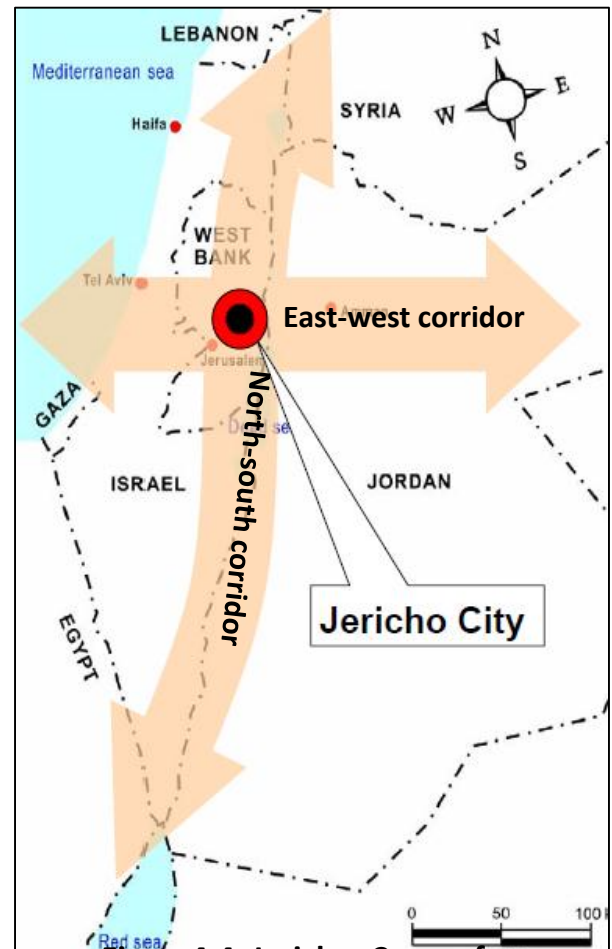


Figure 4.4. Jericho, Cross of Roads. Source: JICA Study Team

Mediterranean Sea and the Red Sea, and the movements of the people and goods with cultural exchange was activated based on the agricultural and commercial activities.(JICA Study Team,2006).

In May 2001, the UN Economic and Social Commission for Western Asia (UNESCWA) adopted the “Agreement on International Roads in the Arab Mashreq” for promotion of international corridors in the Middle East. (JICA Study Team,2006).Route M40 that runs through the West Bank has been designated as one of the main east–west corridors in the region. Route M45 is the main north–south corridor planned to run through Jordan as shown in Figure .4.4. (JICA Study Team,2006).

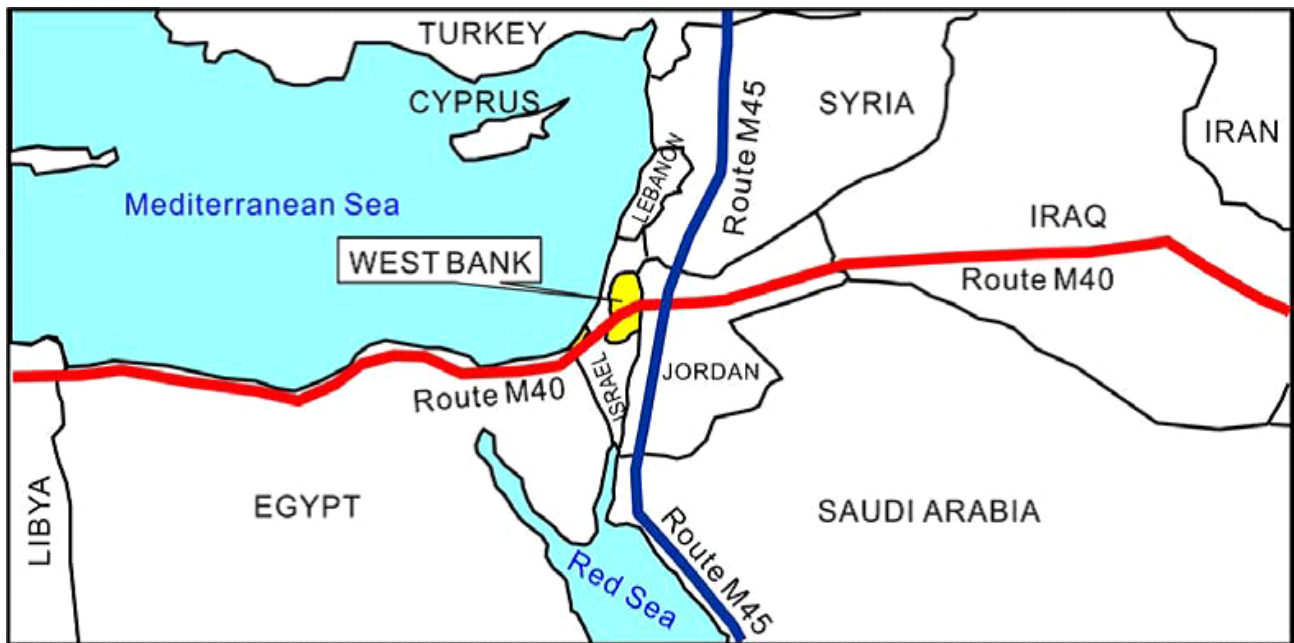


Figure 4.5. Planned International Source:

- Distribution channels

Most growers in Jericho Governorate utilize the wholesale markets in Jericho City and sell their products to traders from Bethlehem, Hebron, and Nablus. (JICA Study Team,2006).

Although the agricultural products in Tubas District are similar to those in Jericho Governorate, the farm–gate price for vegetables in Tubas is lower than that in Jericho, due to its disadvantage with the poorer road conditions. Overall, the consumer market prices at their major target, Nablus, are lower than those in the other towns in the West Bank. (JICA Study Team,2006). Furthermore, traders in Nablus tend to come to Jericho even though it is a further distance because of the convenience of the road networks and the range of the wholesale market. The Ministry of Agriculture (MoA) recommends that farmers grow fruit instead of perishable vegetables. (JICA Study Team,2006).

Growers along Route 90 are shipping vegetables directly to Israel through intermediaries. Vegetables sold in Jerusalem are mainly from Israel. (JICA Study Team,2006).

The wholesale market in Jericho City has been playing a significant role in the trade of horticultural crops since 1968. Most growers in Jericho bring their products to the wholesale market and ask designated commissioners to sell them at appropriate prices. (JICA Study Team,2006).

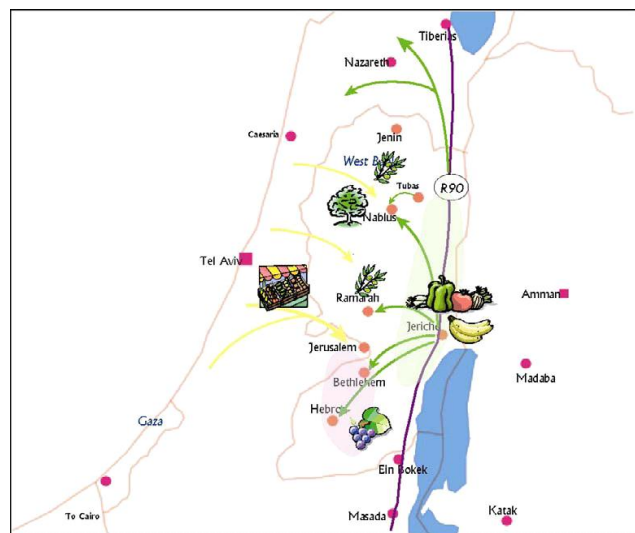


Figure 4.6. Distribution Channels for Vegetables Source: JICA Study Team 79

Commissioners sell these products at the auction and take 7% of the transaction value as a commission. The circulating boxes are rented and the volume is counted by box and not by weight. The wholesale market deals with 600,000–700,000 boxes a year. The estimated value of the dealings in the wholesale market is approximately NIS 12 –14 million (US\$ 2,580,000 – US\$ 3,010,000). (JICA Study Team,2006).

2.3.4 Why Jericho from Social pillar perspective:

- Jericho city characterized by its low density

The population of Jericho city was approximately 21,499 in 2007. Including the surrounding areas, the Greater Jericho area had a total population of about 40,403 persons (2007). The city has the lowest population density of the major

Table4.3.Population Projections

	2007	2012	2017	2022	2027
Jericho (Ariha)	18,110	20,826	23,816	27,276	32,042
'Ein as Sultan Camp	3,119	3,587	4,102	4,691	5,364
Aqbat Jaber Camp	7,084	8,146	9,315	10,653	12,183

- Historical and Cultural Uniqueness

As summarized in the following table, Jericho city has a significant historical and cultural uniqueness that is composed of a multi-religious and cultural background.(JICA Study Team,2006).

Table4.4.Major Historical and Cultural Uniqueness of Jericho City Source: JICA Study Team

Uniqueness	Contents
Historically important sites	- Tell es-Sultan, “The oldest city in the world” - Birth place of agriculture and civilization - The center of Christianity in Roman times
Multi-religious sites	- Objects of Christian, Muslim, and Jewish religions can be observed throughout the city.
Multi-cultural sites	- Objects of Roman, Arabic, and Byzantine times can be observed throughout the city.

- Jericho city is where I live

3.3.4 Why Jericho from Environment pillar perspective

- Jericho has some signs of recycling among its residents



Figure 4.7. Compost Pile At Home

- Jericho the city of bicycles

Bicycles in Jericho are ubiquitous. Farmers and students, shopkeepers and civil servants commute on their bicycles. (Dr. Hamdan Taha and Dr. Ali Qleibo)The fact that Jericho is flat has helped in making it the only city in Palestine where cycling is the major means of transportation, spread out scenically among green fields, orange orchards. Palm trees and relatively low-traffic density, Jericho is a bicycle-friendly city. (Dr. Hamdan Taha and Dr. Ali Qleibo).



Figure4.8. Cycling in Jericho city

- Diversity of Jericho landscape

Great Jericho have 7 different landscape in it border: 1. The oasis , 2. The agricultural land, 3. The mountains, 4. The valley, 5. The Jordan River, 6. The Dead Sea, 7. The Desert.

4.4 Site analysis

I analysis Jericho according to the three pillar of sustainability: environment economic and social.

1.4.4 Site analysis according to environment pillar

I divided the environment analysis to:

- Natural environment which contain: Landscape, Water.
- Physical environment which contain: Housing, West water, Solid west, Energy.

1.1.4.4 land scape

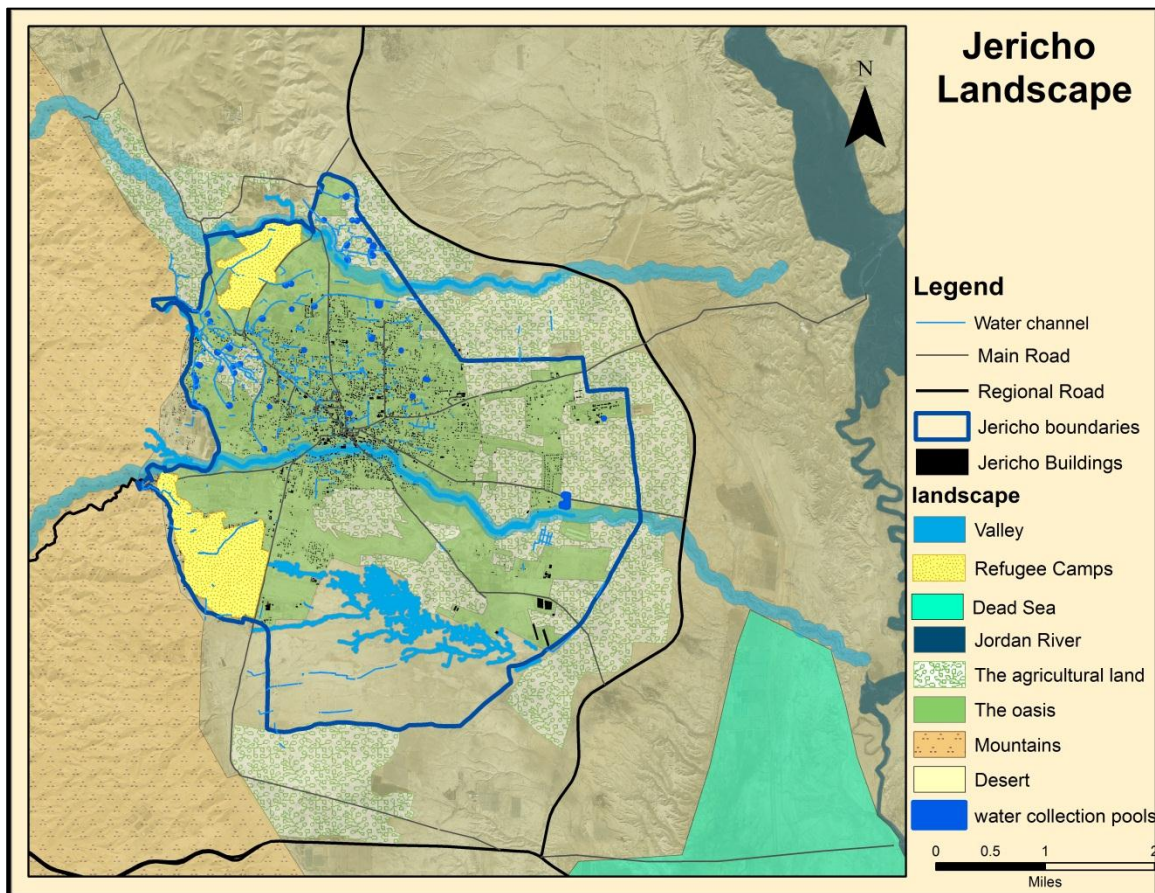


Figure4.9. Jericho landscape

- The Oasis

The oasis identifies the city of Jericho. The area has been uninterruptedly inhabited for millennia because of the Ein-es-Sultan spring that gave origin to the first human settlement and the oasis. Even now, despite the increasing urban growth, to those arriving from Jerusalem through the desert, the city appears as a spot of green in the dry Jordan Plain. (Jericho Master Plan,2013)



Figure4.10. Jericho oasis

- **The Desert**

Even if often considered as an empty land the desert is a very important topographic feature and one of the main components of the ecological system of the region. By surrounding the oasis it defines it, and provides a habitat for many species. (Jericho Master Plan,2013)



Figure4.11. Jericho desert

- **The valley (Wadis)**

The city area is crossed by two main Wadis : Wadi Qelt in the south and Wadi N'wemeh in the north. For most of the year their riverbeds are dry, but large flows occur in winter time due to storm water. (Jericho Master Plan,2013)

The Wadis have typical topographic features within the flat area: a smaller deeper riverbed, usually no larger than 5-10 meters, and a larger “valley”, the size of which varies, normally with steep shores, sometimes spotted by banana plantations or other crops. Wadi Qelt crosses the city centre of Jericho. (Jericho Master Plan,2013)

In addition to the two main Wadis , several smaller ones flow across the plain south and north of the city. They fill with storm water during winter, but remain dry for most of the year. (Jericho Master Plan,2013)



Figure4.12. Jericho valley

- **Jordan River**

To the east, a few kilometres from Jericho, flows the Jordan River. Even if not within the Municipality boundaries, it constitutes a major element in the history and in the cultural landscape of the city. Now the river is separate from the city life. It is divided from it by the by-pass of road 90 and it is not easily not accessible for military reasons. (Jericho Master Plan,2013)



Figure4.13. Jordan River

- **The mountains**

The city landscape is dominated to the west by the steep slopes of the Western Ridge. Even if they are just outside the city boundaries, they constitute a main limit and, most of all, beautiful scenery for the city. (Jericho Master Plan,2013)



Figure4.14. Jericho Mountains

- **The agricultural land**

In addition to the cultivated land of the oasis Jericho has large tracts of farming land which further emphasize its traditional agricultural vocation and play an important environmental role.(Jericho Master Plan,2013)



Figure4.15. Jericho agricultural

- **The Dead Sea**

The Dead Sea is a unique natural area situated in the Jordan rift valley. The entire basin is a spectacular landscape characterized by the abundance of a variety of unique ecosystems not found in any other part of the world. Semitropical marshland, mudflat, and wetland ecosystems are abundant mostly in the north-western areas of the Dead Sea and are mostly characterized by sites such as Ein-Fashkha and Al-Auja. (Dr. Hamdan Taha and Dr. Ali Qleibo)



Figure4.16. the Dead Sea

2.1.4.4 Water

The climate in the Jericho area is dry, with high temperatures in Summer and low rainfall. The rainy period is from October to May and the average rainfall is 150 mm/year. (Jericho Master Plan,2013)

The city is crossed by two main wadis, Wadi Qelt and Wadi N'wemeh, where water flows just in Winter and Spring, while they remain dry during summer. (Jericho Master Plan,2013)

The main source of water in Jericho is Ein es-Sultan spring which provides water both for domestic (42%) and agricultural (58%) use. The flow of water is almost constant throughout all the seasons and is approximately 650 m³/hr. (Jericho Master Plan,2013)

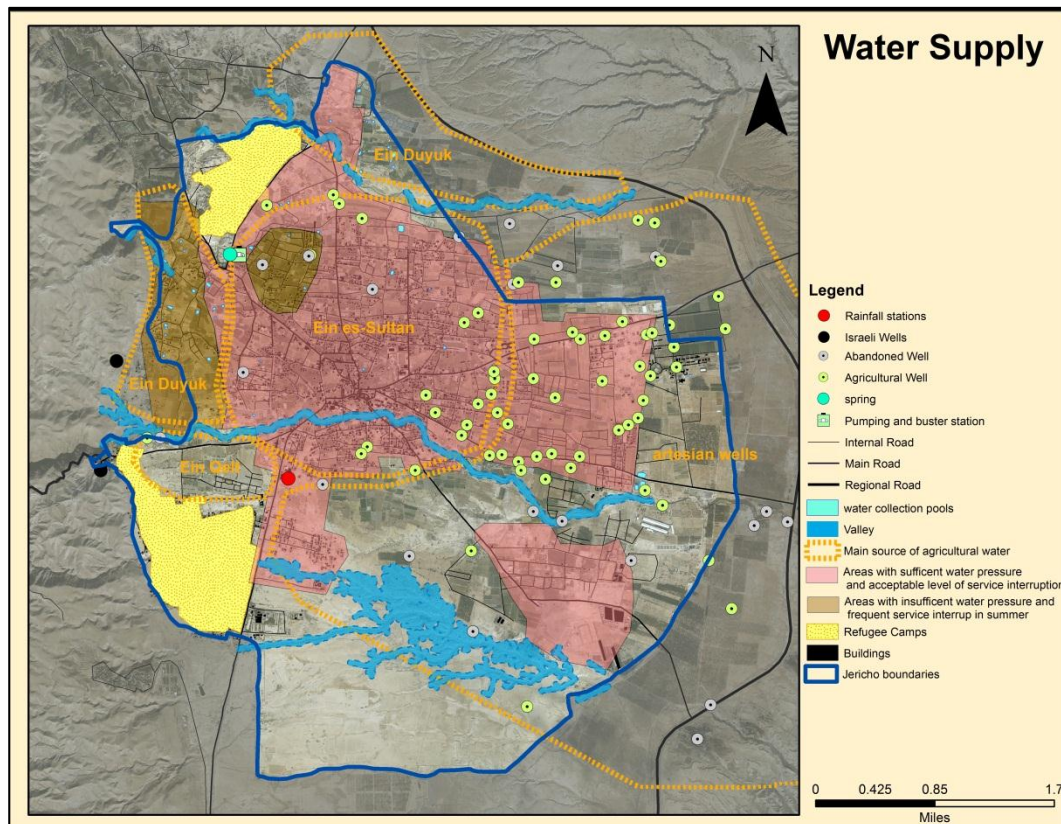


Figure4.17. Jericho water supply

as it show in Fig.4.17,Jericho have many water sources such as Wadi Qelt in the south and Wadi N’wemeh in the north, wells (most of them is agricultural wells), Ein es-Sultan spring and Ein Duyuk spring . and it distribute among Jericho district equally , Covering all jericho city .

3.1.4.4 Housing

statistical book about the Jericho and Al-Aghwar Governorate. Unluckily this data are note desegregated by single local unit but refers to the whole governorate. Just few data about the number of building and dwelling. (Jericho Master Plan,2013)

General Facts about Jericho (PCBS web site, community profile - Ariha - 2011)

Number of buildings: 3,386

Numero of housing units: 4,549

Housing Tenure

Housing tenure pattern in Jericho are pretty similar to West Bank averages: more than four out of five persons own the house were they live. A tiny percentage rent its dwelling on live in it at different entitlement (for free or as work-related benefit). (Jericho Master Plan,2013)

	Other	Rented	Owned
Jericho Governorate	6,1 %	9,5 %	84,4 %
Jerusalem Governorate	4,8 %	16,4 %	78,8 %
West Bank	7,7 %	8,7 %	83,6 %

Table4.5. Jericho house ownership

Source: JICA Study Team

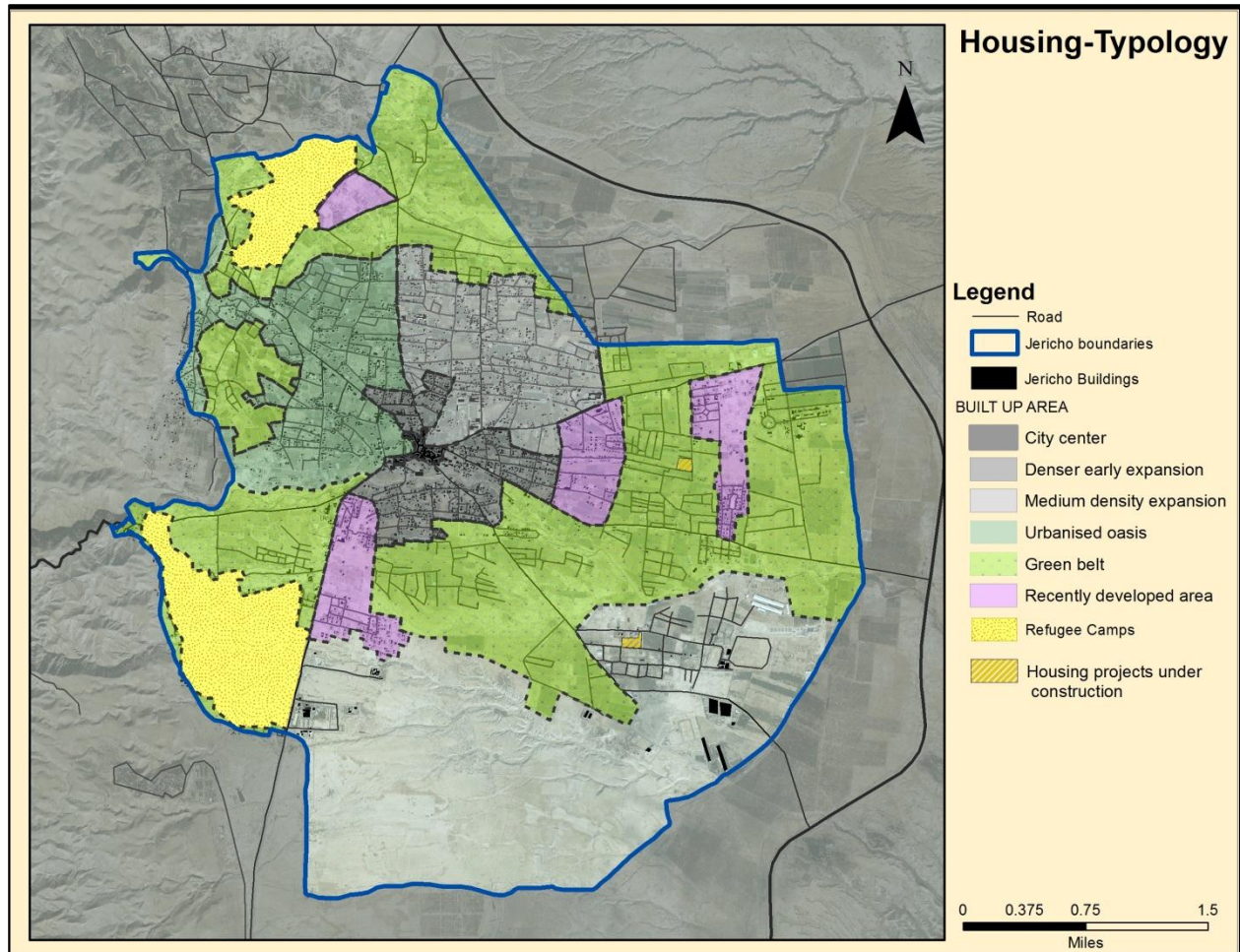


Figure 4.18. Jericho house

As it shown in Fig.4.18,Jericho presents a quite homogenous fabric pattern: 1. The city center, 2. Denser early expansion, 3. Medium density expansion, 4. Urbanism Oasis, 5.

The majority of the land is agricultural land and it create a green belt around Jericho city .

1. The city centre

This area correspond to the inner city core, situated around the Central Square and the road spreading from it. (Jericho Master Plan,2013)

This area gathers most of the city commercial areas, large institutional buildings or compounds, private and public services, the main mosques and transportation hub. (Jericho Master Plan,2013)

2. The denser early expansion

This area constitutes the early expansion of the city, mainly developed from the 60's to the 80's and progressively saturated in the last decades. (Jericho Master Plan,2013)

3. The medium-density expansion

This area, mostly concentrated in the north and north east of the city centre, developed at a slow pace, mainly from the 90's, through small parcelisation plan (up to 20-30 plots) and isolated houses. (Jericho Master Plan,2013)

4. The “Urbanised” oasis

This area, corresponding approximately to a crescent encircling the city centre from north east to south east and reaching far up to the Tell es-Sultan area, is the historical core of the ancient oasis. (Jericho Master Plan,2013)

The backbone of the area is Tell es-Sultan street (once called bustani - garden - street) that used to be lined by big manors surrounded by orchards and, in more recent times, by open-air restaurant. (Jericho Master Plan,2013)

4.1.4.4 West water

General overview of the present condition(Jericho Master Plan,2013)

The city of Jericho is currently lacking of a sewage system. The waste water is currently collected in septic tank, that need to be periodically discharged to appropriate site, or cesspit, that infiltrate directly in the ground. This solution, especially the second one, is cause to serious problems of pollution of the underground water. (Jericho Master Plan,2013)

The Intercontinental Hotel complex has its own water treatment system, that also collect and treat most of the irreducible solid settlement of septic tanks all over the city. (Jericho Master Plan,2013)

Ongoing projects: the sewage system under implementation(Jericho Master Plan,2013)

Since the second half of 2012, a project for providing Jericho with a sewage system has started, developed and funded by the Japanese Government in collaboration with the Palestinian Water Authority . (Jericho Master Plan,2013)

The system is to serve the city of Jericho, Ein Duyuk, N'wemeh, and the refugee camps. The implementation of the project is divided in many phases. Currently only the first one (accounting for more than 32 mil\$ investment) is founded and under implementation. Funding is yet to be secured for the subsequent phases.

The first phase of the project, to be implement by 2014, includes:

- construction of the Waste Water Treatment Plant;

- construction of a large part of the trunk network, accounting for around 25.4 Km.
- Subsequent phases include:
 - construction of the secondary network;
 - houses connection.

The main components of the system will be(Jericho Master Plan,2013):

The Network(Jericho Master Plan,2013):

- 24.5 Km of trunk network (diam. 200÷700 mm) to be realised in the first phase (2012-2014);
- 16 Km of secondary network to be realised in subsequent phases;
- House connections

The Waste Water Treatment Plant (WWTP) (Jericho Master Plan,2013):

- A major Treatment Unit located in the south-eastern part of Jericho, on a land rented from the Ministry of Waqf, covering an area of around 125 dunums (12.5 ha).
- The Design capacity is of 9,800 m³ per day maximum. The capacity is sufficient for the city of Jericho, including the two refugee camps and the villages of Ein Duyuk and Il Nweimeh
- The treatment unit includes: basin set-up for the treatment of waste water, according to the specific methods and techniques chosen by the Japanese developers, a 1000 m³

- water tank for the storage of the treated water for the agricultural use, basins for drying the solid part of the waste water for the production of fertilizing,
- solar station for the production of 100 kw for the reduction of the electricity consumption for the functioning of the entire unit.
- The project envisaged the reuse of part of the treated water for agricultural and industrial purposes.
- Public gardens and natural landscaping.

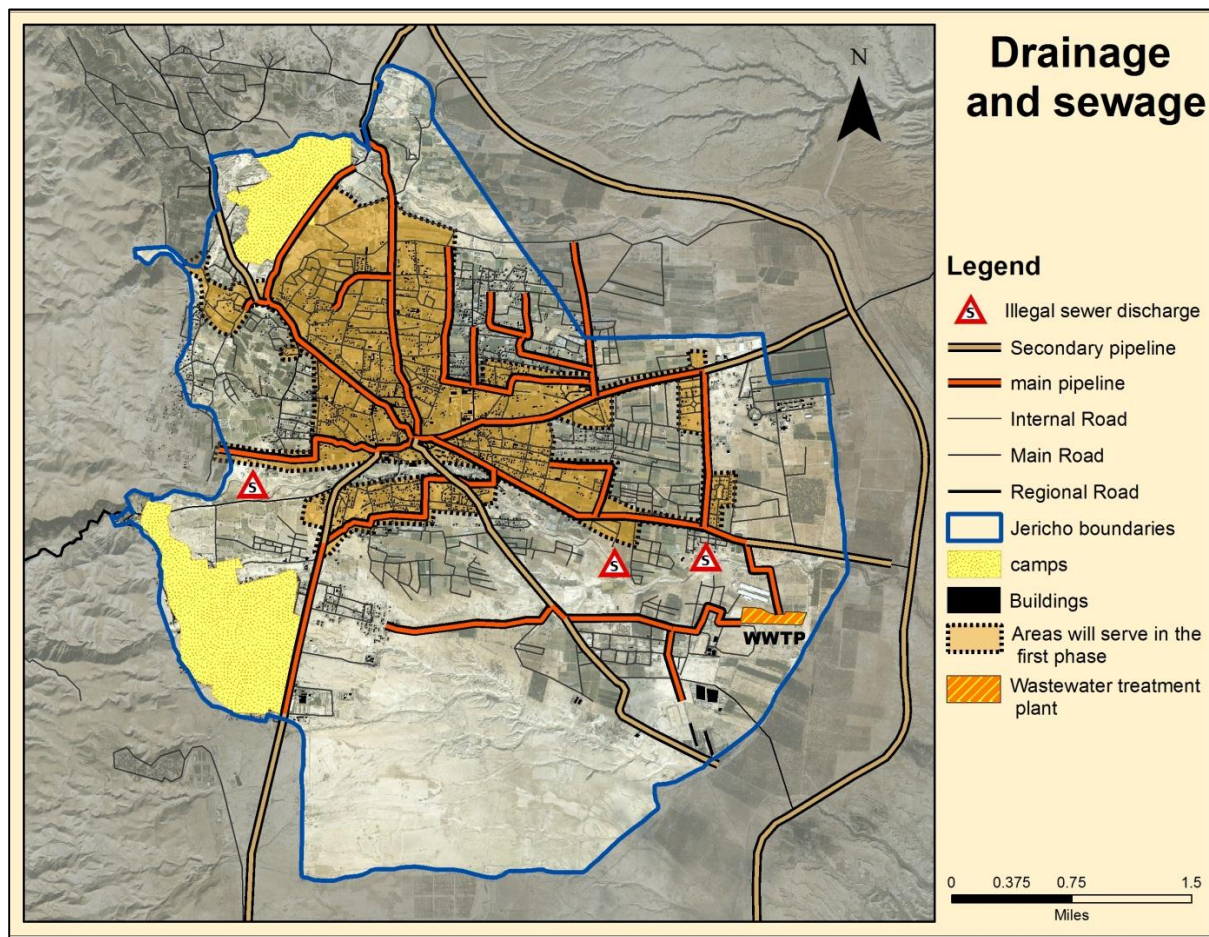


Figure 4.19. Jericho drainage and sewage

As we can see in Fig.4.19, still not all Jericho houses connected to the sewage network and still there is some illegal sewer discharge

5.1.4.4 Solid waste

Overview of the present situation: the collection and disposal system(Jericho Master Plan,2013)

The bodies in charge of the management and collection of solid waste in Jericho are the Municipality and the Joint Council for Service, Planning and Development (JCSPD), with responsibility divided as following(Jericho Master Plan,2013):

- the JCSPD is responsible for collecting the solid waste from the containers and of sending it by truck to the dumpyard where they are treated for final disposal;
- the Municipality of Jericho is responsible for collecting the solid waste from the houses and public spaces and of their disposal in the containers.

The location and quantity of containers throughout the city is decided by the Municipality in cooperation with the JCSPD. (Jericho Master Plan,2013)

UNRWA collects the solid waste door-to-door Inside the camps with its own trucks, disposing it in the containers and then, according to an agreement between UNRWA and the municipality, the JCSPD collects the solid waste from the containers to the final disposal site. (Jericho Master Plan,2013)

The average daily solid waste production is 33 ton/day, with the highest peak at around 50 ton/day (winter) and lowest at 25 ton (summer). (Jericho Master Plan,2013)

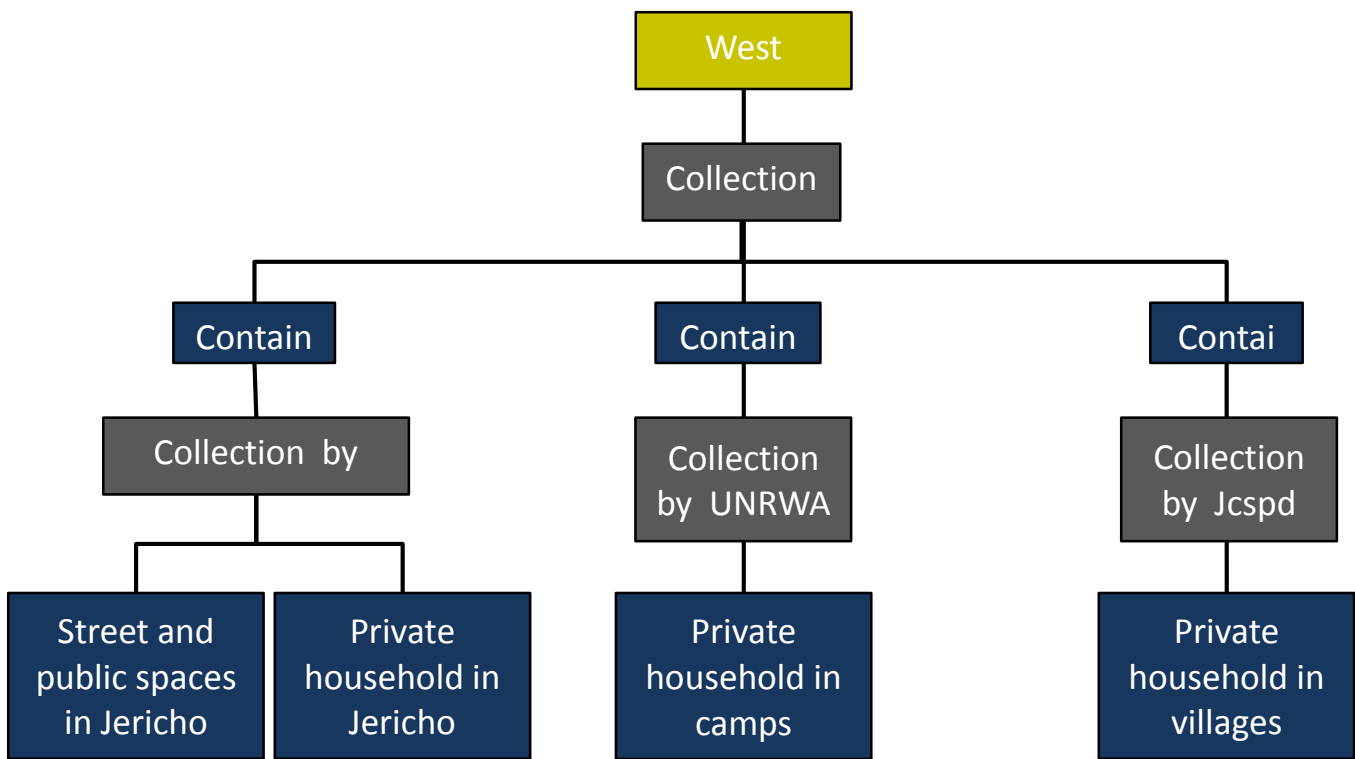


Figure 4.20. Jericho drainage and sewage

The estimated per-capita production of solid waste is(Jericho Master Plan,2013):

Houses in Jericho: 0.8 Kgday

Camps: 0.65 Kgday

Tourism: 0.65 – 0.7 Kgday

Average production is slightly higher than the national one, stated at 0.6 Kg/day (0.7 in West Bank and 0.4 in Gaza strip) but low compared to developed countries averages (i.e. Italy, 1.5 Kg/day). At present, there is no kind of treatment or recycling of garbage. (Jericho Master Plan,2013)

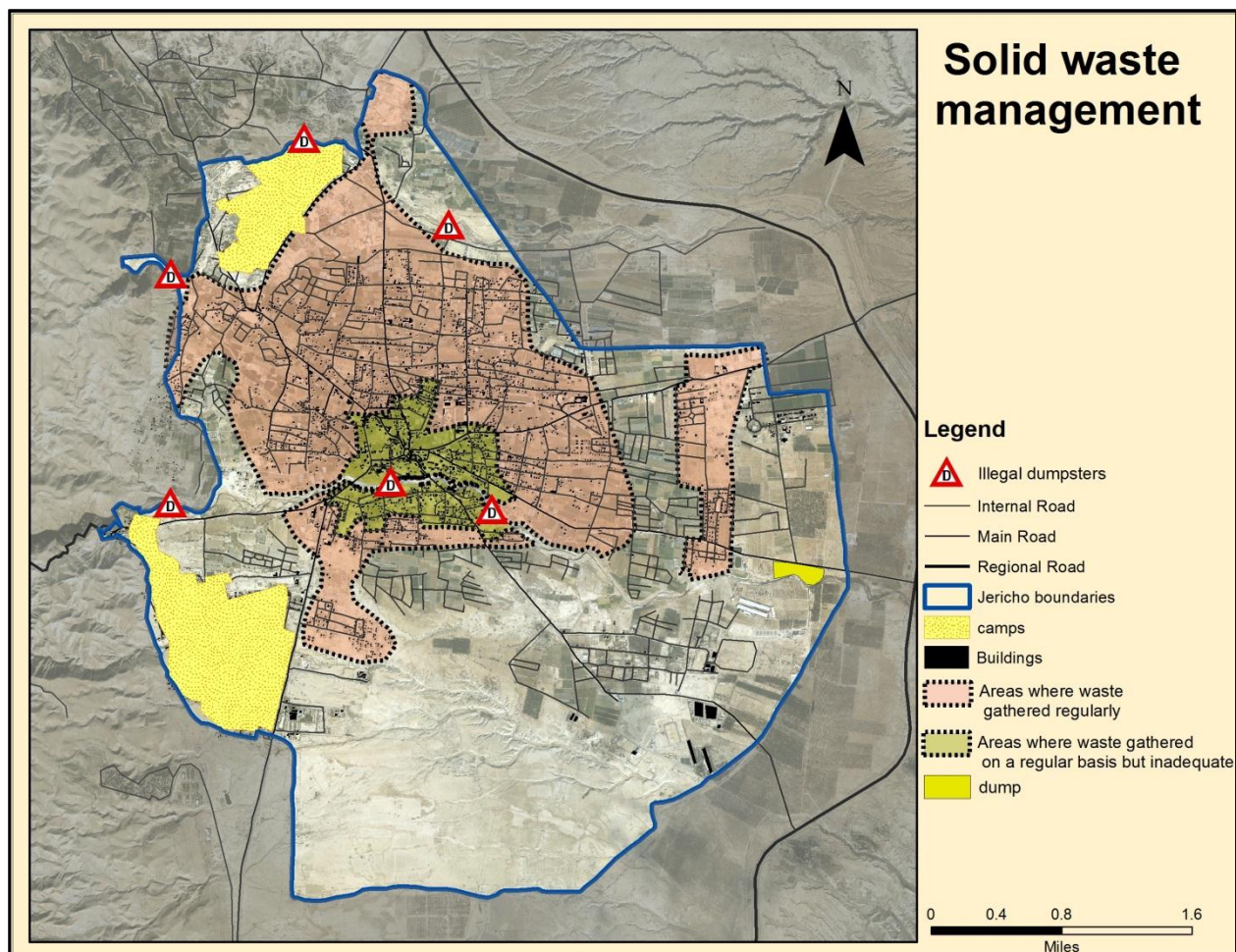


Figure 4.21. Solid waste management

As we can see in Fig.4.21, the city center and some of the surrounding area are suffering from an inadequate waste gathering and there is still some illegal dumpsters site.

6.1.4.4 Energy

Overview of the present situation(Jericho Master Plan,2013)

Jericho has been connected to a public electricity network since 1964, served by Jerusalem Electricity Company; this having since then been the main source of electricity in the city. It is noted that approximately 99% of the housing units in

the city are connected to this network (Jericho Municipal Council, 2011) (Jericho Master Plan,2013).

In Jericho there are two main sources of electrical supply; they are both managed by the Jerusalem District Electric Company (JDECO). The first source is from Israel. The second one is from Jordan through King Abdullah Bridge,. It uses a 33kV transmission line. (Jericho Master Plan,2013)

The total capacity of JDECO's supply is 35 MW (15 from Israel and 20 from Jordan). The power is alternatively taken by the two sources. The present need of electric power is of about 20 MW. In the future JAIP may need 28 MW. (Jericho Master Plan,2013)

Currently, there are two transformer stations in the southern part of Jericho. One is located near the intersection of Route 1 and the regional trunk road No. 449, with the capacity of 15 MW. The other is located close to Inter Continental Hotel along the road No. 449 with its capacity of 10 MW. (Jericho Master Plan,2013)

JDECO is planning to increase its capacity in the next three years, passing from the current 25 MW to 40-45 MW. (Jericho Master Plan,2013)

At present electricity is mainly for domestic use and for a few factories but in the future it will be necessary to supply the industrial zone JAIP. (Jericho Master Plan,2013)

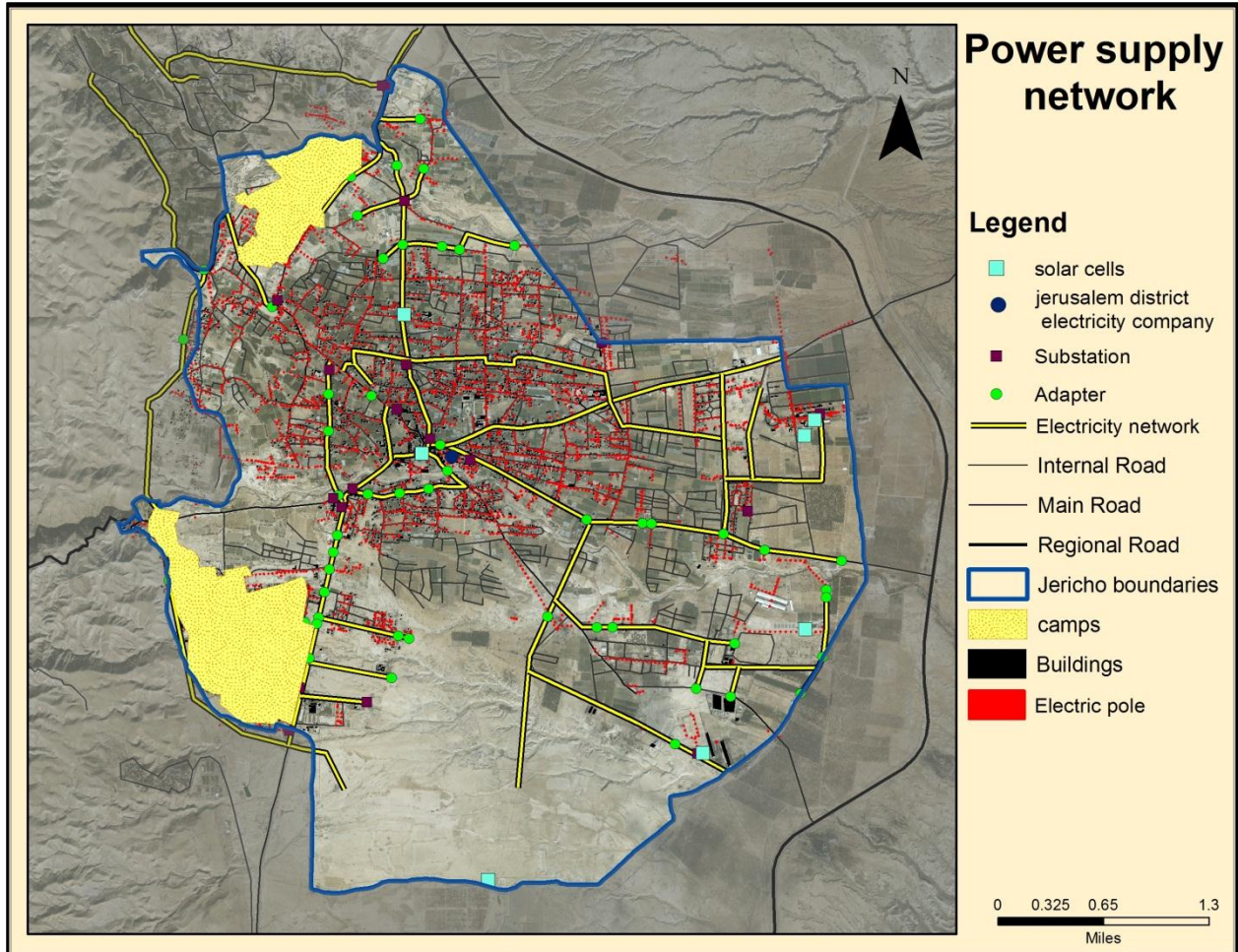


Figure4.22.Power supply network

As we can see in Fig.4.22,Electricity network covered the whole city .

Opportunity and Strength of the environment pillar

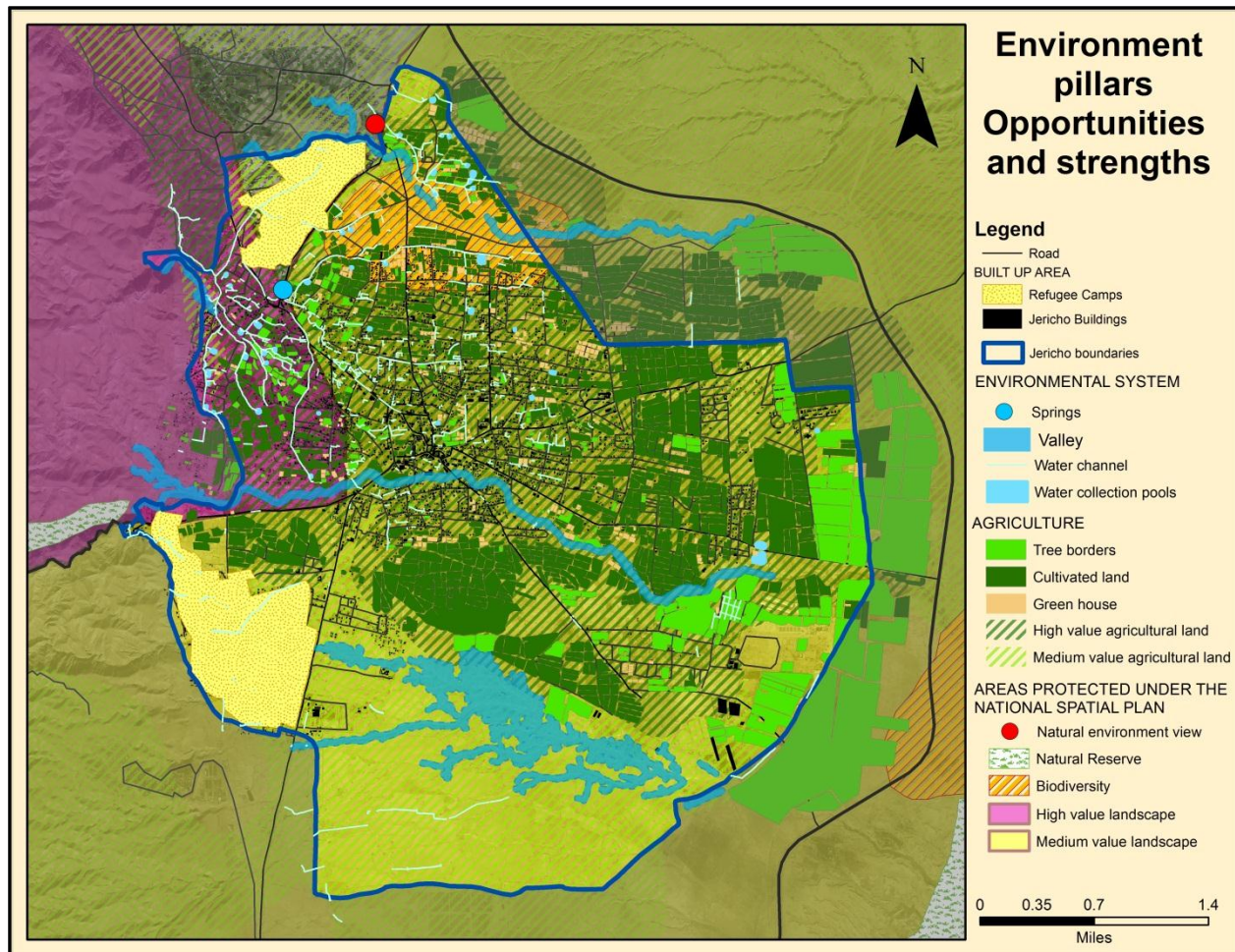


Figure4.23. Environment pillar opportunity and

As we can see in Fig.4.23, the environment system in Jericho consists of water resources such as springs, valley, water channel and water collection pools, agriculture land consists of green house, trees and cultivated land, and areas protected under the national spatial plan such as natural reserve, biodiversity, high value landscape and medium value landscape.

Most of the city agricultural land is classified as high value.

Threatens and Weaknesses of the environment pillar

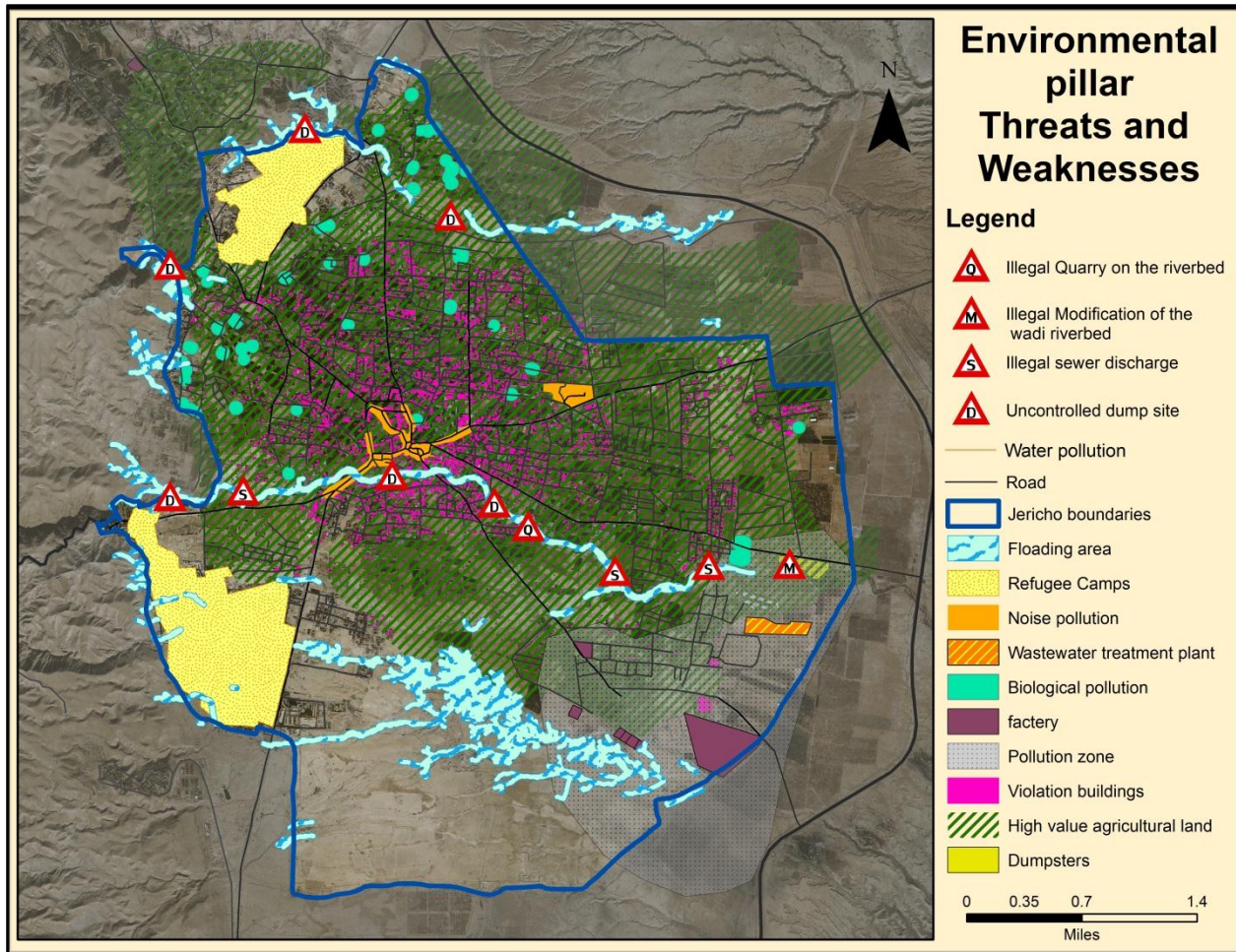


Figure4.24. Environment pillar opportunity and

Jericho suffered from some problems that threatens its environment system as we can see in Fig.4.24, these problems summarize in illegal Quarry on the riverbed, illegal Modification of the wadi riverbed, Illegal sewer discharge, uncontrolled dump site and all cause a water pollution. There is noise pollution come from the CBD area and some main streets, biological pollution come from agricultural pool a pollution zone from the industrial area in addition of the pollution comes from the WWTP and the dumpster in the east side of the city. Most of the city buildings are built up in a high agricultural land causing some problem in construction and cultivation.

2.4.4 Site analysis according to Economic pillar

The main elements of the economic pillar is : 1. Tourism, 2. Agriculture, 3. Transportation.

1.2.4.4 Tourism

Jericho city is rich in tourism assets and is expected to be an international tourism city in the future. In the event that more tourism related facilities are established to receive tourists and visitors, the city and tourism assets will turn out to be vulnerable to such facility development and increased number of visitors. Therefore, tourists should be properly guided to lessen such vulnerability. (Jericho Master Plan,2013)

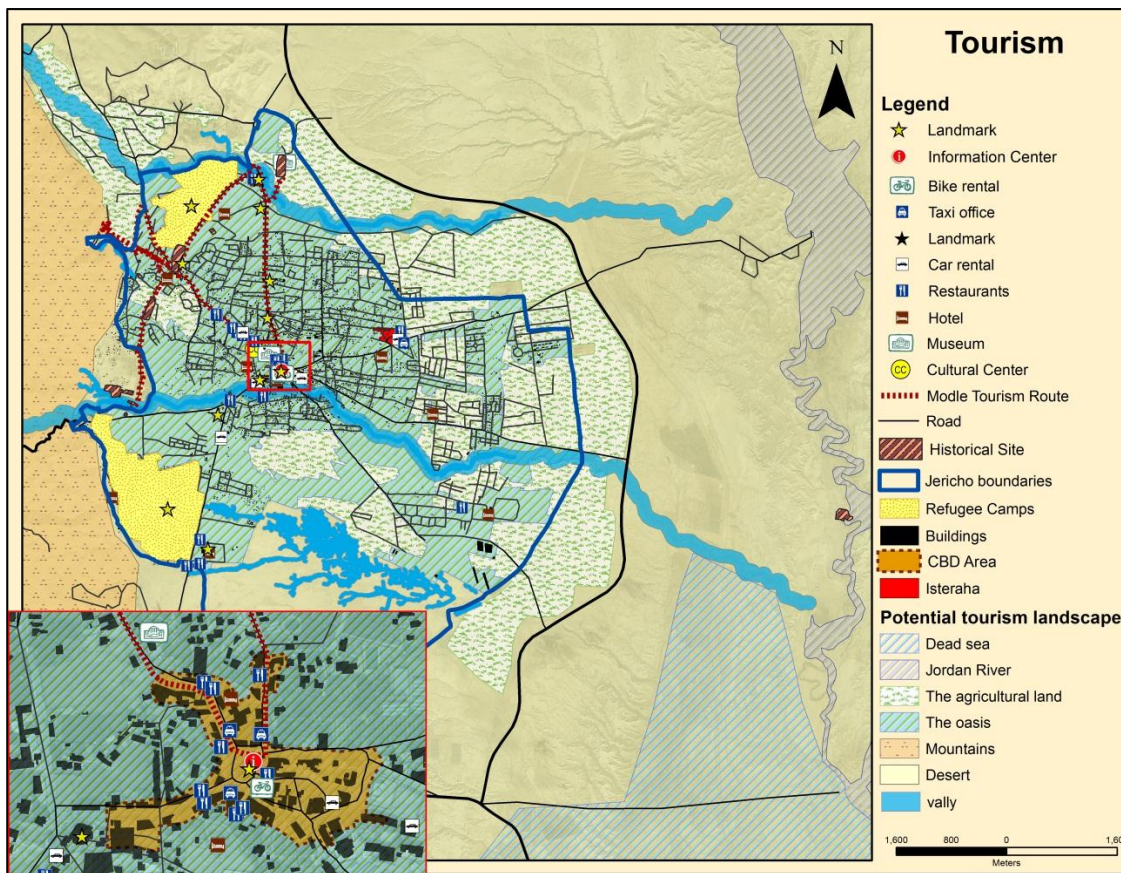


Figure4.25. Tourism

Jericho is known as the oldest town in the world, so as we can see in Fig.4.25,Jericho have many historical site in addition of it unique landscapes which can consider as a potential tourism feature and the defriend tourist facility.

2.2.4.4 Agriculture

Jericho was one of the ancient centers in the near east that witnessed the development of agriculture between the tenth and eight millennia BC. (Dr. Hamdan Taha and Dr. Ali Qleibo)

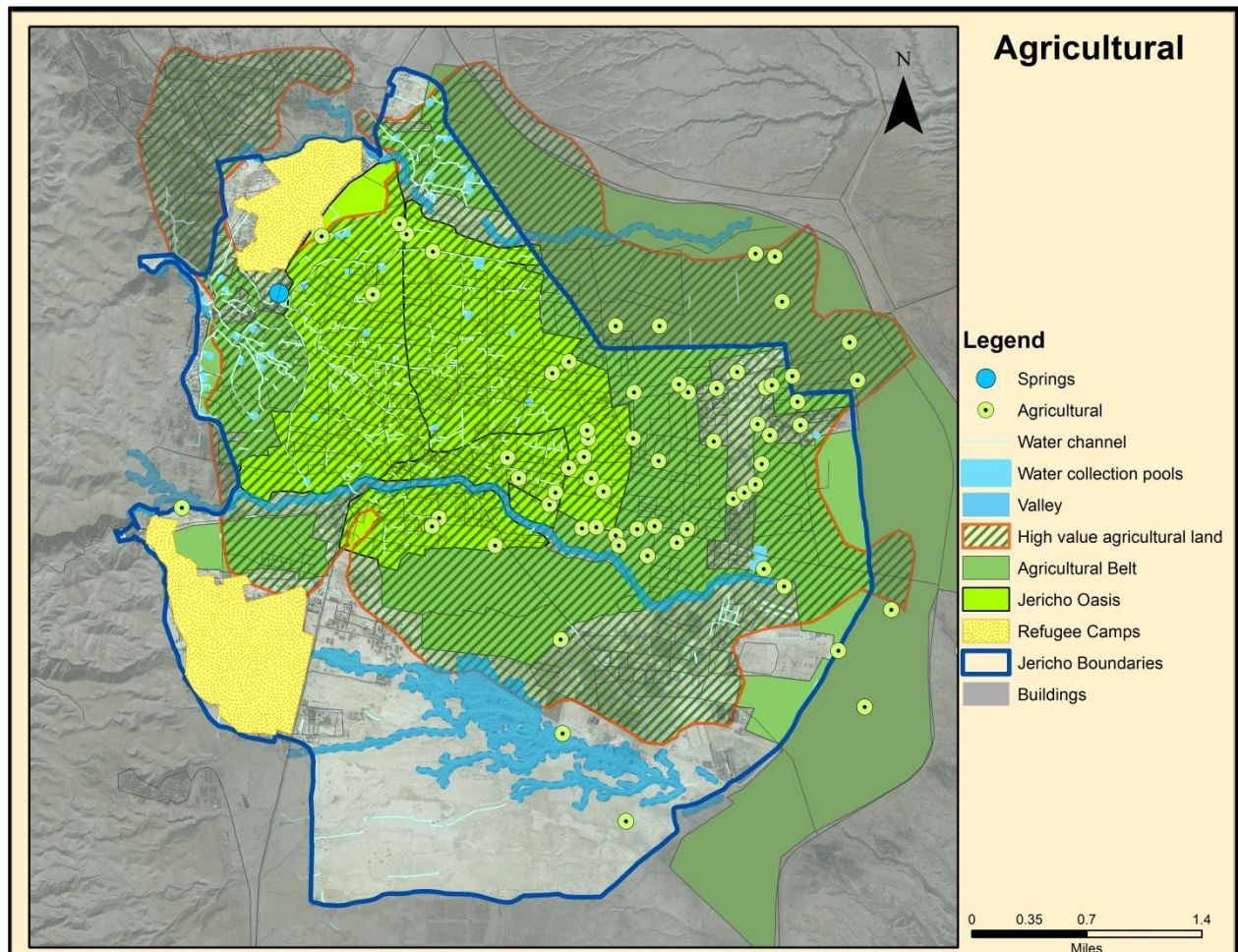


Figure4.26. Agriculture

As we can see in Fig.4.26,most of the built up area in Jericho city is consider to be an oasis which is one of the landscapes in Jericho, there is one spring (Ein

el-Sultan spring) in the city border, most of the wells are used for agriculture purpose, and the agricultural land surround the city like a green belt.

3.2.4.4 Transportation

General overview of the present condition(Jericho Master Plan,2013)

Road network

Jericho's road network is structured in a radial pattern, with all the main roads branching off from the central square (al-Dawar). For this reason most of the local and long distance traffic (e.g. buses directed to the main bus terminal or trucks), have to pass through the central square. (Jericho Master Plan,2013)

In the past years, most of the main roads have been upgraded and repaved. Secondary road has also been progressively paved in the last years. Most of them, especially in the outer areas, do not have sidewalk or traffic lights. Sidewalks, even along the main roads, are in medium to bad condition, even if recently implemented. Their design was not intended to allow safe circulation of handicapped persons. (Jericho Master Plan,2013)

Two of the three existing bridges over Wadi al-Qelt, all concentrated in the central area, are in poor conditions. Roads in the city centre suffer because of an intense and chaotic mix of use (motorised and pedestrian circulation, unorganised parking, etc..). Traffic conditions are critical in the city centre especially during rush hours (early morning, 12-14 at school exit) and on Fridays due to people coming from outside for the weekend (especially in winter). (Jericho Master Plan,2013)

To avoid the bypassing traffic entering the city centre a ring road was proposed, first in 1988 and later by JICA in 2006 but never implemented. (Jericho Master Plan,2013)

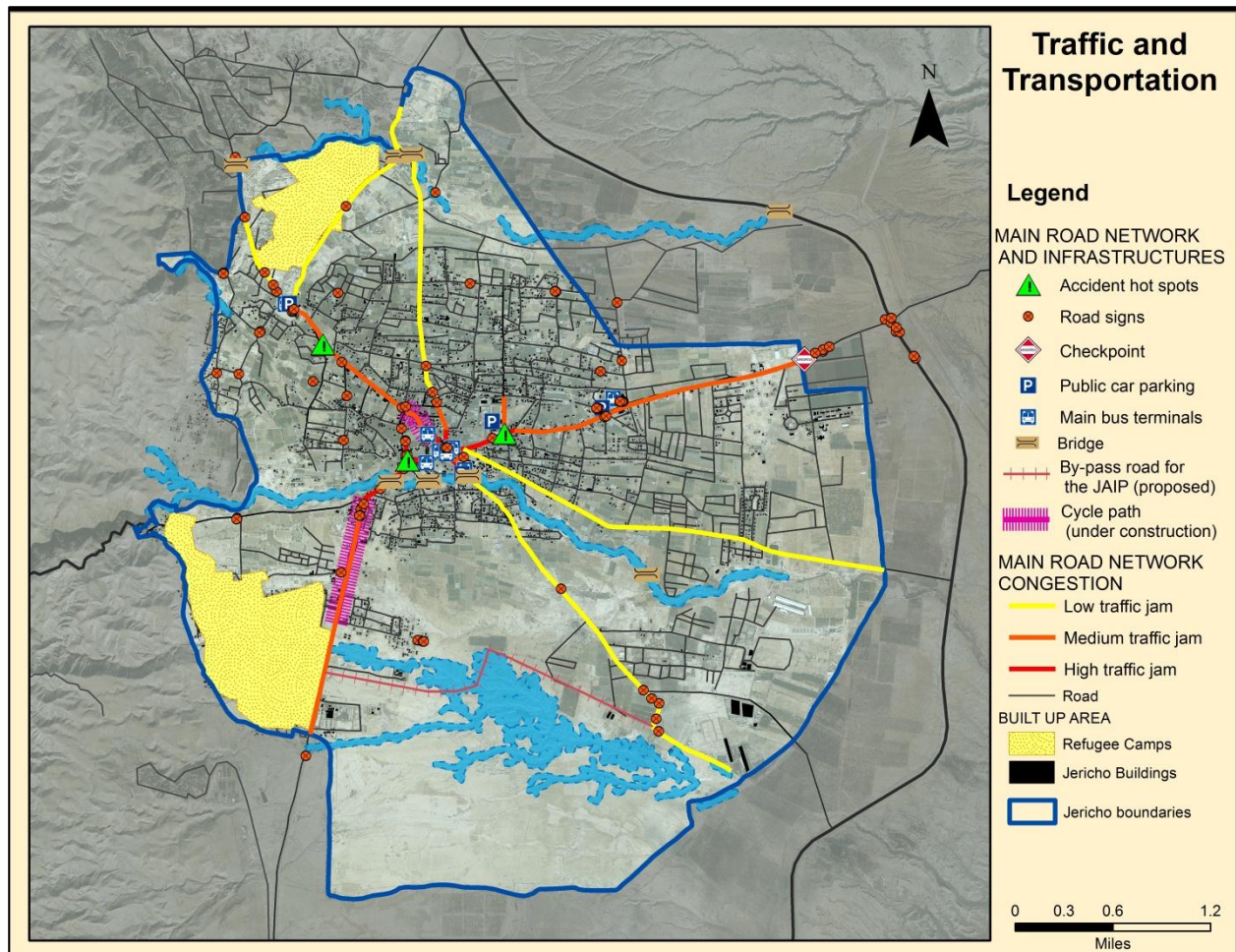


Figure4.27.Traffic and transportation

As we can see in Fig.4.27, Jericho in general have low traffic jam except the CBD area still not jammed as Nablus or Ramallah city .

Opportunity and Strength of the economic pillar

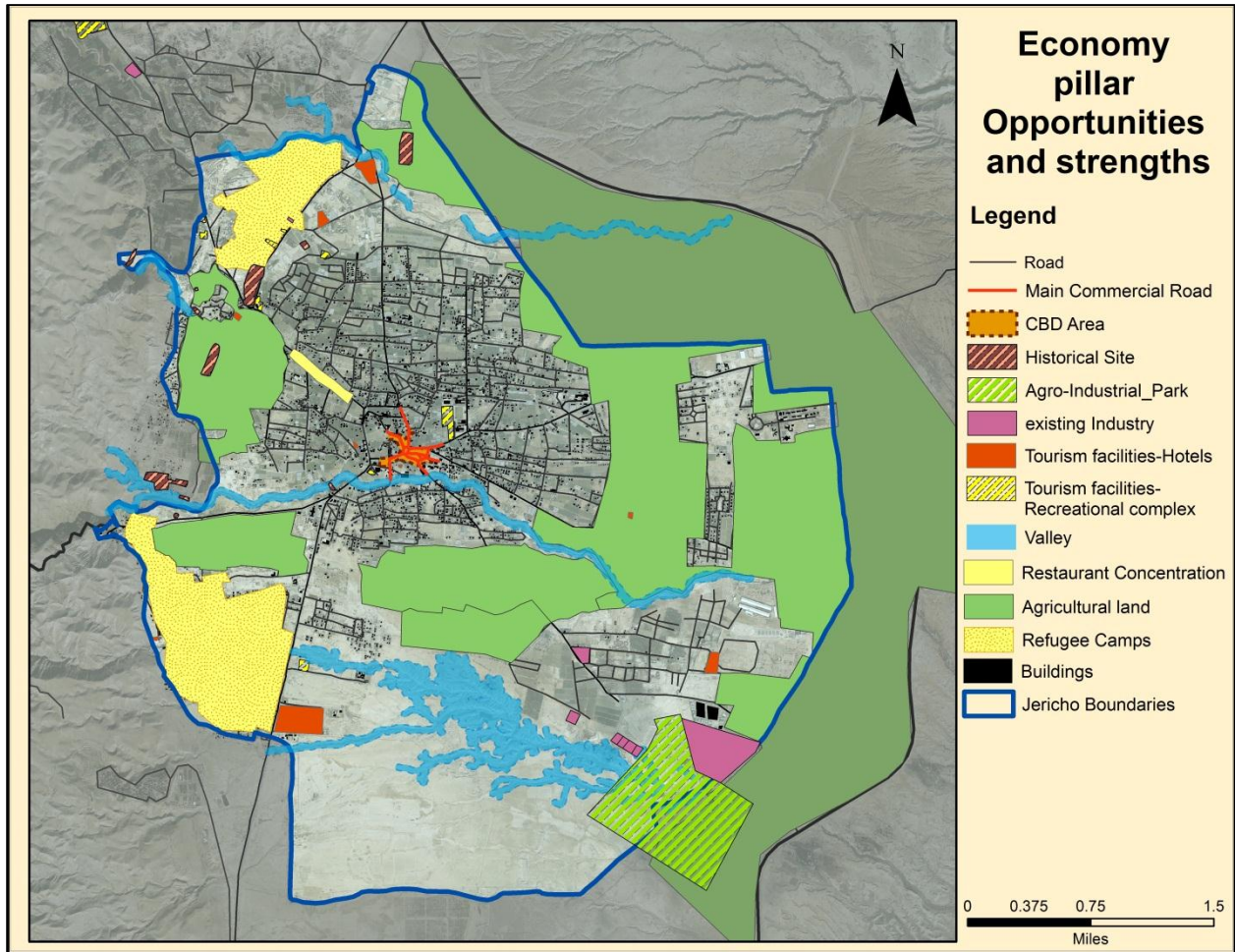


Figure4.28.Economic pillar opportunity and

As we can see in Fig.4.28,there is a lot of opportunities sites such as agricultural land , industrial area, CBD area ,historical site and tourism facilities.

Threatens and Weaknesses of the economic pillar

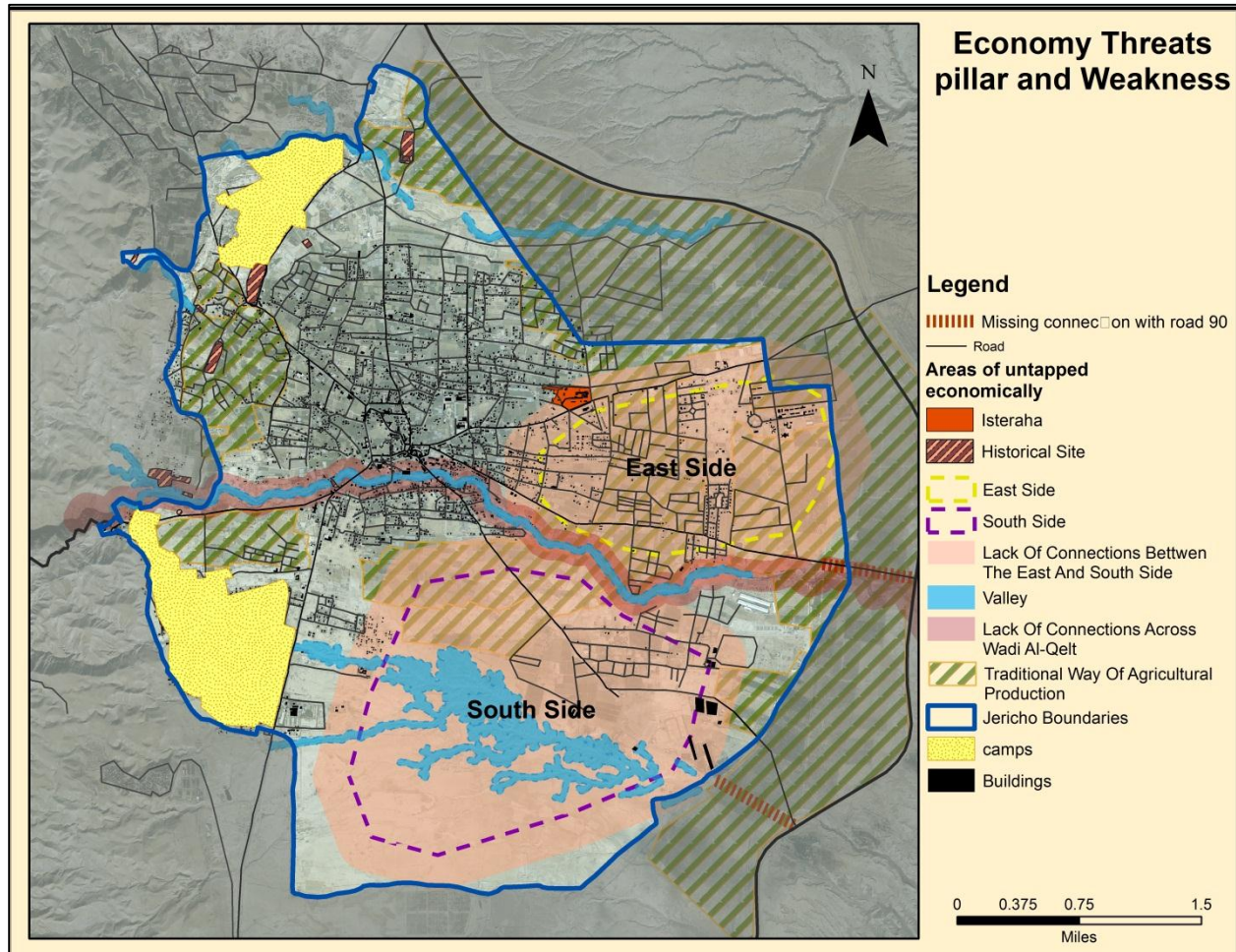


Figure 4.29. Economic pillar Threatens and

As we can see in Fig.4.29, there is obvious Lack of connections across Wadi al-Qelt in the central area of the city, causing weak connecting between east side and the south side in the city (there is no direct connection between this sides) , the agricultural land Suffer from the traditional way of production in addition of some site that economically is not exploited such as the historical site and the isteraha.

3.4.4 Site analysis according to Social pillar

The main elements of the social pillar are: 1. Education, 2. Health, 3. Government, 4. Religion, 5. Social services, parks, culture and sports

1.3.4.4 Education

There are 16 schools in the municipality of Jericho and 3 in the camps (two in Aqbet Jaber, one in Ein as-Sultan). Jericho schools system covers from elementary to high school level. Most of them are run by Government with a few run by privates. UNRWA is responsible for schools up to the secondary level in refugee camps. The Directorate of Jericho is the body responsible for management and supervision of both private and public schools in the Governorate. (Jericho Master Plan,2013)

The average number of students per teacher in the school is nearly 18, while the average number of students per class is approximately 31. (Jericho Master Plan,2013)

Table4.6. Jericho schools
Source: JICA Study Team

Type of school	Number of students	N° of schools
Government	5,884	8
Private	1,869	5
UNRWA (camps)	4,248	3
TOTAL	12,221	16

Currently there are 8 kindergartens in Jericho, hosting around 670 pupils, run by private or religious association. (Jericho Master Plan,2013)

Governmental technical schools such as agricultural, industrial, commercial are lacking; there are only two vocational centres in Jerusalem St. Higher level

education is provided by the Al-Quds Open University, even if in few fields. A small centre for students with learning difficulty, owned by the municipality, with a capacity for 30 persons, but there are not enough facilities for disabled students. (Jericho Master Plan,2013)



Figure.4.30. some of Jericho schools

Sources: Jericho Master Plan - Spatial Development Framework - *draft, march 2013*

A private kindergarten (up-left), the new Terra Santa school in the Franciscan premises (up-right) and the public school Fatima (down).

The geographical distribution of schools in Jericho is not based on population pattern, but in most cases, the choice of the location was based on the availability of land. The Directorate of Education estimates that at present there is need for 3 more schools in Jericho, to be located in this three areas: al-Qassab, along the

road to Hisham's palace (near the Al-Esteqlal University) and near to Ad-Dyuk Tahta. (Jericho Master Plan,2013)

In general, the educational system of Jericho suffers from a lack of well trained teachers and personnel. At present, the majority of teachers come from outside. Together with other factors, this lead to frequent abandonment of pupils from schools, especially among males after class ten. (Jericho Master Plan,2013)

2.3.4.4 Health

There is a number of health centres in Jericho City: a main governmental hospital located in the south along Jerusalem st., 8 local health centres, 18 general physician clinics, 19 specialized physician clinics, 2 radiology centres, 10 medical laboratories, one governmental motherhood and childhood centre, 3 physiotherapy centres and 9 pharmacies, in addition to 5 ambulances owned by the Palestinian Red Crescent Society. The health services treats around 4.000-4.500 persons per month. (Jericho Master Plan,2013)

Main Problems(Jericho Master Plan,2013):

- Lack of space
- The Directorate of Health has insufficient electricity power.
- The new hospital of Jericho south of the city centre sometimes has problems with the crossing of the Israeli check-point by ambulances and sick people.
- Massive use of the health facilities by Palestinian militaries.
- Lack of many medical specialities.

- Lack of modern diagnostic equipment.

3.3.4.4 Gouvernement

Jericho has several governmental institutions, such as the office and nursery of the Ministry of Agriculture, Police station, National Security centre, Post office, office of the Ministry of Labour, office of the Ministry of Social Affairs, Chamber of Commerce, Fire station and office for the Ministry of Interior, etc. (Jericho Master Plan,2013)

4.3.4.4 Social services, parks, culture and sports

Jericho has a large variety of local institutions and associations that provide services to various segments of the society such as children, youth and women, as well as services in the sectors of culture and sports, as listed below(Jericho Master Plan,2013):

- A municipal library.
- A Theatre.
- A centre for handicapped people
- A large stadium and several sports centres
- A certain number of clubs for younger peoples (Markaz Al Tefel, Shebab, Hilal, Terra Santa, Baladna)

In general, apart from the Spanish garden in the city centre, Jericho suffers from a lack of large organised green areas and parks, even if this situation is compensated by the presence of agricultural(Jericho Master Plan,2013)



Figure4.31.The Jericho stadium



Figure4.32.the Spanish Garden

5.3.4.4 Religion

- Waqf and mosques

The term “waqf” define properties dedicated to purposes recognized by the Muslim law as religious, pious or charitable. Jericho has historically many waqf lands since the time of the Sultan Baibars of Egypt (1260). Along the time some of this properties became private. (Jericho Master Plan,2013)

The Ministry of Waqf is in charge of the management of mosques (paying electricity and water bills, imams' salaries, Quran schools, etc.), pilgrimages, shrines, collection and distribution of Zakah, the management of all the waqf property. (Jericho Master Plan,2013)

Waqf land cannot be dedicated for residential use. (Jericho Master Plan,2013)

- Latin Christian Community (Franciscan compound)

The properties of this community are mainly located in the city centre, along Warda al-Azara st. There are about 500 Christians in Jericho, of 220 whom are

Latin, corresponding to 53 families. The compound host many facilities: a monastery, a school (for children up to 10 years old), a nursery, a parish church, an hall for reception of pilgrims. A new school is under construction. (Jericho Master Plan,2013)

- Coptic Church

The properties of the community are distribute between Al Qasab near Wadi al-Qelt (Zaccheus’ house and a church), the Sycamore tree (a convent), as well as small parcels of land in different parts of the city(Jericho Master Plan,2013).

Opportunity and Strength of the social pillar

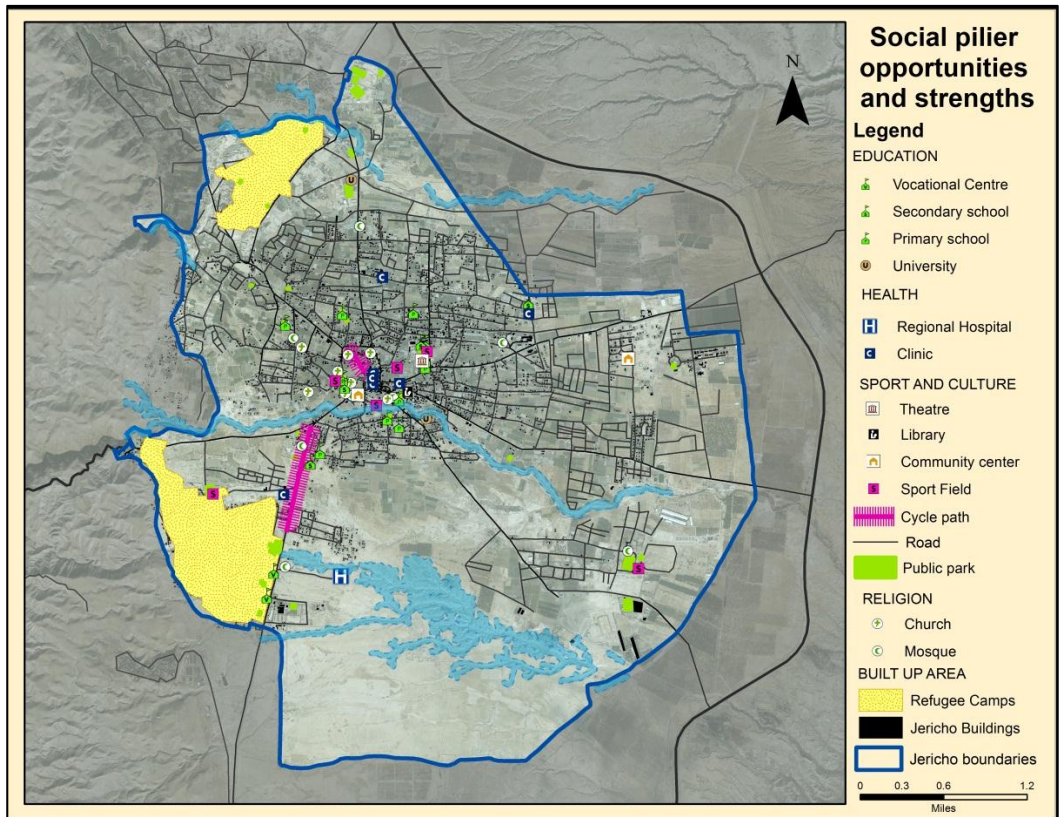


Figure4.33.social pillar Opportunity and Strength

As we can see in Fig.4.33, jericho city is Self-Sufficient from the Community Facilities but still need more social facilities to Support it resident.

Threatens and Weaknesses of the social pillar

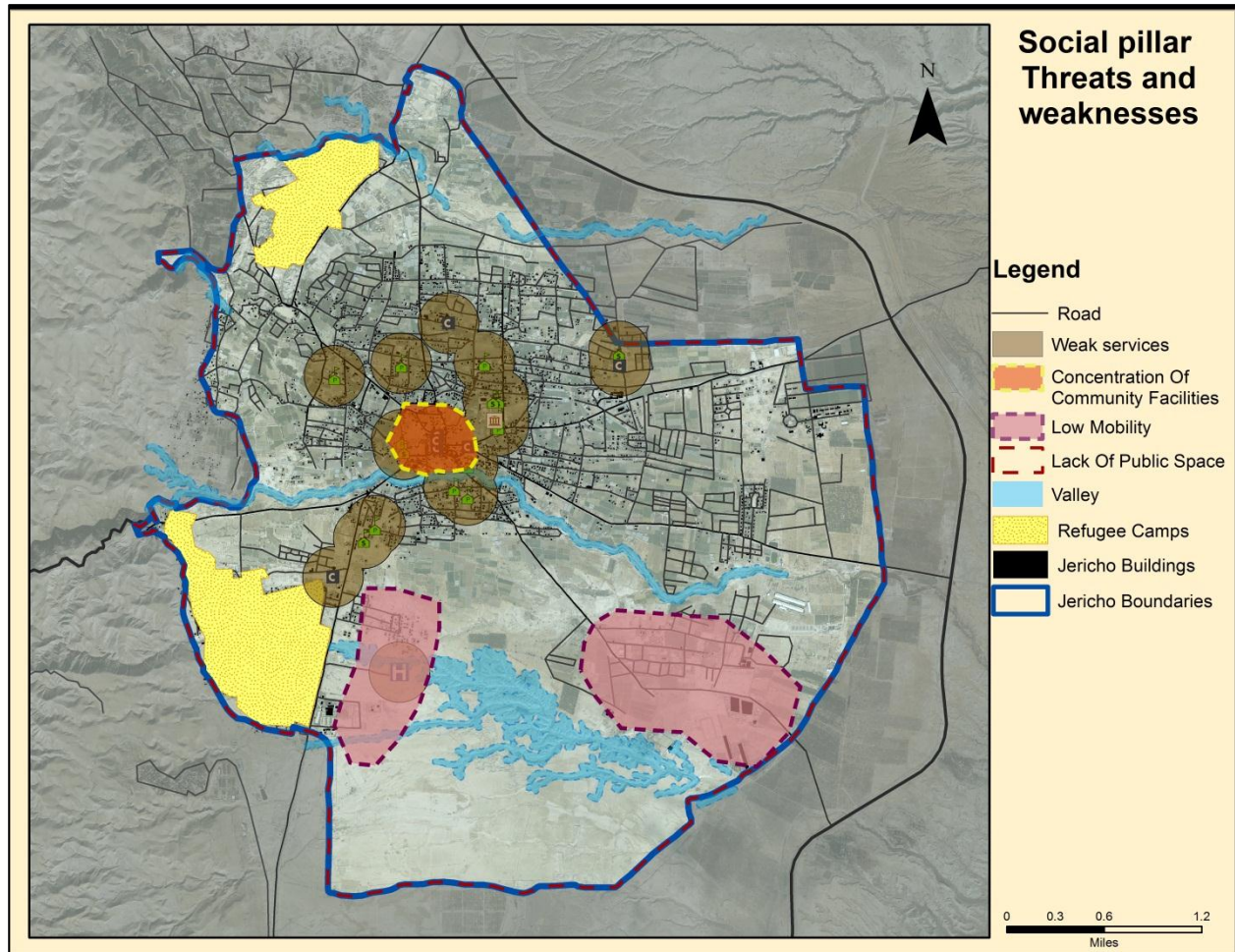


Figure4.34.social pillar Threatens and Weaknesses

As we can see in Fig.4.34, we have low mobility in the industrial area and in the public hospital of Jericho , low services quality from the Community Facilities , Concentration of this facilities in the CBD area and we have lake of public space.

Chapter 5

1.5 Vision

Based on the previous site analysis I come with a vision to Jericho city supporting the sustainability approach

“Jericho is city of the moon and palm tree, a living history, oasis of Pease, tourism gateway, city of sustainability where all people are safe, healthy and having equitable opportunities for success and happiness”.

It focuses in Jericho most important Features and how Jericho supposed to be seen, in addition of its role in the sustainability world.

2.5 Developing a concept plan

based in my vision to Jericho and the site analysis I developed a concept plan for the three pillar of sustainability

1.2.5 Environment pillar concept

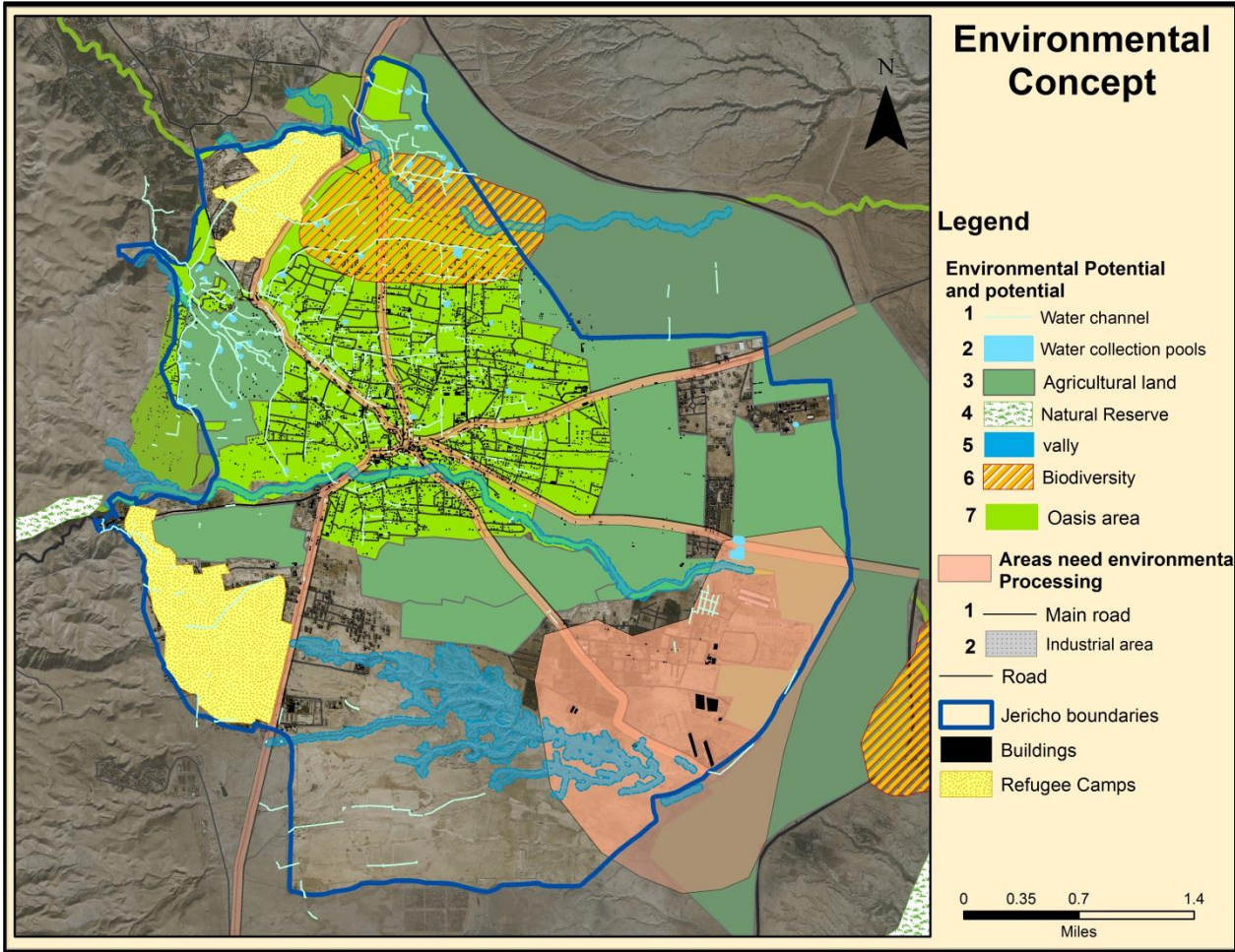


Figure5.35. Environment pillar concept

as we can see in Fig.5.35, I separate the environment feature to environmental component need protection and have potential to improve the city sustainability such as water channel, water collection polls, agricultural land, natural reserve, the valley, biodiversity area and the oasis, and there are some area need environment processing to protect the city from their emissions such as the main streets and the industrial area.

2.2.5 Economic pillar concept

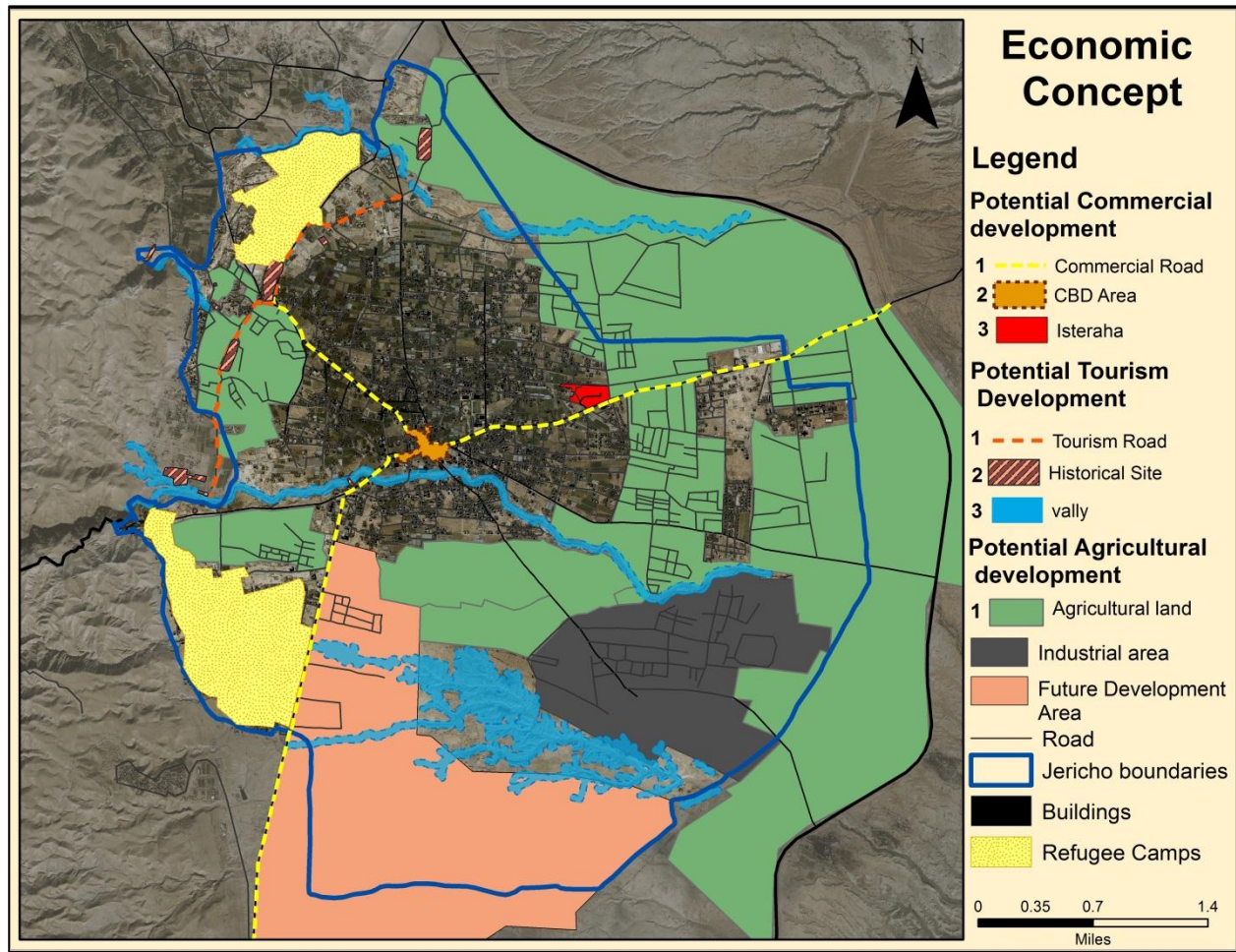


Figure5.36. Economic pillar concept

As we can see in Fig.5.36, we divided some of the city elements to elements have potential commercial development such as commercial road, CBD area and isterhaha , elements have potential tourism development such as historical site, tourism road and the valley and elements have potential agricultural development such as agricultural land in addition to the industrial area and future development area.

3.2.5 Social pillar concept

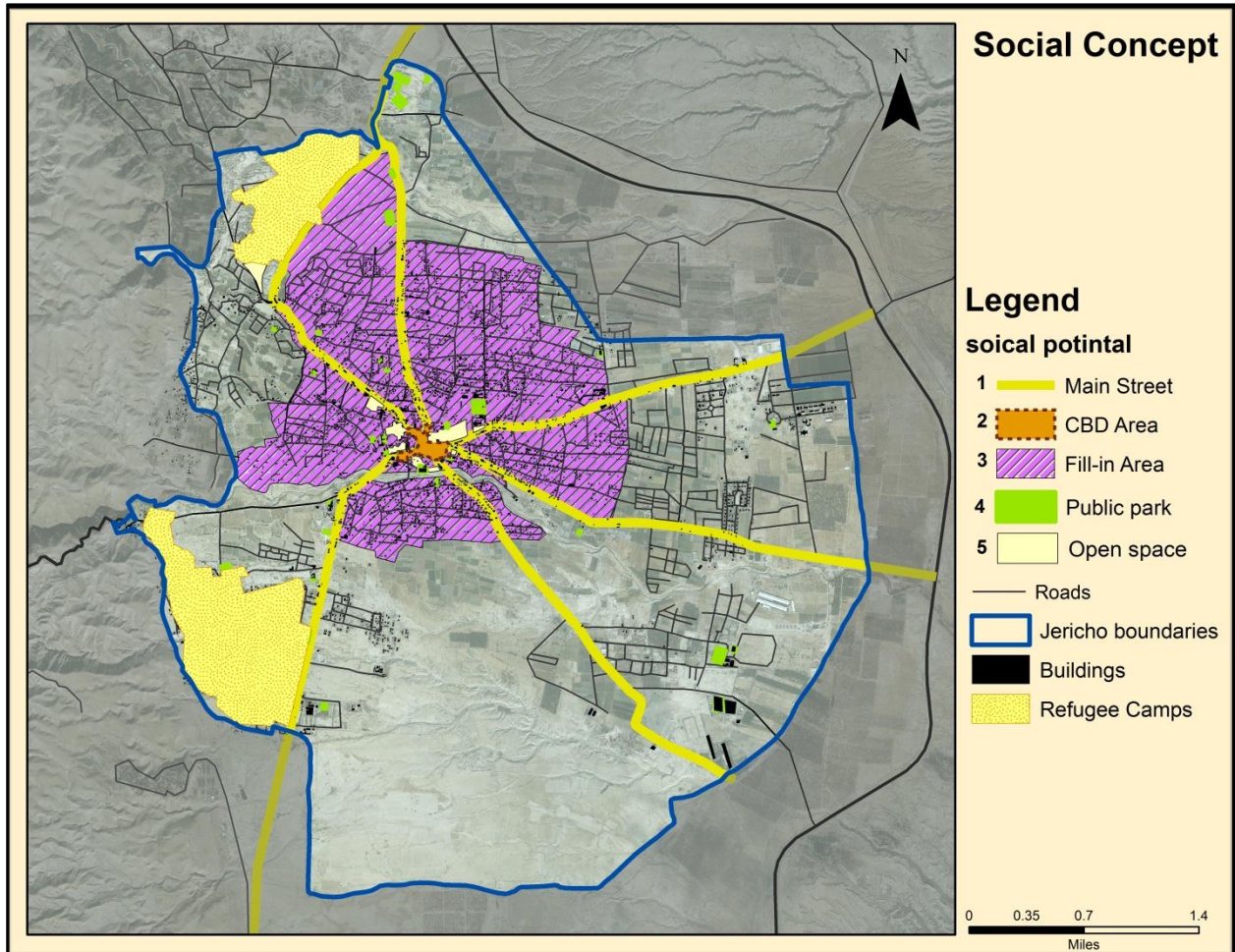


Figure5.37.Social pillar concept

As we can see in Fig.5.37, we find some social potential area in the city such as main streets, CBD area, public parks and Open space. The built up area in the city it can tolerant more resident (condensation).

Chapter 6

1.6 Master plan

Based on the concept plan of the three pillar of sustainability I come up with sustainable Jericho master plan which will Guide me to develop a sustainable form for Jericho.

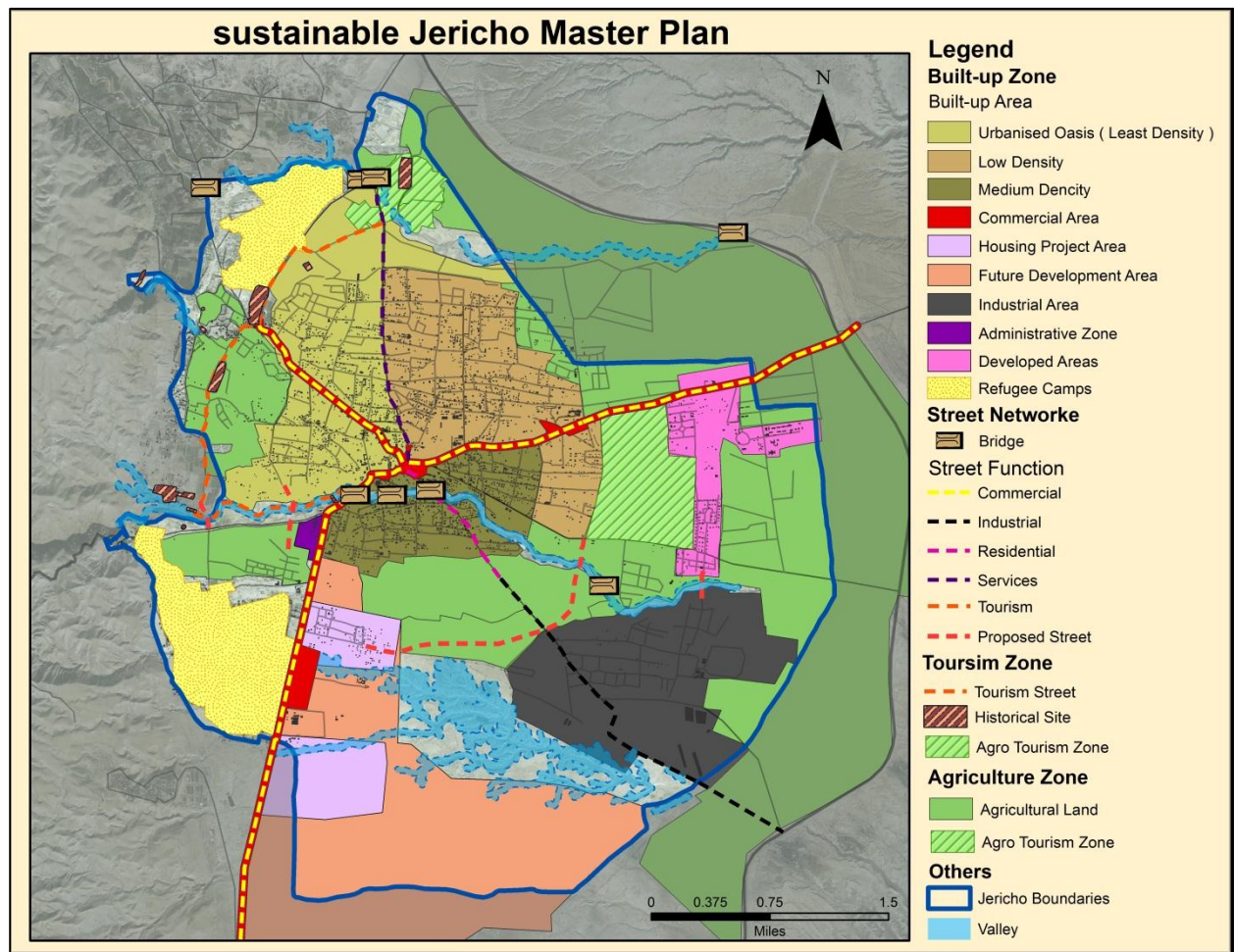


Figure6.38.Sustainable Jericho master plan

As we can see in Fig.6.38, I divided Jericho to four zones Built-up zoon, street network zoon, tourism zoon and agricultural zoon

1.1.6 Built up zoon

This zoon contain the residential built-up area segregate to three densities type urbanism oasis and this type have the least density among the others because it has the least existing density in the city and it reflect the heart of the oasis so I gave it this classification to help keeping the oasis landscape in the area and in the other two calcifications (low density and medium density) I kept the density less than high so I can protect Jericho to transform to city like Ramallah or Nablus with tall dense building the second built up area in this zoon is commercial areas which contain the main street, the area around the isteraha, the area beside the Intercontinental hotel, and the CBD area, and the other built up area in this zoon are Future Development Area, Housing project area, Industrial area, Administrative Zone, Refugee Camps and Development project area.

2.1.6 Street network

I divided the main street based on the street function and that help to know what kind of function to instill in the area and how much load the street will get in future based on what kind of vehicles and function will be used for, based on that I classified the main streets into Commercial streets, Industrial street, Residential street, Services street and Tourism street, and then I proposed a street to connect the east side of the city with the south side to improve the mobility in the city.

3.1.6 Tourism zoon

This zoon contains historical site, the tourism street which connect the most number of historical site in the city and the agro tourism zoon and this classification help to give a new orientation to agricultural land which will increase the economic benefit of the land and attract the farmers to improve their methods in farming and in this way I can protect the agricultural land from vanishing.

4.1.6 Agricultural zoon

This zoon contains agricultural land and agro tourism zoon.

2.6 Master plan project

Based on Jericho master plan and the sustainability three pillars I proposed some project that will enhance the sustainability concept in Jericho.

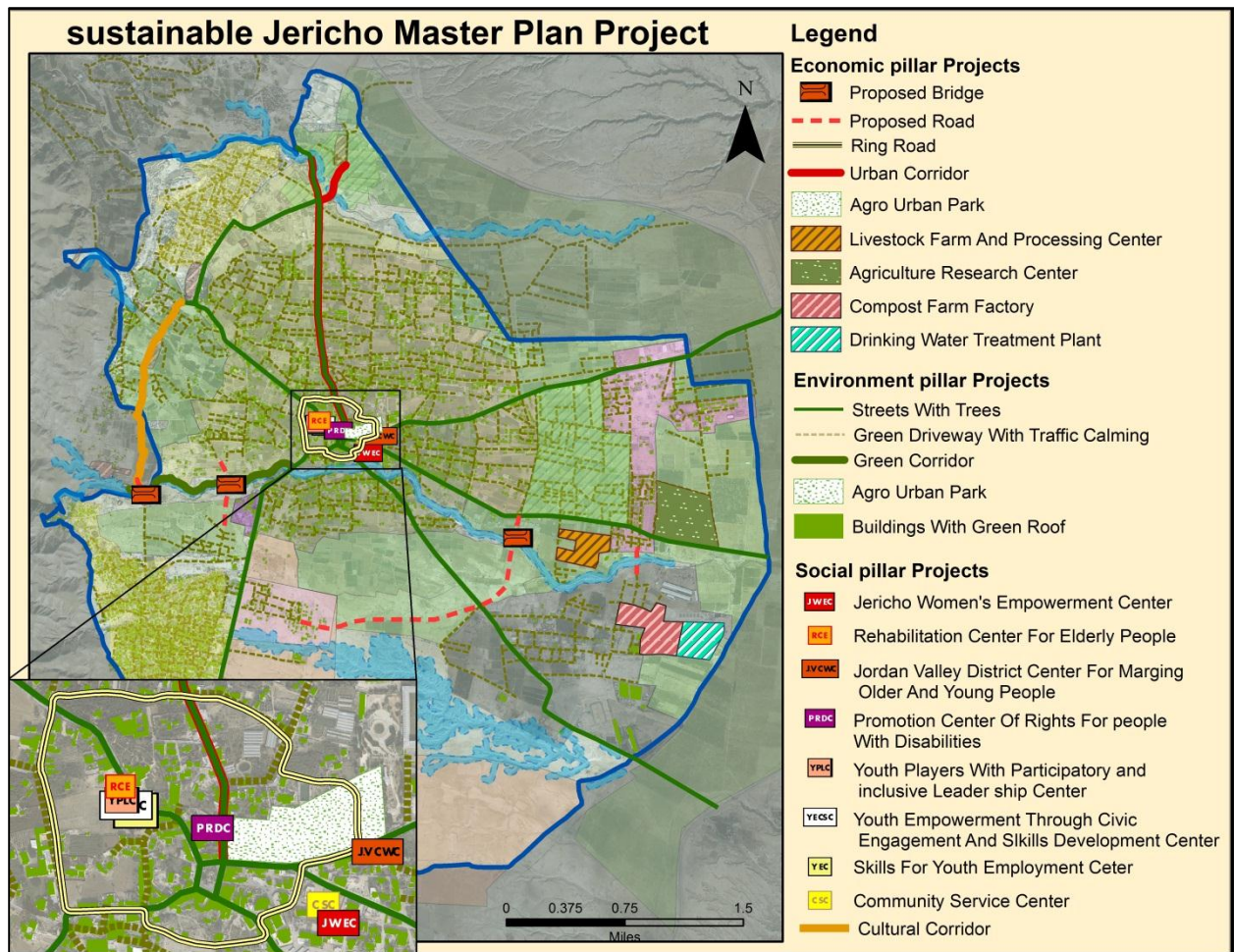


Figure6.39.Sustainable Jericho master plan

As we can see in Fig.6.39, I divided the proposed project in to the three pillars of sustainability as the following .

1.2.6 Economic pillar project

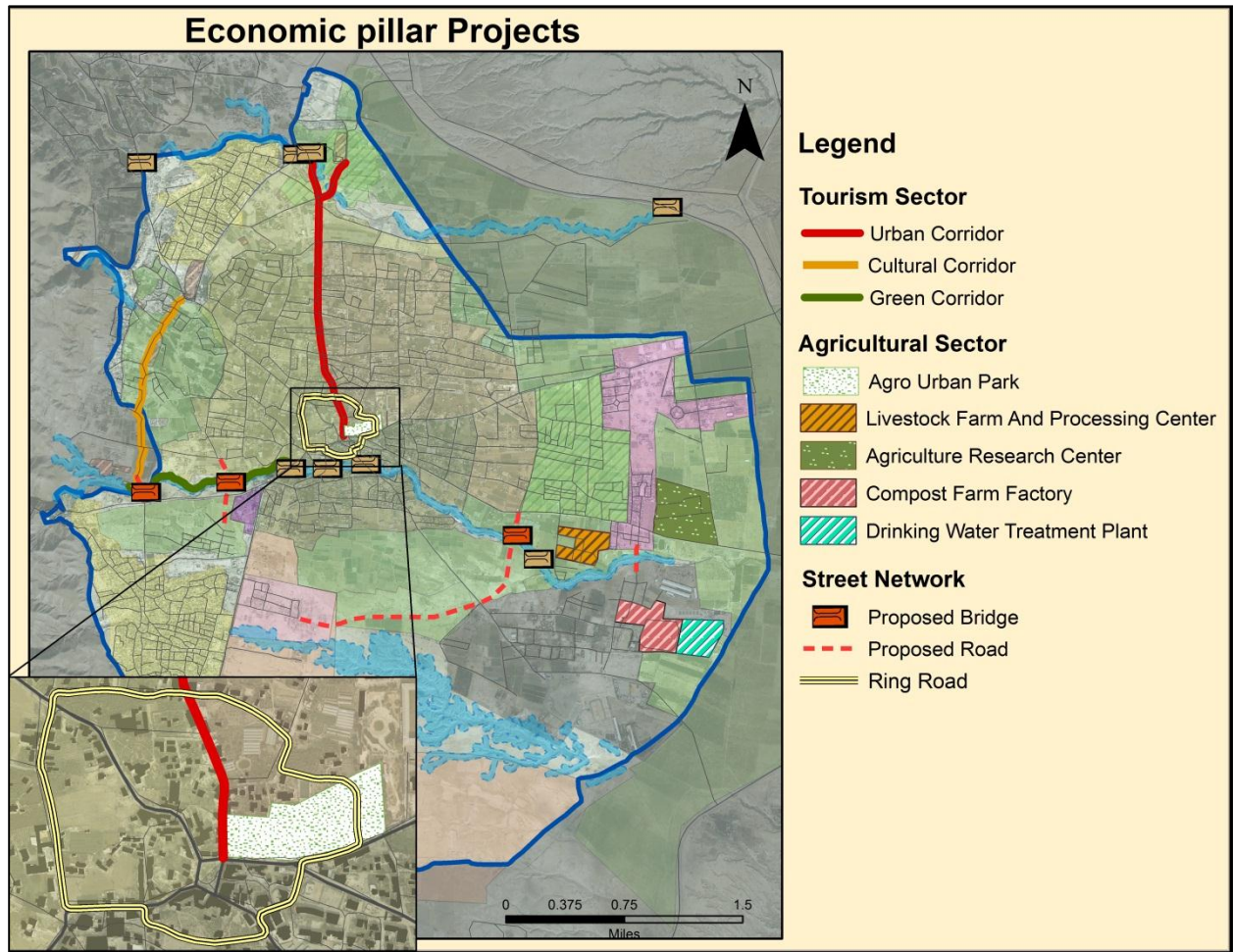


Figure 6.40. economic pillar projects

As we can see in Fig. 6.40, I divided the economic pillar project based on three elements of economic pillar: tourism sector, agricultural sector, and transportation sector.

Economic pillar project:

- Proposed Bridge, to enhance the connectivity and mobility of the city.
- Proposed street.
- Ring road in the CBD area.

- Urban corridor.
- Agro urban park in the CBD area.
- Livestock Farm and Processing Center.
- Agriculture Research Center to improve the farmer skills in farming.
- Compost Farm Factory.
- Drinking Water Treatment Plant.

1.1.2.6 The ring road project

First I Preview the existing condition of the CBD area.

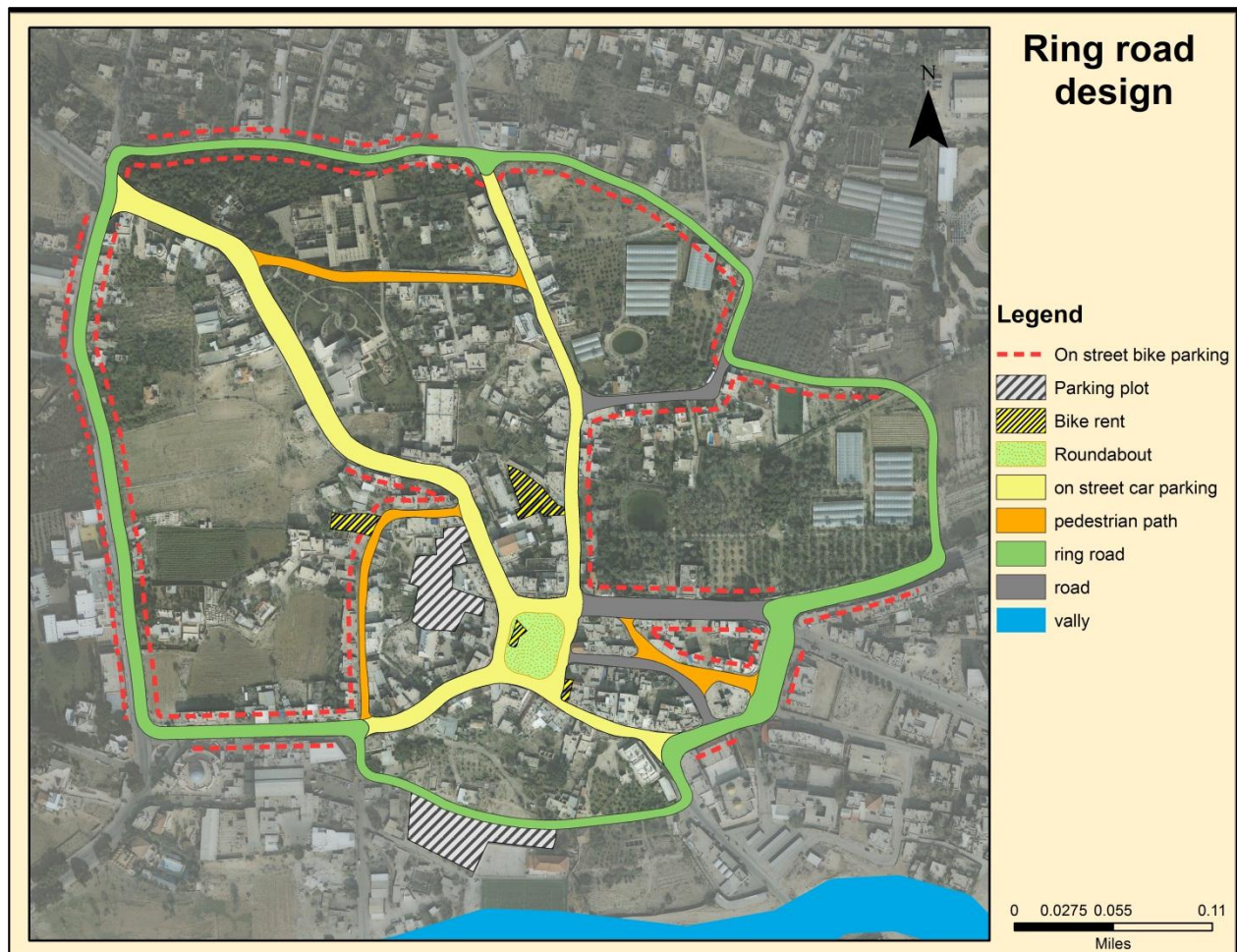


Figure6.41. Existing road in the CBD area

As we can see in Fig.6.41, most of the street in the CBD area are two direction and two lane despite the street width it have one pedestrian street and bike park in the main roundabout and one privet bike rent.

Then I make modification in the street network in the CBD area to make it more for pedestrian less for vehicles.

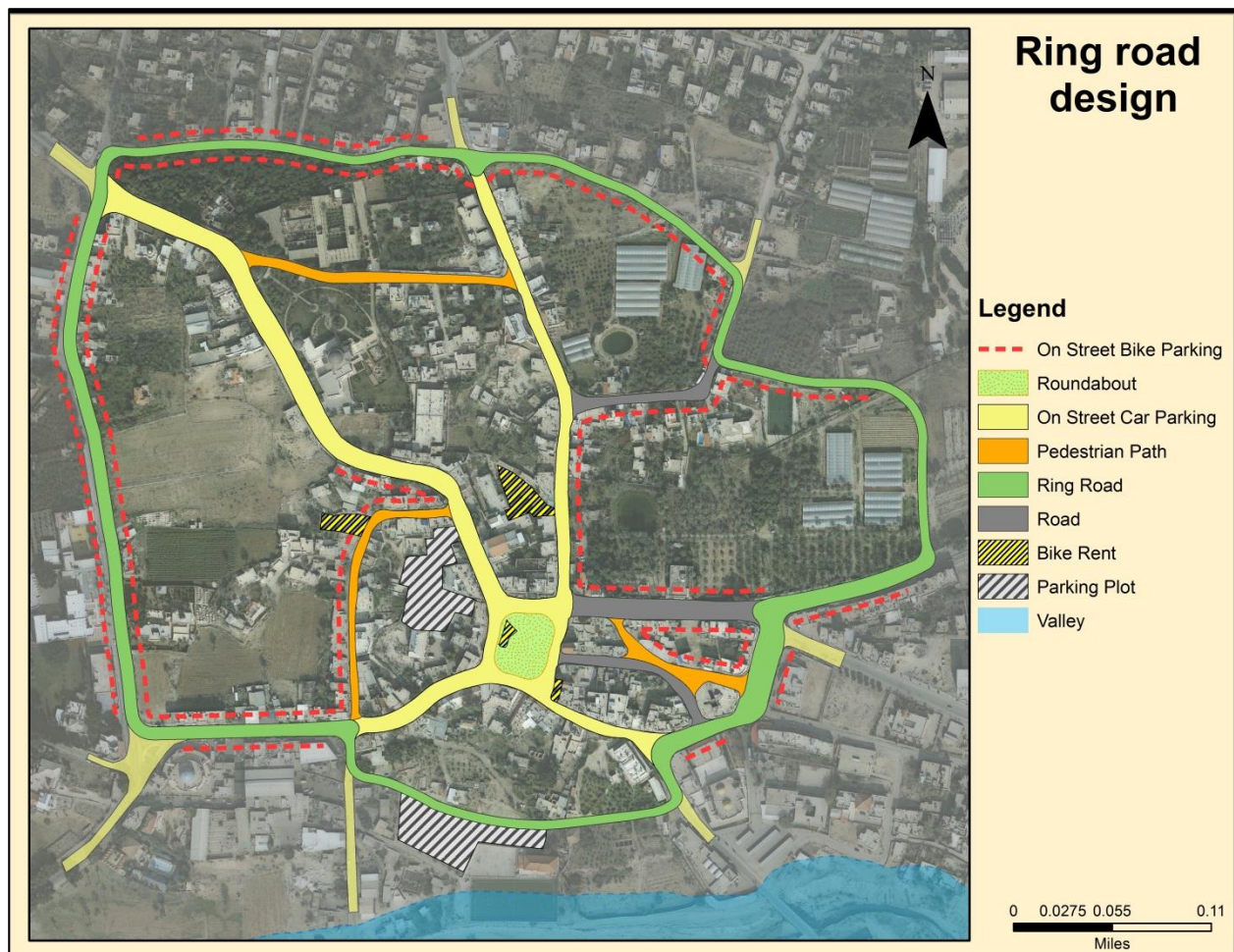


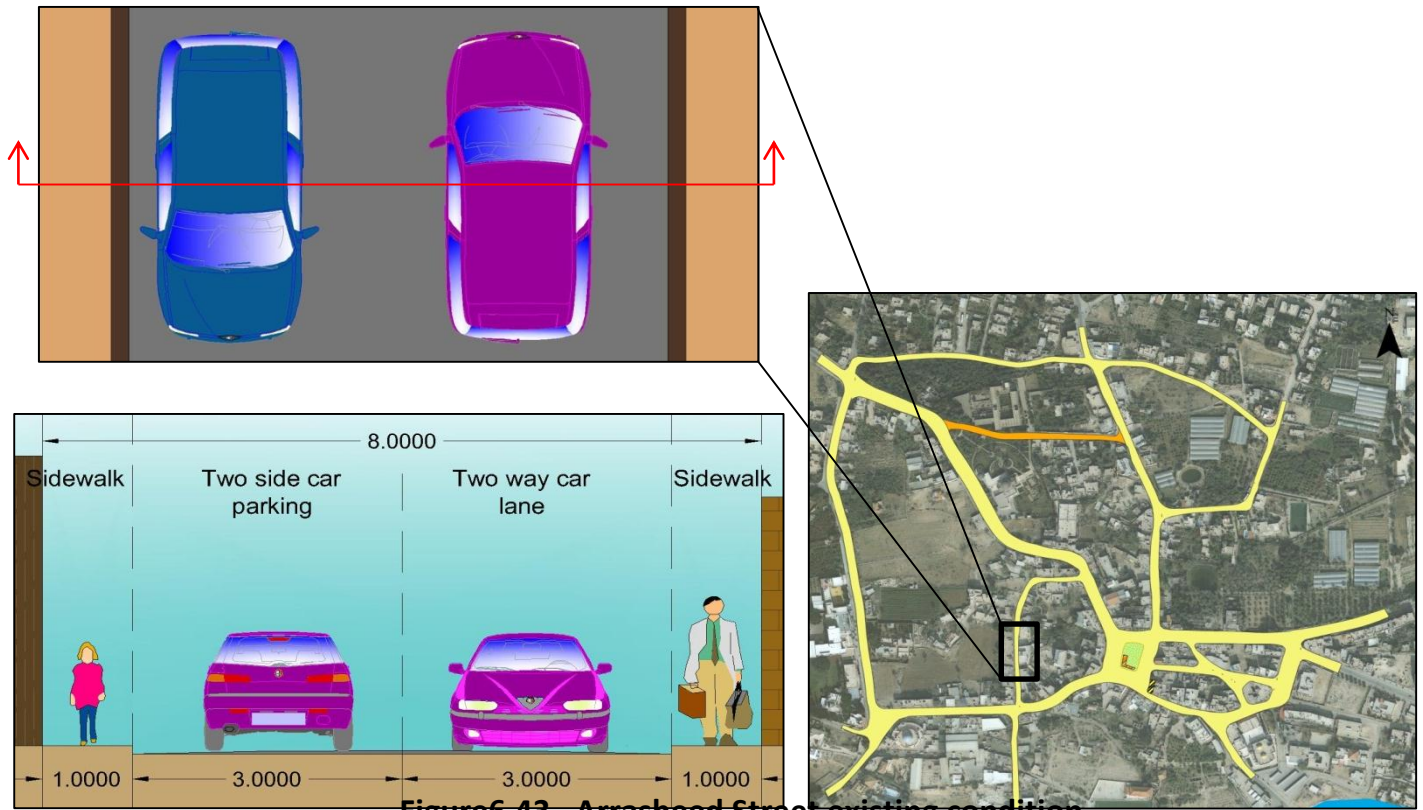
Figure6.42.Ring road design

As we can see in Fig.6.42, I proposed two streets in the area so I can complete the ring road around the CBD area, the ring road is two way street with two lane and no on street car parking, because of this it allowed me to decrease the space for cars by making most of the street inside the ring road one lane in one way

which allowed me to add a bike lane and increase the space for pedestrians (side walk), I turn two streets to pedestrian streets because they have the less amount of traffic and they will not interrupts the car circulation in the CBD area, and I suggest some on street bike parking along some streets, some bike renting and car parking.

And here some of the sites plan for the existing condition along with the suggested design.

- Arrasheed Street



Not enough/sufficient space for cars nor for pedestrian

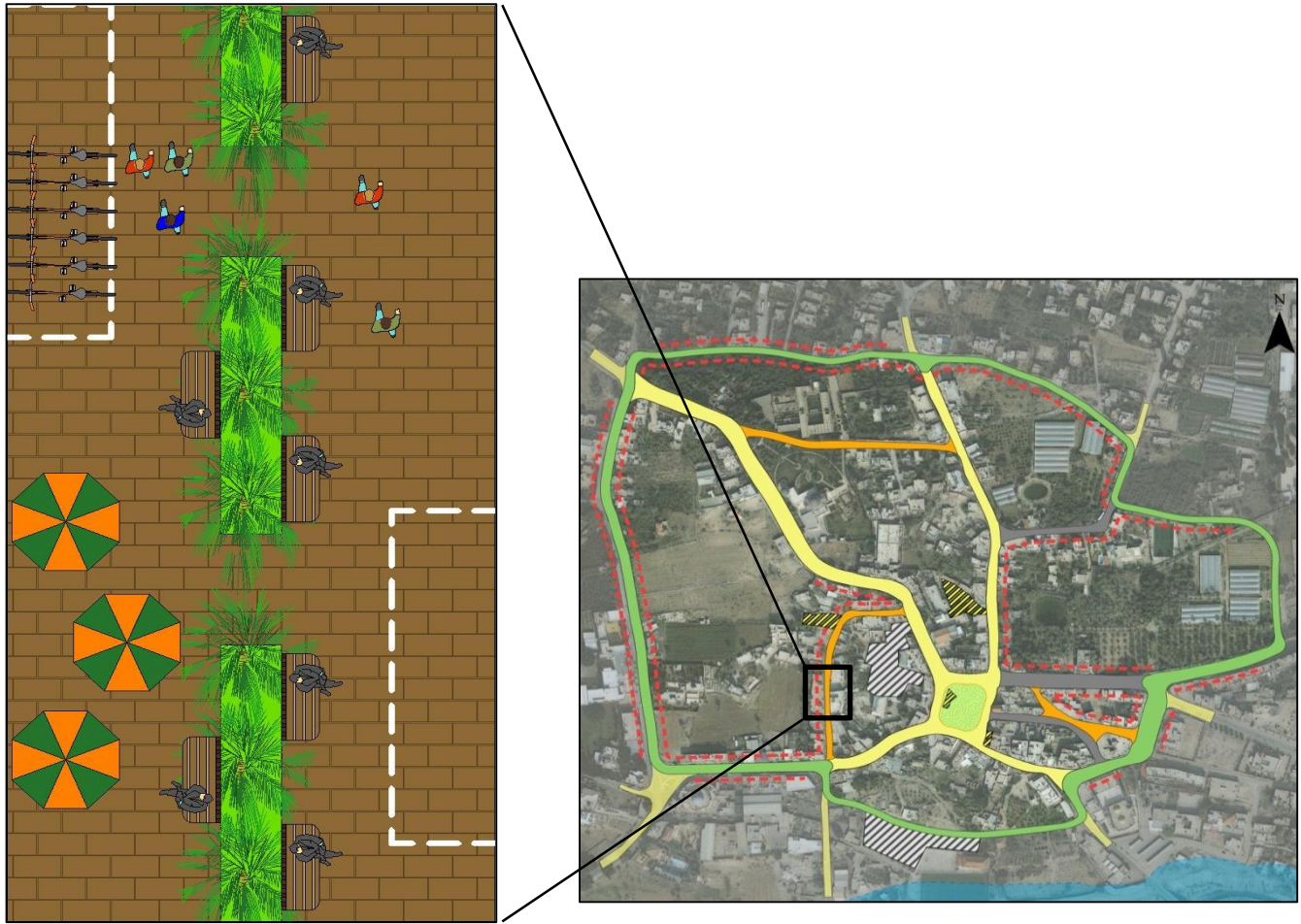


Figure6.44.Arrasheed Street proposed condition

I turned Arrasheed Street to a pedestrian street allowing me to suggest some functions on the area such as On street bike parking, Open air coffee, Setting area, Green space.

- Warda Azara Street

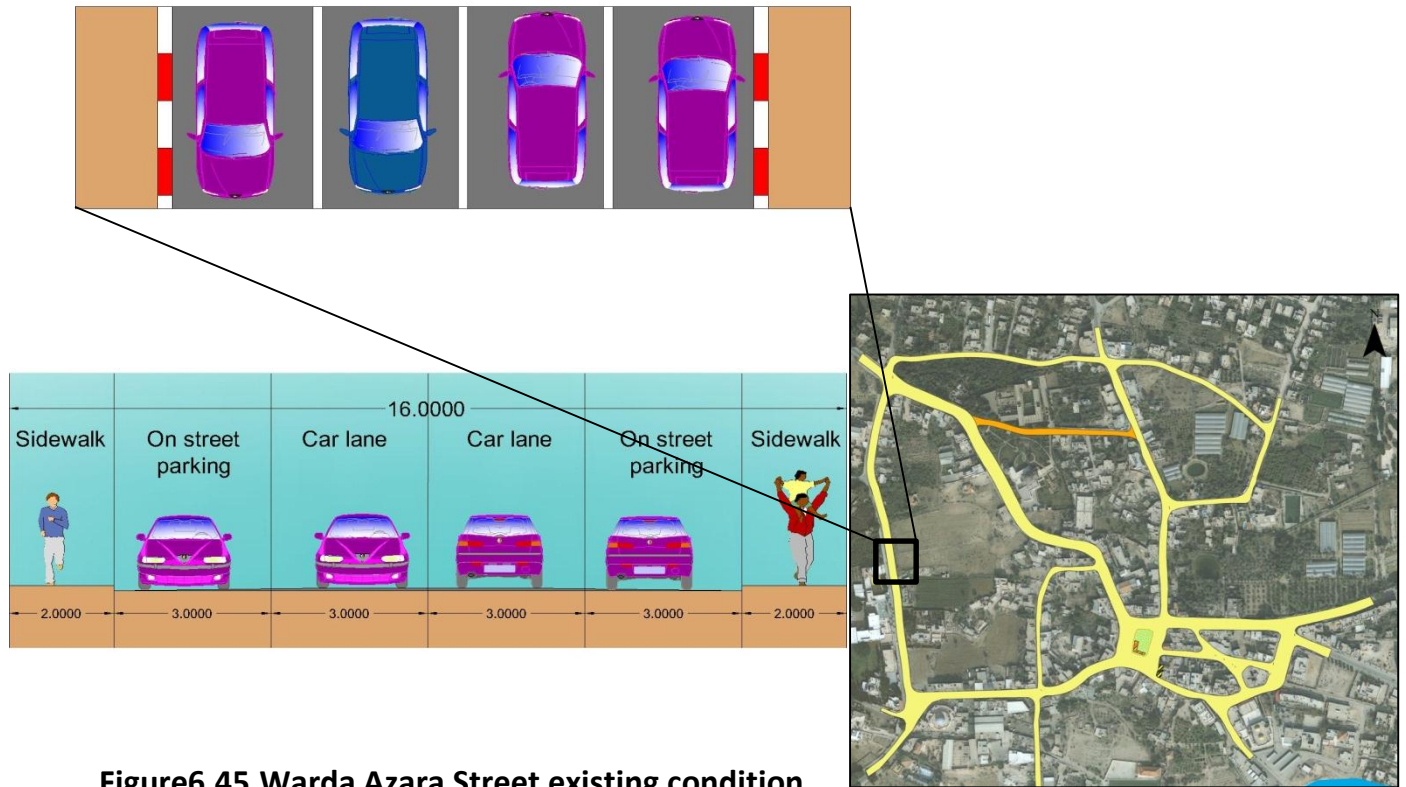


Figure 6.45. Warda Azara Street existing condition

In the proposal design I change Warda Azara Street to be part of the ring road.

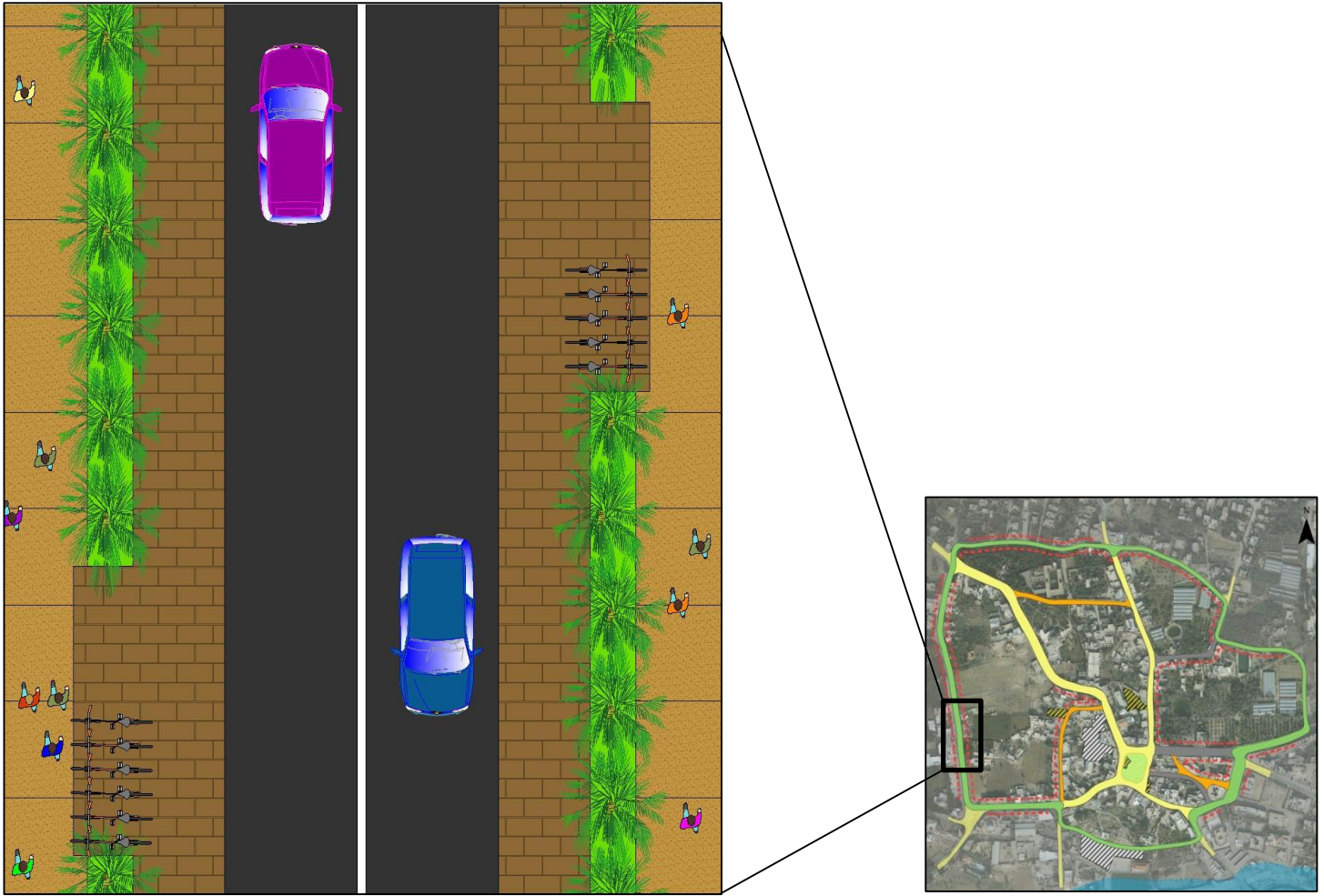


Figure6.46.Warda Azara Street proposed

Making the street less for vehicle, allow me to increase the side walk width, add two bike lane n two ways, on street bike parking and add green space to separate the sidewalk from the bike lane.

- 'Ain es-Sultan Street

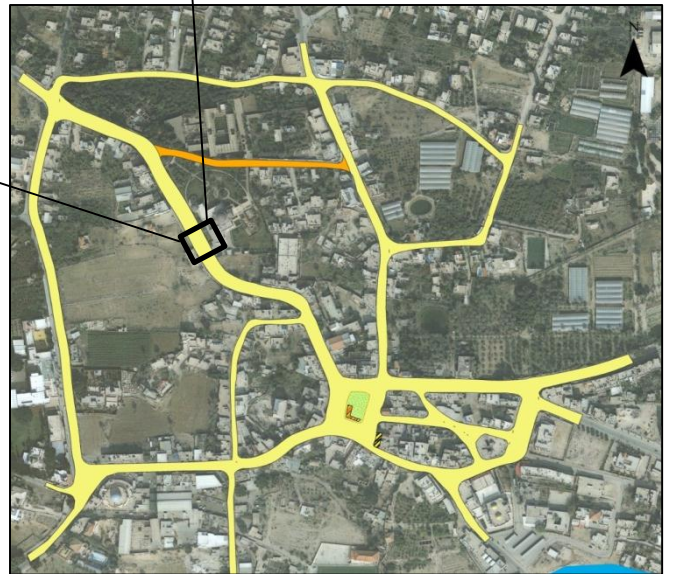
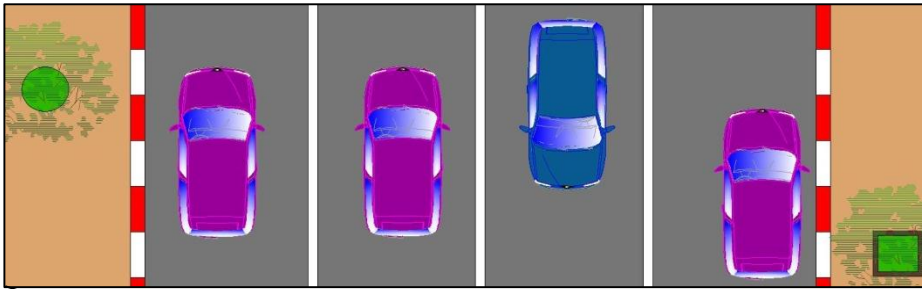


Figure6.47.'Ain es-Sultan Street existing

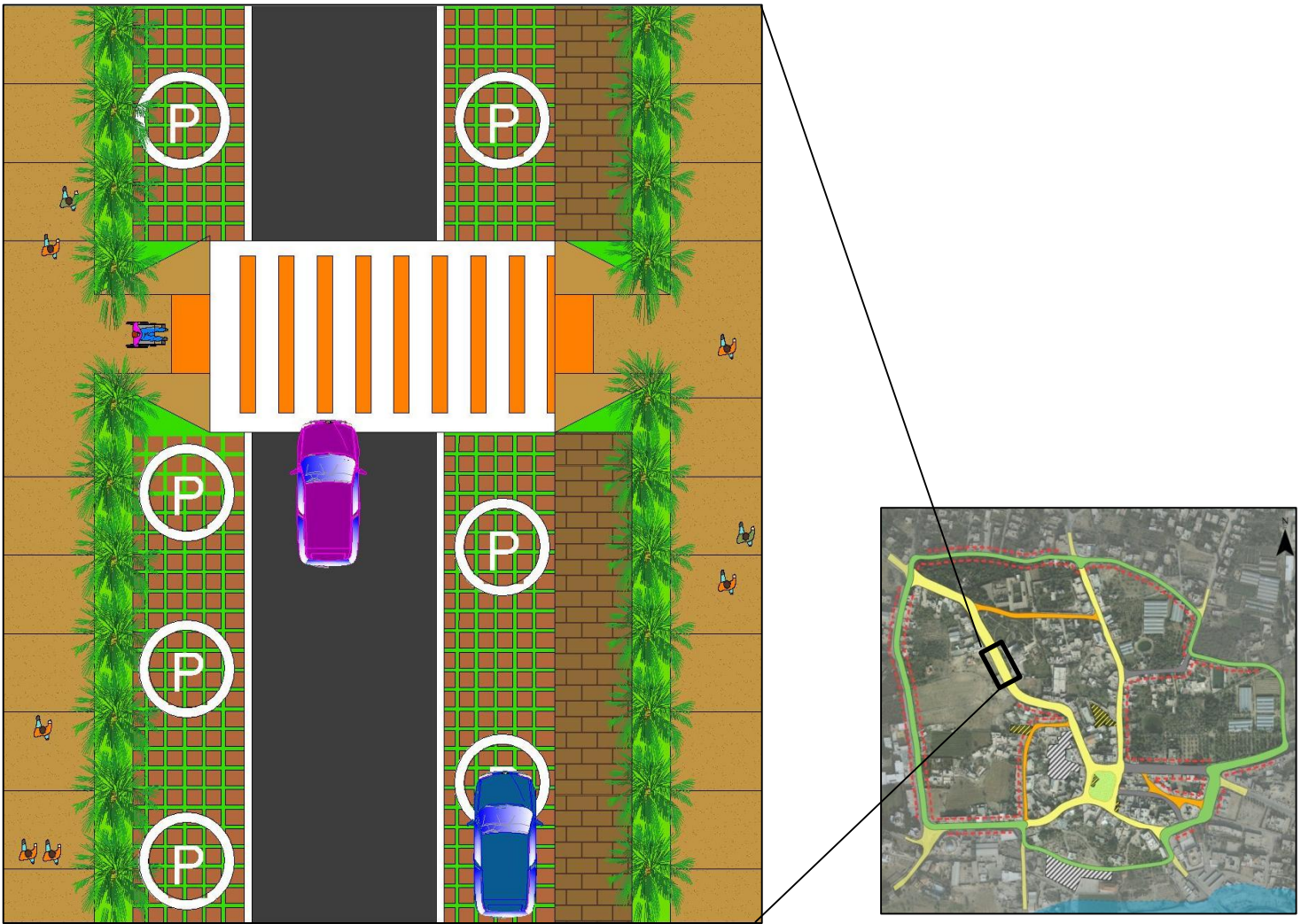


Figure6.48. 'Ain es-Sultan Street proposed

I change 'Ain es-Sultan Street inside the ring road area to one way street with one lane which allow me to make on street green car parking that help to decies the heat island in the city, add one bike lane in two ways and increase the width of the sidewalks.

2.1.2.6 Tourism route

To enhance the Tourism Sector in the city I proposed a tourism route to survive Jericho visitor.

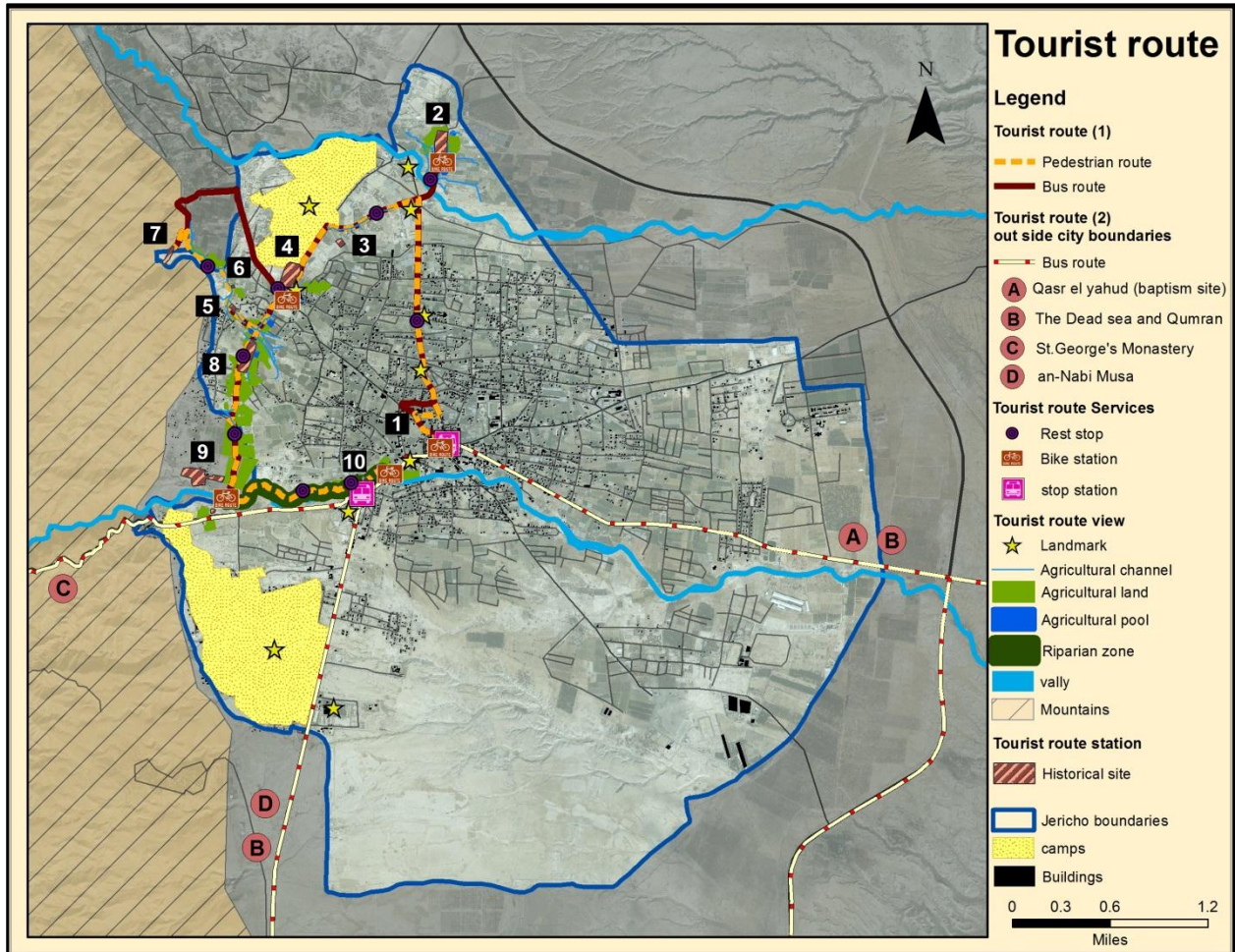


Figure6.49.Tourist route

As we can see in Fig. 6.49, I proposed two route, tourist route (1) for the historical site inside Jericho city boundaries and the tourist can choose between experiment walking or riding a bike using the pedestrians route which allow you it use the valley route or using the bus route, tourist route (2) for historical site

outside Jericho boundaries. Part of the tourist route is the tourist route service which contains rest stop, bus station and bike station. While the tourists using the route they can enjoy seeing some of Jericho landscape feature such as agricultural channel pool and land, the valley, view to the mountain and some of Jericho landmark.

From the tourism route I come up with three corridors help to defined Jericho as a sustainable city, urban corridor, cultural corridor and green corridor.

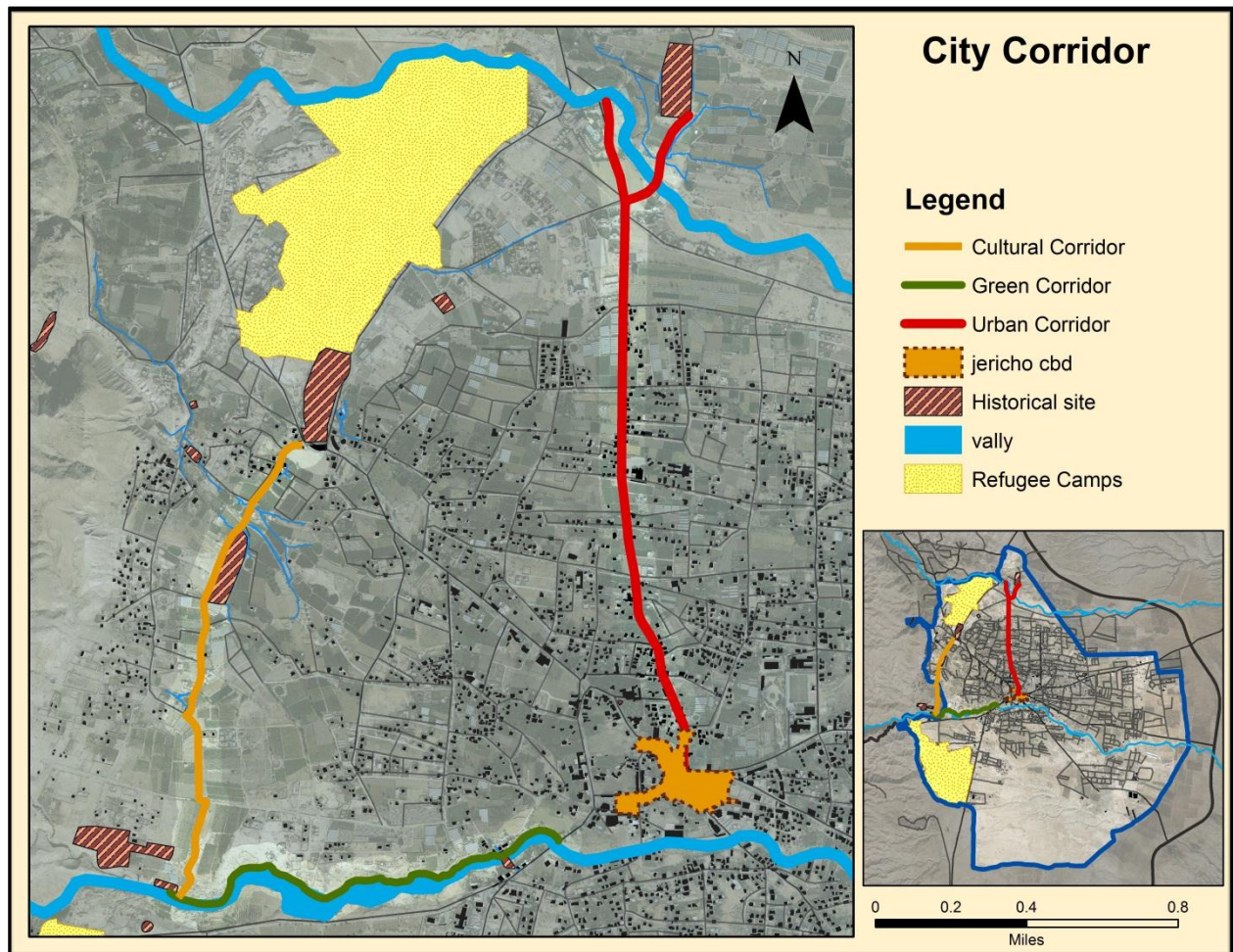


Figure6.50. Jericho city corridor

As we can see in Fig. 6.50, the city corridors contain an urban corridor connecting the CBD area with Hisham palace, cultural corridor connecting ancient

Jericho (Tell es-Sultan) with Herod's palace and green corridor connecting Herod's palace with the CBD area.

- **Urban corridor**

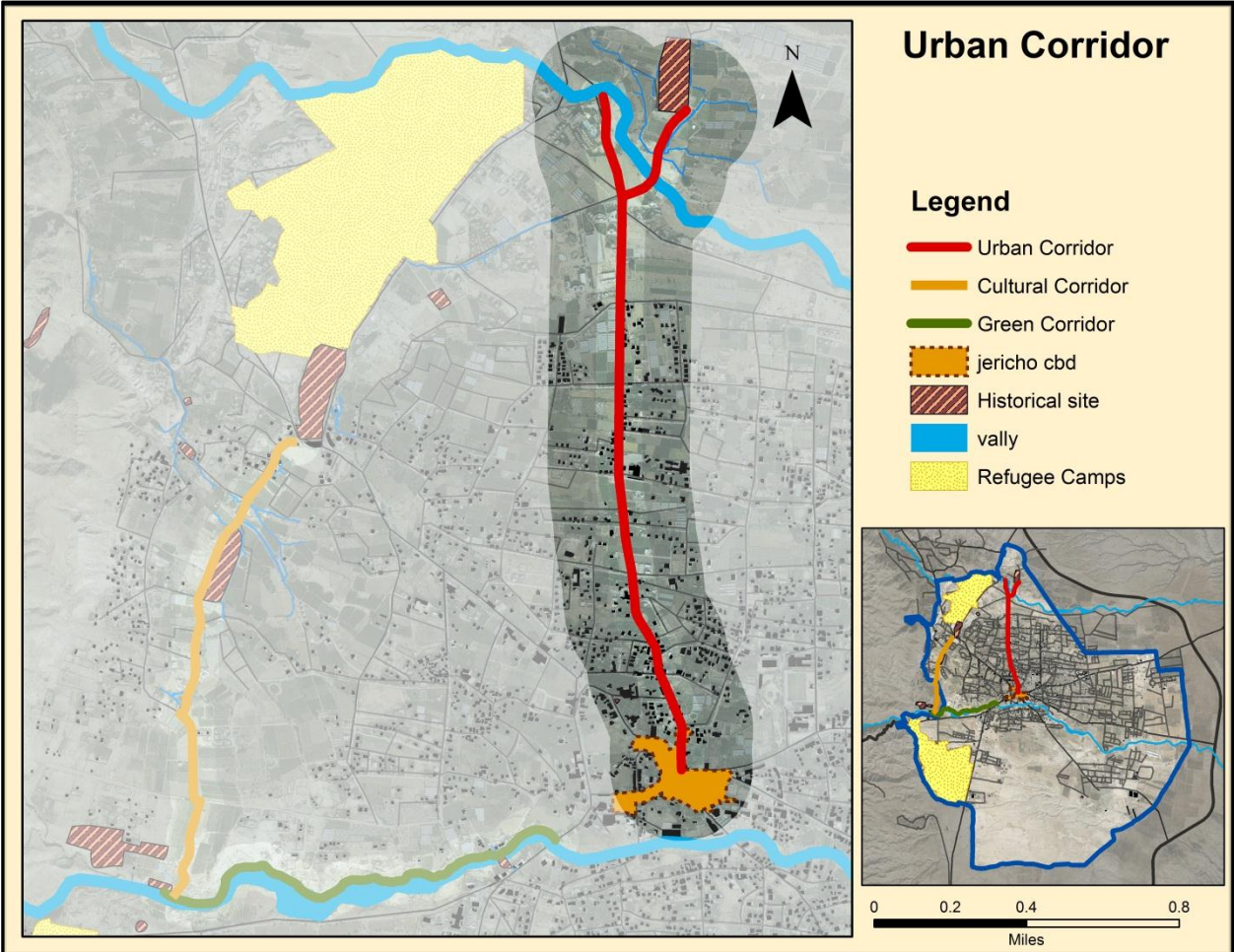


Figure6.51. Urban corridor

As we can see in Fig. 6.51, urban corridor connecting the CBD area with Hisham palace.



Figure6.52.Urban corridor path

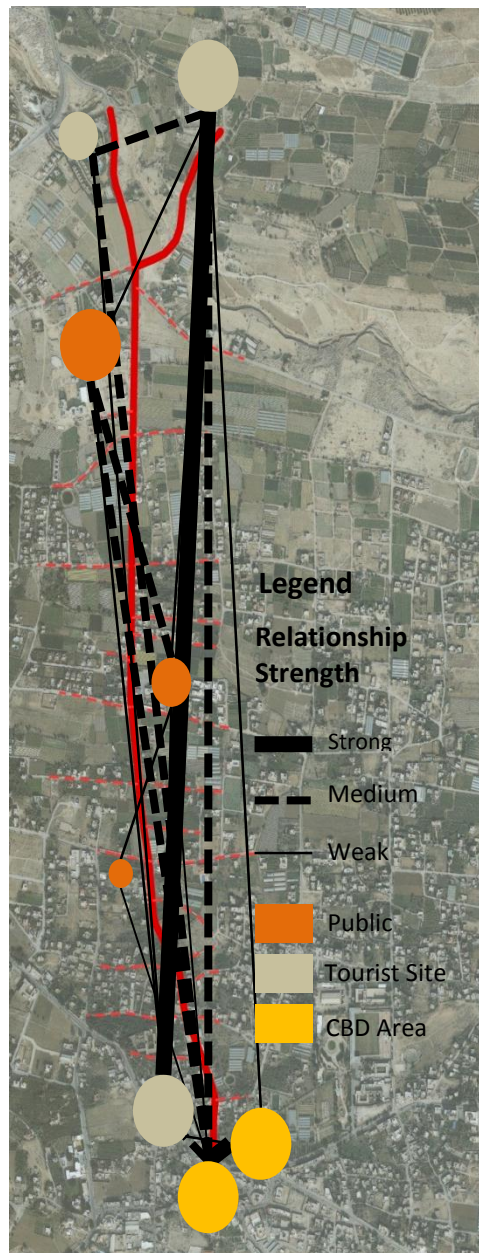


Figure6.53.Urban corridor landmark relationship

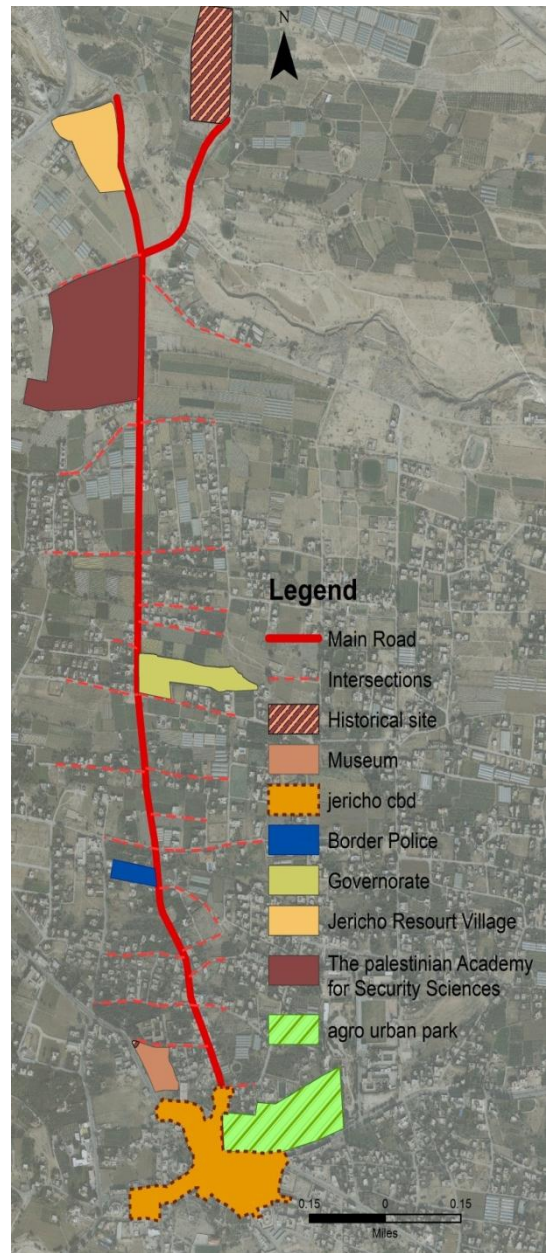


Figure6.54.Urban Corridor existing land mark

As we can see in the prewise Figs. 6.52–54, first I defined the urban corridor path then determined the landmarks site an set the relationship between them based on the strength and the type.

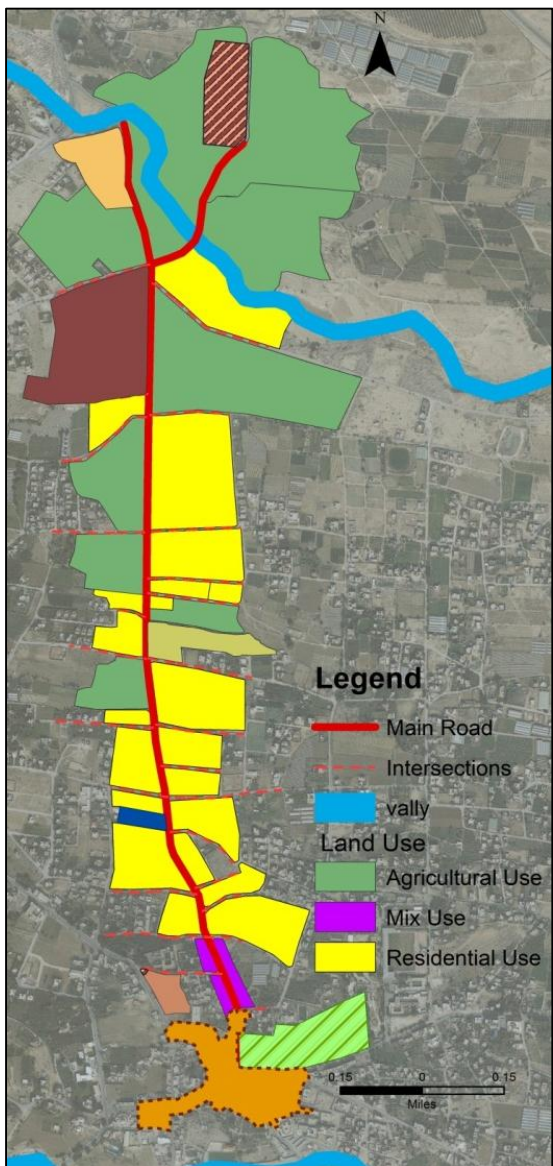


Figure6.55.Urban Corridor

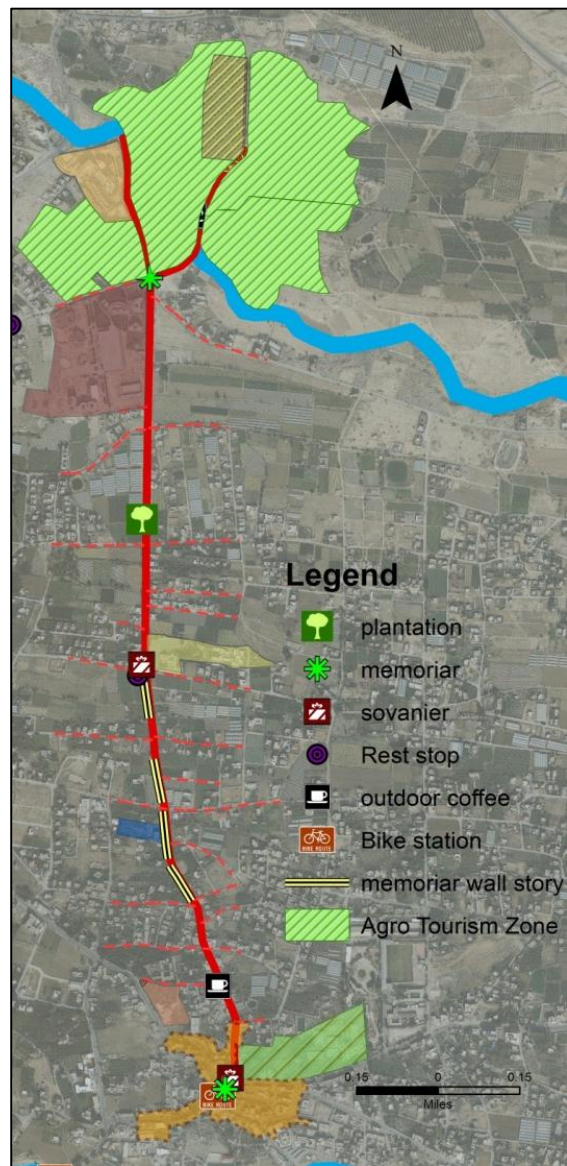


Figure6.56.Urban Corridor

Then I determined the existing land use for the corridor, as we can see in Fig.6.55, the corridor start with mix use then residential use (most of the corridor land use) and the corridor finish with agricultural use which is a part of the green belt that surround the city.

Based on the land mark and the land use of the corridor I proposed some project to strengthen the corridor, based in the function of the corridor and landmarks I give national orientation to the urban corridor, so to strengthen this orientation I

suggest to install Palestinian flags along the corridor along with memorial in the intersection that connect the corridor with Hisham palace , Jericho Resort Village and the rest of the tourism rout, memorial wall story, Agro Tourism Zone to protect the area from any activity could change the landscape of the area, protect and increase attractiveness of the agricultural land in addition of some small shops as it shown in Fig.6.56.

- **Cultural corridor**

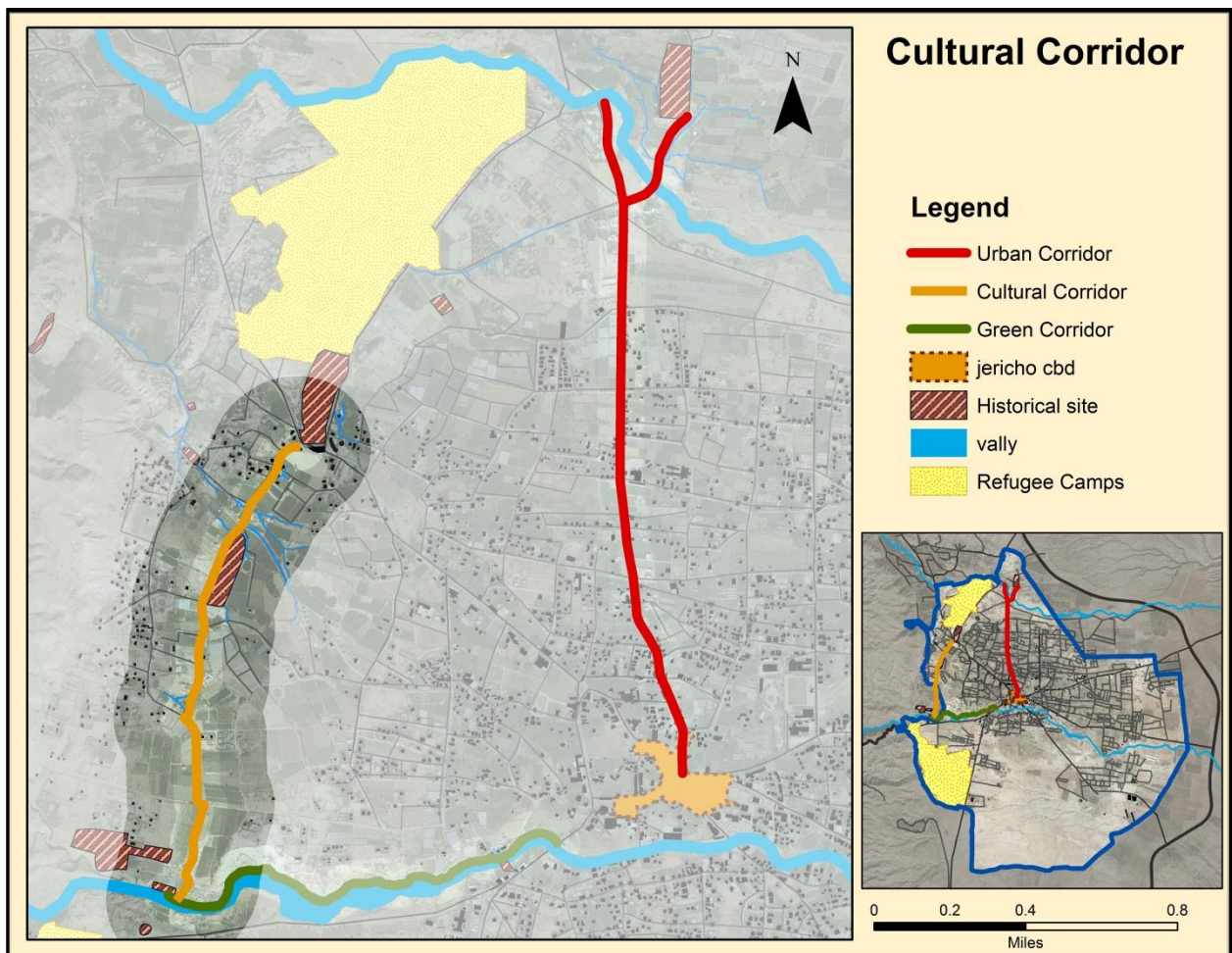


Figure6.57.cultural Corridor

As we can see in Fig.6.57, cultural corridor connecting ancient Jericho (Tell es-Sultan) with Herod's palace.



Figure6.58.cultural Corridor path

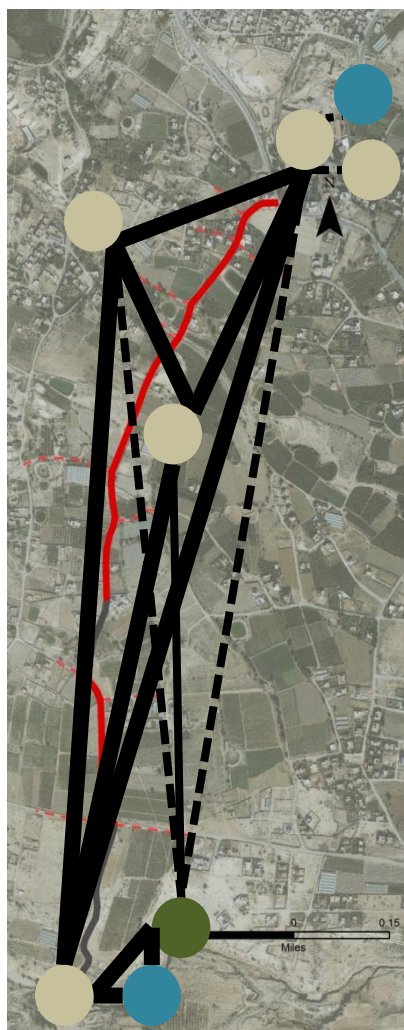


Figure6.59.cultural Corridor landmark relationship

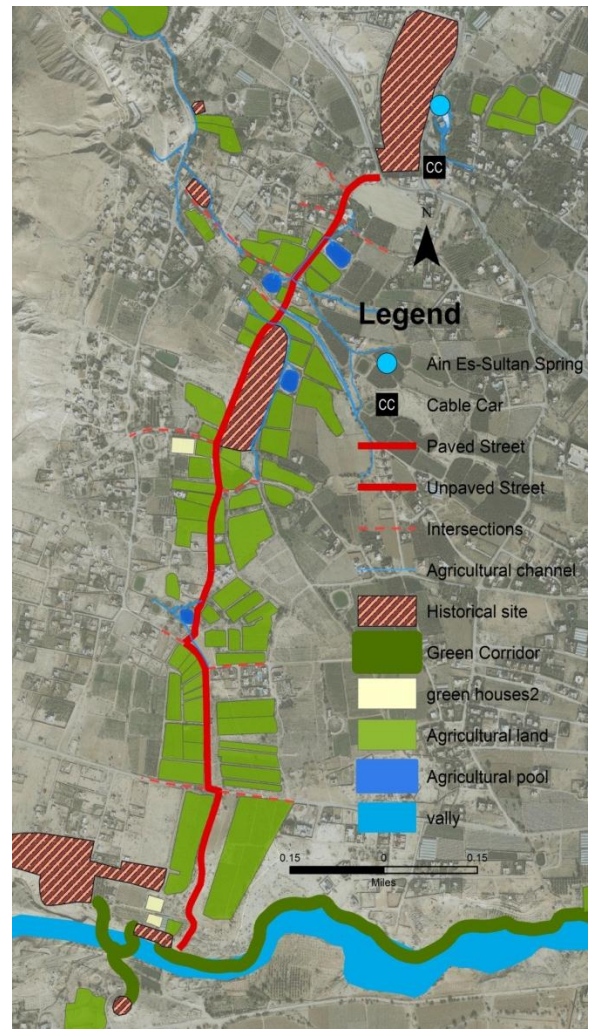


Figure6.60. cultural Corridor existing land mark

As we can see in the prewise Figs. 6.58–60, first I defined the cultural corridor path then determined the landmarks site an set the relationship between them based on the strength and the type.

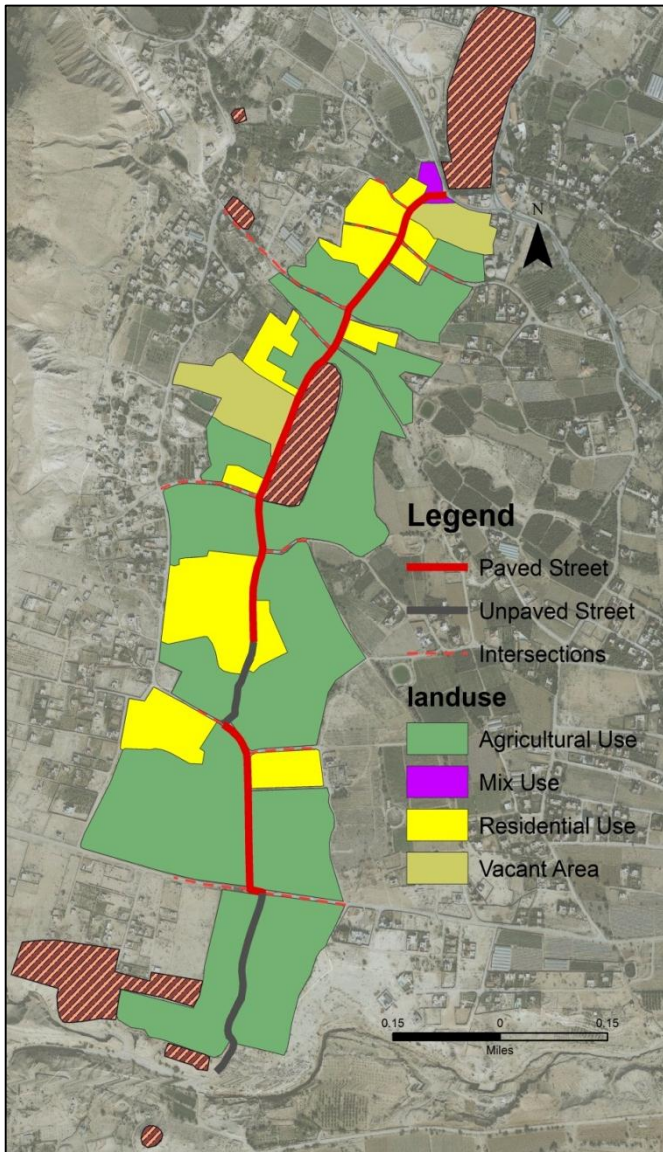


Figure6.61.cultural Corridor land

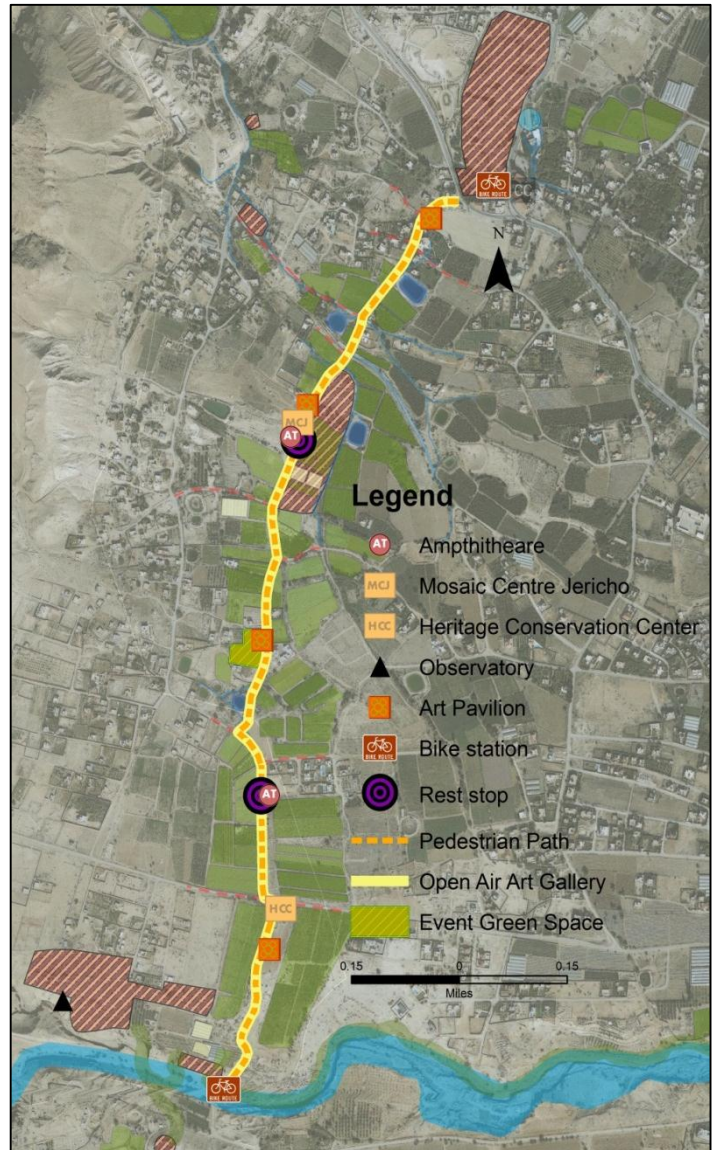


Figure6.62.cultural Corridor

Then I determined the existing land use for the corridor, as we can see in Fig.6.61, the corridor start with mix use then residential use and the rest of the corridor land use agricultural use (most of the corridor land use) which is normal according to the area classification on the master plan it consider to be an urbanism oasis.

Based on the land mark and the land use of the corridor I proposed some project to strengthen the corridor, i proposed two rest step in within the corridor area with

Amphitheatre, four station to install Art Pavilion project, relocate the Mosaic Centre Jericho to the corridor, Heritage Conservation Center, Event Green Space, Open Air Art Gallery along the corridor and change the pavement in the corridor to green driveway path as a share street for Vehicles and pedestrian as we can see in Fig.6.62.

- **Green corridor**

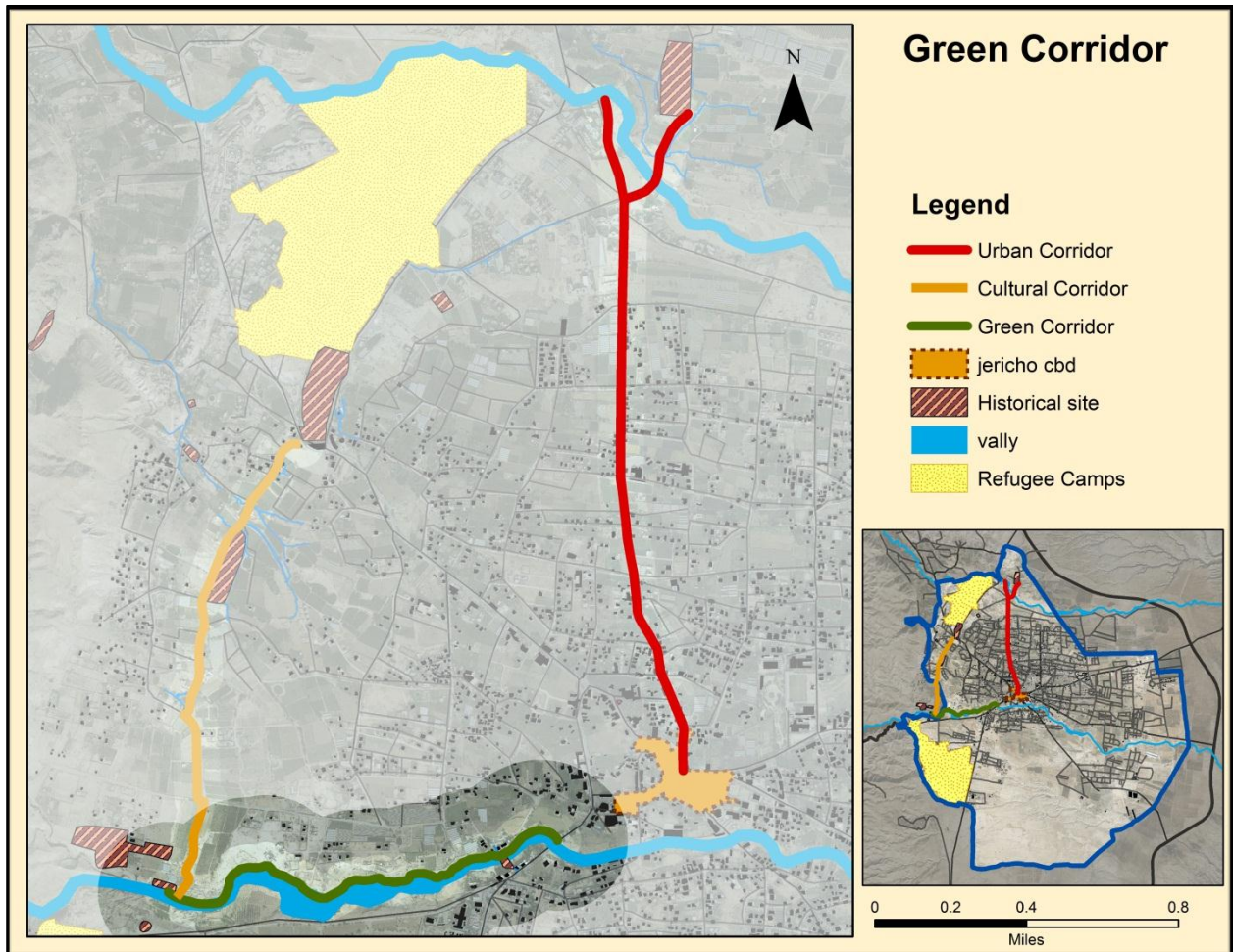


Figure6.63.Green Corridor

As we can see in Fig.6.63, green corridor connecting Herod's palace with the CBD area.

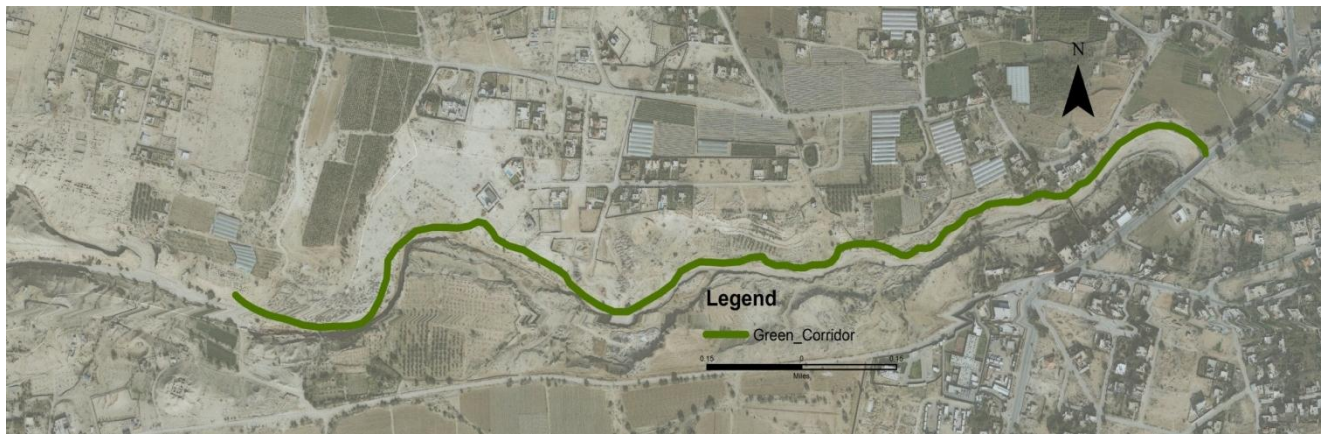


Figure6.64.Green Corridor

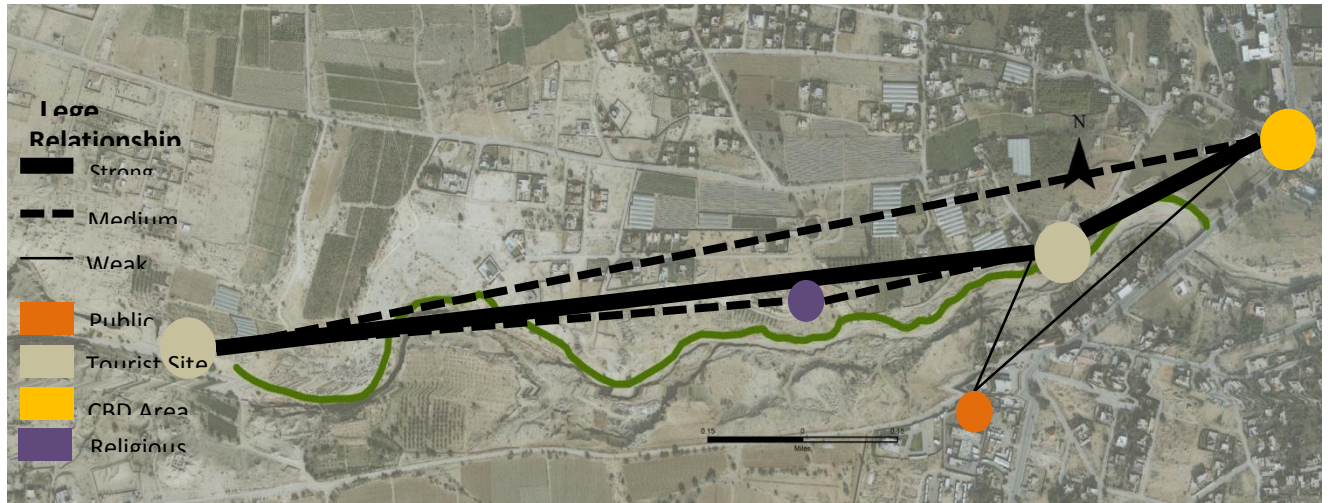


Figure6.65.Green Corridor landmark

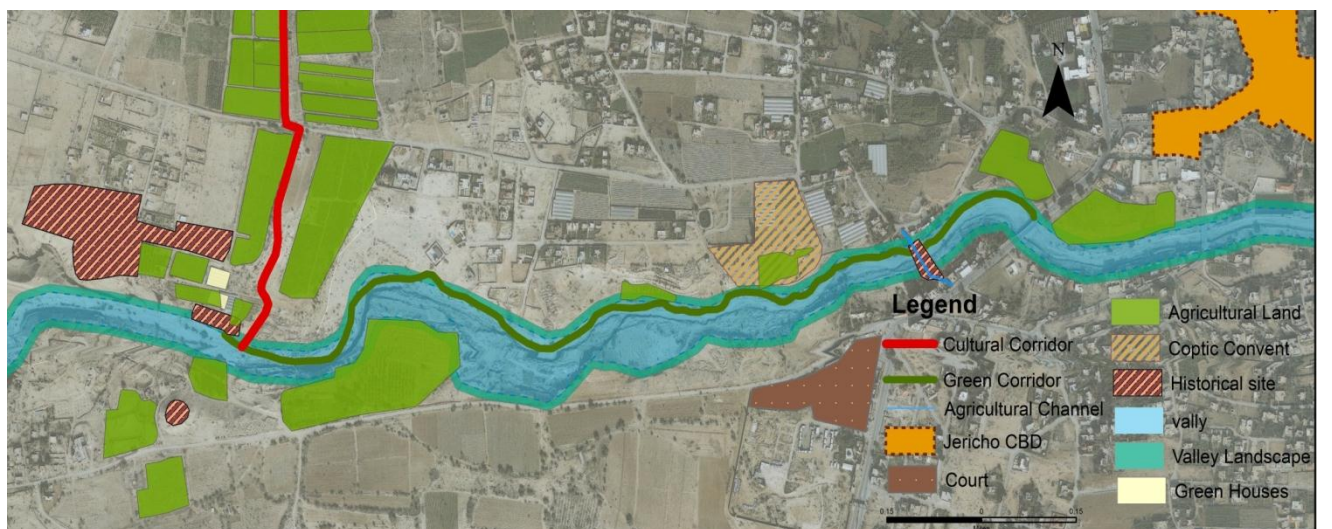


Figure6.66.Green Corridor existing

As we can see in the previous Figs. 6.64–66, first I defined the green corridor

Path then determined the landmarks site a set the relationship between them based on the strength and the type.

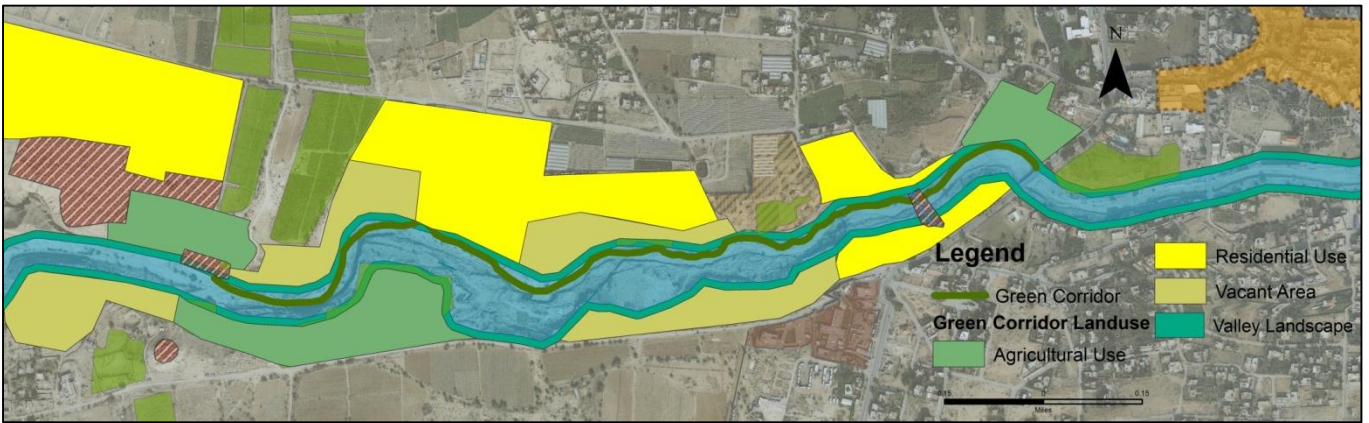


Figure6.67.Green Corridor land use

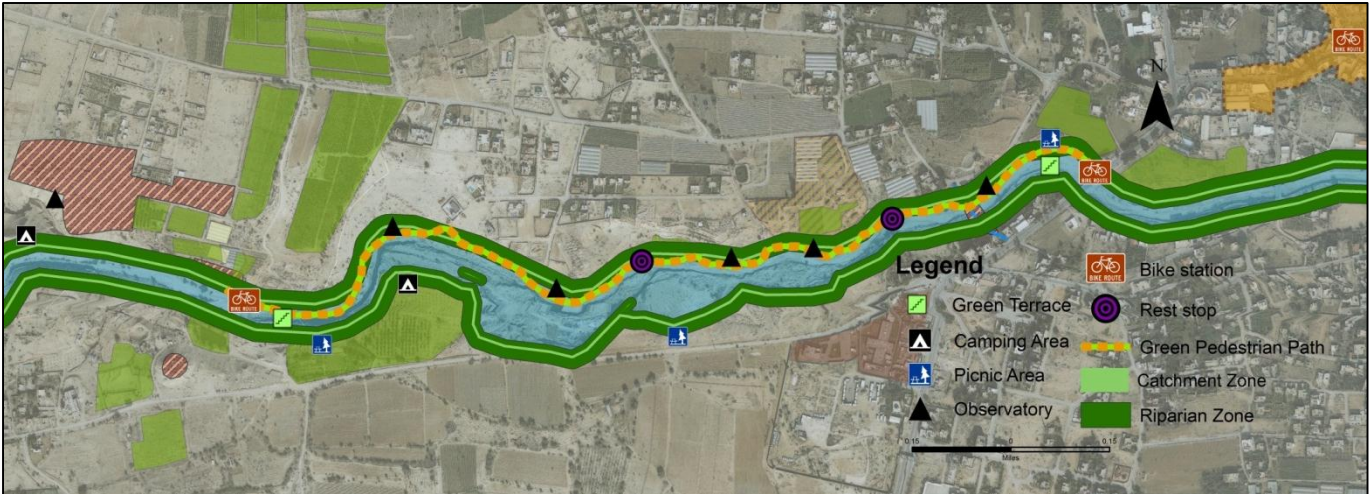


Figure6.68.Green Corridor project

Then I determined the existing land use for the corridor, as we can see in Fig.6.67. Based on the land use and the land mark in the corridor I proposed some project to enhance the landscape in the corridor (valley landscape), such as riparian buffer along the valley, catchment zone within the riparian buffer, camping area picnic area green terrace, observatory and I proposed trail (path) for pedestrian to walk or cycle along the valley in the edge and inside the valley as we can see in Fig.6.68.

In my proposed project I tried to have the least influence in the valley landscape so I help the visitor to enjoy the natural and the valley without the influence of urban cities.

1.2.6 Environment pillar project

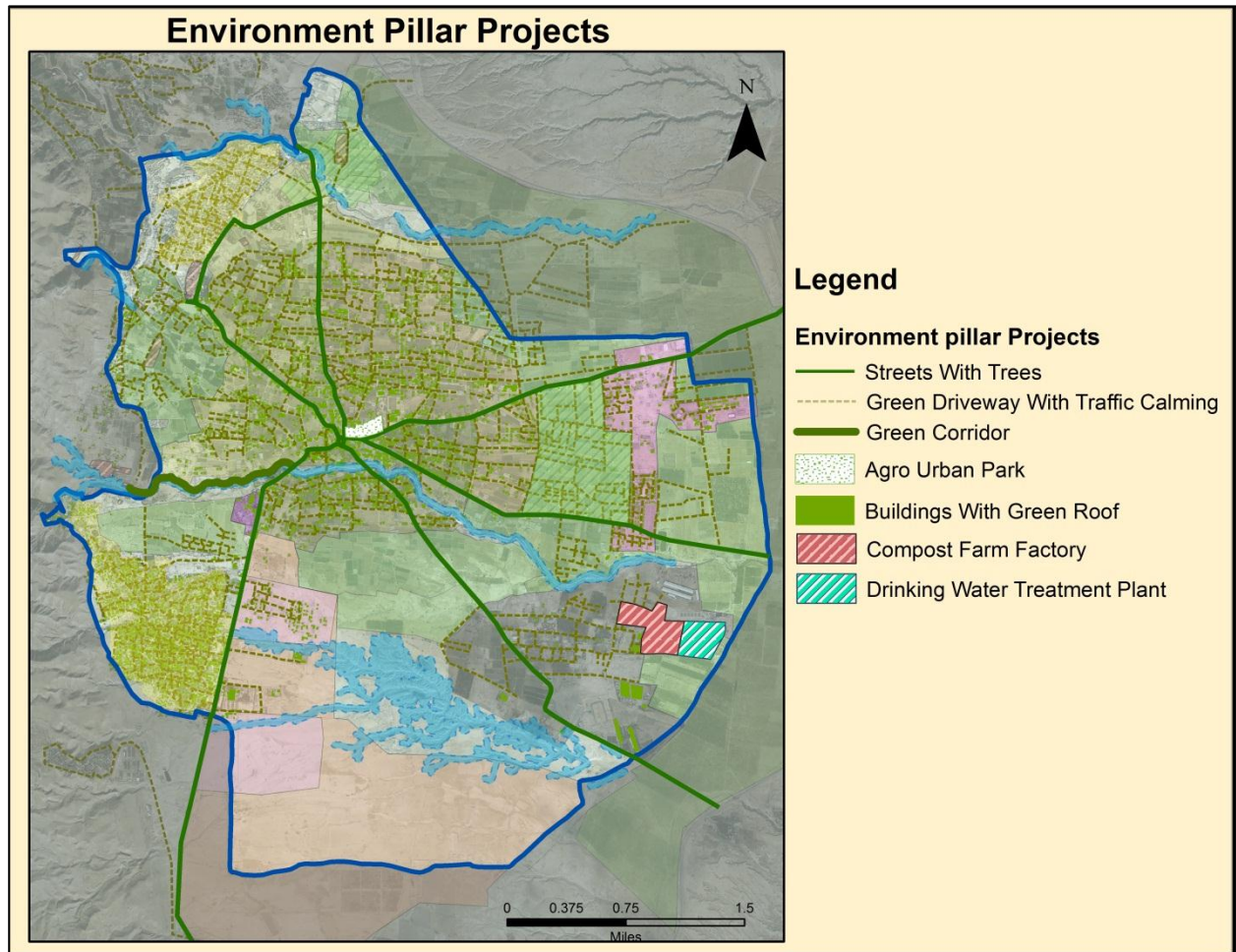


Figure6.69.Environment pillar project

As we can see in Fig.6.69, I proposed some project in Jericho city to improve and protect Jericho environment.

Environment pillar project:

- Streets with Trees along the main streets.
- Green Corridor along Wadi Qelt.
- Green Paved Street with Calming traffic(shared street).
- Buildings With Green Roof.

- Agro Urban Park.
- Compost Farm Factory
- Drinking Water Treatment Plan

I proposed a share street (street for pedestrian and Vehicles) with traffic calming to ensure safety, I use green driveway to decrease the heat island in the city, proposed green roof top project for Jericho building to decrease the effect of the heat waves in summer, an agro urban park in the CBD area to Encourage organic farming, it Contain a small plaza, Agricultural channels and pool, Palm, crop and green house zoon, Rehabilitation Farmers Center and Outdoor Organic Restaurant.

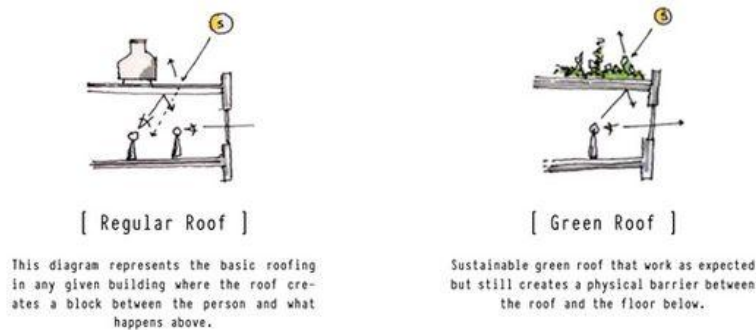


Figure6.70.Green Roof buildings

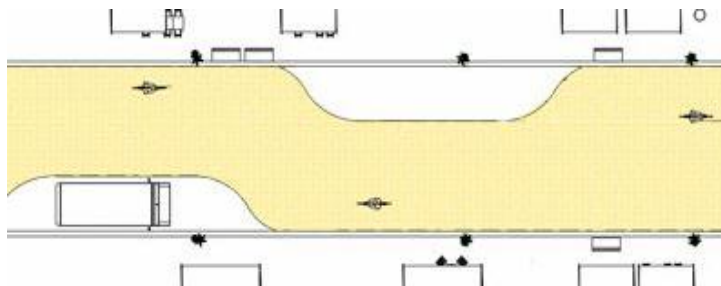


Figure6.71.Share Street with traffic



Figure6.72.Green Paved Street

1.2.6 Social pillar project

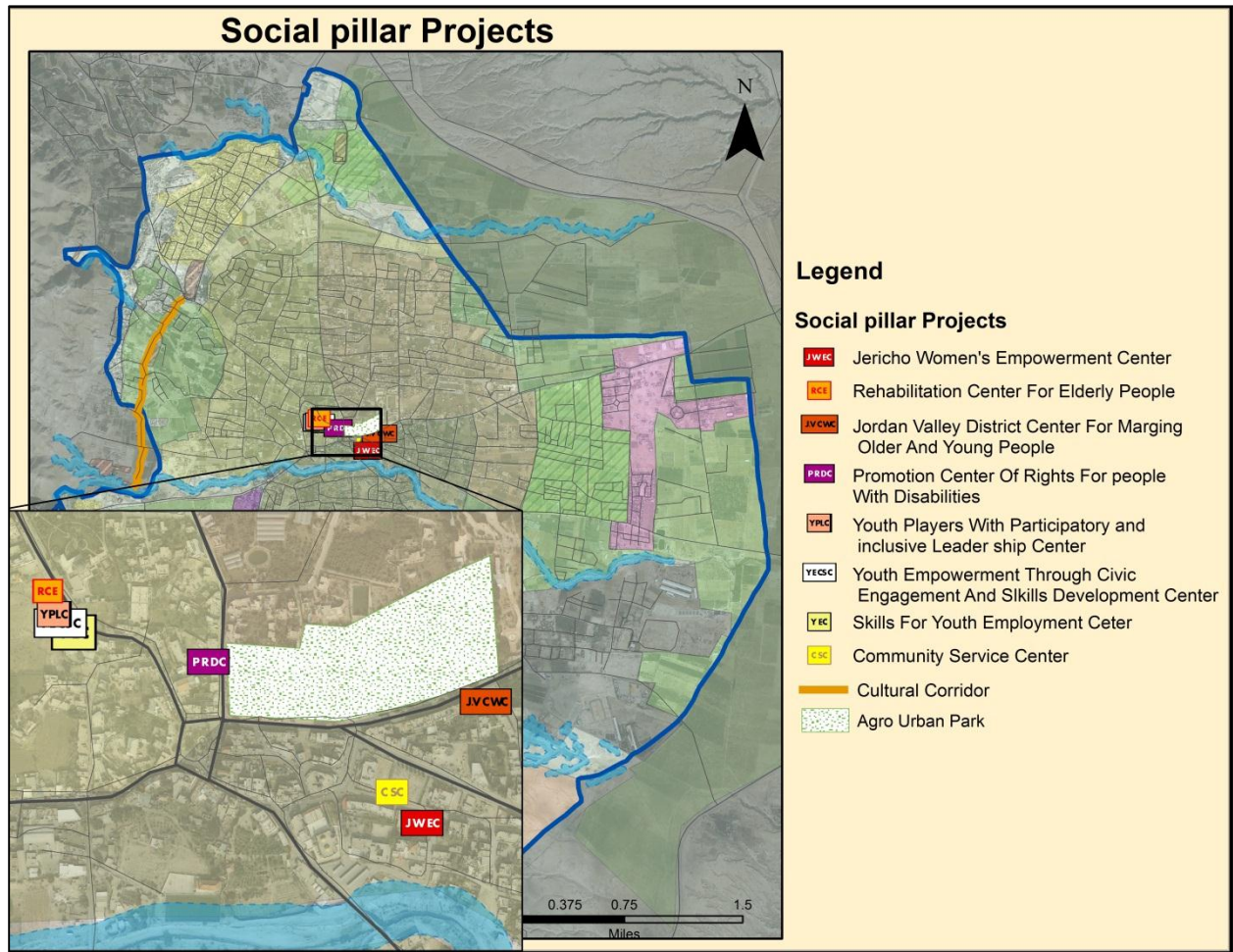


Figure6.73. Social pillar project

Social pillar project:

- Jericho Women's Empowerment Center
- Rehabilitation Center for Elderly People
- Jordan Valley District Council Bringing Older and Young People Together Center.

- Collective Action for the Promotion of Rights for the Youths Living With Disabilities Center.
- Youth Players with Participatory and inclusive Leadership.
- Youth Empowerment through Civic Engagement And skills Development Center.
- Skills for Youth Employment Center.
- Community Service Center.
- Cultural Corridor.

Chapter 7

1.7 Conclusion

Building sustainable cities help saving the environment and a lot amount of money, going sustainable doesn't have to be expensive it start from individual action coordination with the local community and government it will help to achieve sustainability goals.

In my project (Jericho as sustainable city) I work in three pillar of sustainability merging them with city fabric to come up with master plan and projects achieving the sustainability concept in the city, but that will not happen unless we all work together local community, public sector and privet sector.

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