<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>2.0</td>
<td>Literature Reviews</td>
<td>2</td>
</tr>
<tr>
<td>3.0</td>
<td>Environmental Qualities</td>
<td>3</td>
</tr>
<tr>
<td>4.0</td>
<td>Case Studies</td>
<td>4</td>
</tr>
<tr>
<td>5.0</td>
<td>Design Principles</td>
<td>5</td>
</tr>
<tr>
<td>6.0</td>
<td>Data and Space Requirements</td>
<td>6</td>
</tr>
<tr>
<td>7.0</td>
<td>Site Context</td>
<td>7</td>
</tr>
<tr>
<td>8.0</td>
<td>Conceptual Model</td>
<td>8</td>
</tr>
<tr>
<td>9.0</td>
<td>Application to Site</td>
<td>9</td>
</tr>
<tr>
<td>10.0</td>
<td>The Final Model</td>
<td>10</td>
</tr>
<tr>
<td>11.0</td>
<td>Reflective Summary</td>
<td>11</td>
</tr>
<tr>
<td>12.0</td>
<td>Bibliography</td>
<td>12</td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION

1.1 Overview
1.2 Methodology
1.0 INTRODUCTION

1.1 Overview

Today the world is home to approximately 7.5 billion people. It is estimated that by 2050 70% of the world population will live in urban areas (Brescia and Marshall, 2016). This will put strain on infrastructure, services, consumables and space. In order to combat this many redevelopment schemes will have to find innovative ways of accommodating the growing number of people seeking residence in urban areas.

Many prominent figures within Architecture and Urban Design have commented on the rise of high density developments and praised the process of combining increased levels of residential with other essential and leisure facilities. This process is aiding in accommodating the increase in population and migration of the public back to urban based living.

“There is no simple answer to these challenges. The goal is to improve the quality of life for city people, housed, let us hope, in concentrations both dense enough and diverse enough to offer them a decent chance at developing city life” (Jacobs, 1961).

Issues 1 facilitates the platform to investigate high density schemes and allows a critical understanding of the many challenges and problems to be established. The brief gives one the opportunity to relate to contemporary physical and social issues that have no obvious resolve. Through interrogations and applications of case studies, alternative methods and means to achieve a desired objective can be formed in the response to the question...

“How do we safeguard and deliver high levels of environmental quality in the context of increasing intensification of land use?”

At present the political/religious conflict in Syria has led to the rise in the Syrian population seeking refuge in foreign countries. This is ever present in the neighbouring country of Lebanon where figures suggest the current number of Syrian refugees in the country to be around 1.5 million (1 million of which are registered) (UNHCR), 2016). The Capital of Lebanon, Beirut has seen 280,170 registered refugees take shelter within the city and is putting stress on infrastructure, resources and land (UNHCR), 2016).

Contemporary political uncertainty is growing. Today many countries are witnessing the breakdown of well-established international relations. This is present when looking at the political divide within Europe and the USA with heightened national security and the rise of right wing politics. The shift in political agendas has seen the breakdown of support given to war torn countries through caps on numbers of refugees and even full bans.

Group 1 aim to provide a solution to the mass influx of refugees into Beirut by providing a compact Urban Design scheme which will accommodate, rehabilitate and facilitate the services needed for the people to not just survive the conflict but to establish a new vibrant, prosperous and diverse community.

The objective is about establishing a hybrid model that accommodates best practices from both the Western and the Arab world. This exercise will help us in testing how “universal” are urban design qualities; are they context specific or do they transcend physical and even cultural boundaries.
1.0 INTRODUCTION

1.2 Methodology

The methodology followed to deliver the key environmental qualities in dense urban areas is as follow.

The brief was first expanded to answer an important urban issue of the 21st century: how to house an increasing number of refugees in cities through high density development.

The environmental qualities were chosen in regard to the specificity of the case of Syrian refugees in Lebanon. Once these qualities were defined, literature review helped in providing a theoretical framework to better assess them. For each environmental quality, main concepts were running through the different texts of literature; the concepts with most occurrence were then used to assess the chosen case studies and measure how successful they were in implementing the environmental qualities.

The case studies were chosen for the prevalence of our environmental qualities and had to successfully answer at least one of the specified qualities.

From the analysis of both the literature review and the case studies derived design principles that were later applied to the conceptual model. The conceptual model was also informed by the analysis of Arab city design seen necessary working in the context of the Middle East.

The conceptual model was then applied to site after having understood its context and the planning requirements. The final masterplan implemented the specified design qualities and was reflect upon.

The final outcome is a research informed design.
2.0 ENVIRONMENTAL QUALITIES

2.1 Issue of Syrian Refugees in Lebanon
2.2 Environmental Qualities
SYRIAN REFUGEE CRISIS
About 11 million Syrians are on the run!

Turkey: 2,764,500
Syria: 6,325,978 people internally displaced
Lebanon: 1,048,275
Jordan: 655,404
Iraq: 228,894

1 in 5 people is a Syrian refugee
The 21st century saw the emergence of conflicts in the Middle East, which marked the rise of refugees’ migration all over the world. One of the most disruptive of these conflicts is the Syrian Crisis that forced around 4.8 million Syrians to seek refuge in neighboring countries. Lebanon was hit hard by the Syrian Crisis hosting more than 1 million registered Syrian refugees who crossed the borders seeking safety and shelter. Lebanon is already host to other refugee communities (500,000 Palestinian refugees and 6,000 Iraqi refugees); Lebanon, with a national population of 4.4 million, has today the largest concentration of refugees per capita worldwide, with one person out of five being a refugee.

Lebanon is a highly urbanized country with 87.8% of the population living in cities according to the World Bank. The pressure on the country’s weak infrastructure and economy was aggravated by the influx of refugees. Only 1 in 10 Syrian refugees live in camps because of the Lebanese government’s recent “no camp” policy. Syrian refugees are scattered across the country and are struggling to settle in unfamiliar urban communities where they live in collective shelters, old or abandoned apartments, garages, unfinished constructions and warehouses. The typical image of a refugee camp with tents set up in rural sites is thus distant from Lebanon’s context. The majority of refugees reside in cities where they generate new forms of production and mobility.

Since the outbreak of the Syrian crisis in 2011, many of the Syrian refugees settled in Beirut in the search of better opportunities. The city is already dense and suffocating to allow for new developments to host the Syrian refugees who find themselves occupying existing Palestinian camps. These camps are already overcrowded with low living conditions and are not able to absorb the influx of Syrian refugees. However, the latter cannot afford other places within the city knowing that they are only allowed to work in agriculture and cleaning. They also occupy small informal businesses (garbage collection, food selling, hairdresser...) to make some money.

The competition for land, jobs and resources has created tension between the Lebanese communities and the refugees’ communities. Co-existence becomes a necessity knowing that these refugees might never go back to their home countries and if they do what happens to their settlements.

2.0 ENVIRONMENTAL QUALITIES

2.1 Issue of Syrian Refugees in Lebanon

Figure.04 Condition of Palestinian Camps in Lebanon where Syrians are settling in the city

Figure.05 (Below) Syrian Family Occupying War Torn Buildings
Findings | Design Implications
--- | ---
Syrian refugees stressed that the lack of a “proper” shelter was holding them back from looking for jobs. | Provide sufficient housing to support syrian demand and deliver better living conditions and environmental qualities.
48% of the children between the ages of 6 and 14 years old are out of school and 84% of the children between the age of 15 and 17 years old are out school. The reasons for such high numbers are the cost of education, children labor, the transportation cost and the absence of nearby schools. | Provide schools within walkable distances from residential areas and develop an affordable public transport.
36% of refugee households suffered from severe food insecurity. The coping strategies were to cut on expenses of health and education, send children to work and accept any job even with bad working conditions. | Develop an urban agriculture scheme to produce local food. This will also create working opportunities for Syrians knowing that practicing agriculture is permitted for Syrians by the Lebanese Gov.
The main concern of refugees living in Lebanon are safety/security and job security. Safety concerns were expressed by both the Syrian refugees and the Lebanese communities. Safety was found to be linked to the type of housing with lower safety among Syrian refugees living in camps than apartments. | Create safer environments with more active edges and passive surveillance (eye on the street)
Limited access to services is another highlighted point by Syrian refugees with 28% saying they never had access to any kind of services. Health and Education are the hardest services to access. | Provide more services in proximity to residential areas that can be easily accessible by foot since most of the Syrians do not own a car.
The relation of Syrian refugees with the Lebanese people is sometimes inexistnet with low levels of social interaction. The lack of interface between both communities is one source of the tension between both groups with 30% of Lebanese reporting feeling fear toward Syrians and 31% having even hatred feelings. | Create more public spaces to promote social interactions between both communities. Leisure and recreational facilities are also good places for interface. Also promote a common identity, the Arab identity, so both community feel connected and belonging to the place.
2.0 ENVIRONMENTAL QUALITIES

2.2 Environmental Qualities

The environmental qualities chosen after the analysis of the Syrian refugees situation in Lebanon are the following:

• Climate: creating climate responsive design to ensure human comfort without the need of excessive costly technologies.

• Permeability/Accessibility: providing access to services within walking distances is crucial as refugees do not usually own a car and have thus a limited mobility.

• Land use: accessing the same services within mixed use development will encourage interaction between different social groups.

• Open Space: in addition to the many benefits to the provision of open spaces within cities, they can support urban agriculture which will fight against food insecurity faced by many refugees.

• Identity/Integration: issues of identity and integration are critical when dealing with refugees as they need to feel integrated within their new communities for them to prosper.

• Safety: promoting safe environments is crucial when dealing with refugees as there are usually tensions between host and refugee communities. A safe environment should be created to encourage healthy interaction between both groups.

• Adaptability: proposing an adaptable scheme is crucial when dealing with a transient population such as refugees. How can the design adapt in case of population growth and how can it function as an integral part of the city in case the refugees left back to their home countries.
Strategic urban planning will allow for the climate to be controlled and exploited to best benefit the users. Block will be laid out in a way that provides optimum solar gain and solar shading where necessary. This will help to promote a better energy efficient lifestyle, while at the same time providing a ‘healthier lifestyle’.

A well connected and efficient street pattern provides the user with a permeable network of streets and routes. This helps to reduce travel times, promote the use of sustainable modes of transport, reduces pollution and helps to encourage a healthier lifestyle.

By providing a varied and interesting land-use mix, a vibrant and profitable urban fabric is formed. A mixed land-use is also beneficial to creating lively communities and neighbourhoods where diversity can be celebrated and expressed openly.

Adequate open space allocation is particularly important in dense urban areas. Blue and green networks are crucial to promoting a high quality urban environment; they help to promote sustainability, support biodiversity, contribute to a positive micro-climate and have a positive impact on urban dwellers’ mental and physical health.

A strong sense of place and identity provides the user with a high level of community engagement and a sense of ownership. By creating high quality places for people to live, a strong sense of identity will not only help to retain a places population but will also help to promote tourism and ultimately its local economy.

Safety is related to the comfort level of people within their communities. Creating safe environments is crucial when designing for people from different backgrounds. Safe places are also more successful and dynamic as people feel relaxed to wander the streets and practice different activities.

A flexible and responsive environment allows for the users to easily adapt their places to suit their needs for both living and working environments. Adaptive places are also key when looking at refugee and crisis situations that require shelter and other necessities to be quickly and efficiently set up.
3.0 LITERATURE REVIEWS

3.1 Selected Quotes

3.2 Environmental Qualities Assessment
### Climate

The country's hot (35°C average) and humid climate, with plenty of rainfall, has also contributed to the production of a unique cultural landscape. Particularly important for the process of place-identity construction is a rich supply of timber; which has traditionally been used in the building of houses, mosques, shophouses and other building types.

Zone where through traffic is excluded and the quality of the local environment takes precedence. Routinely achieved in new development through careful planning of road hierarchy.

### Permeability/Mobility

In terms of how linkage spaces are used in everyday life, there is an urgent need to foster the availability and appeal of public transport; both to increase choice for those people without guaranteed access to private cars, and also to reduce carbon emissions in the cause of co-dwelling with nature.

It is generally recognised that mixed uses will reinforce the viability of centres with overlapping uses, providing multiple reasons for people to go and stay in the centre. Allow people to make short walking trips between facilities rather than relying on longer car-based trips. Create vitality and character in a place. Provide the opportunity for individuals to live and work in close proximity.

### Land Use

A second important lesson is evident in the use of existing cultural landscapes in constructing a rooted sense of imagined community. This is evident at various scales. At the large scale, it is felt through the overall morphological structure; as seen in Mexico City, where different morphological layers produce a double-coded set of meanings, both Aztec and Spanish. This double-coded cultural landscape was then used by 20th century designers to construct new cultural landscapes; most obvious in the design of the public open space network, where the expansion of the existing grid pattern provided a successful tool for integrating different communities, enabling different groups of users to encounter each other.

### Open Space

It should already be obvious, from case studies themselves that design from the place-identity perspective is shot through with no internal complexities and contradictions; there is no single ‘right answer’, though there may be many inappropriate ones. The lessons we can learn, therefore, are merely useful aids for making better informed design decisions, and for evaluating the pros and cons of alternative design ideas.

Cultural Value: for example, buildings of special architectural or historic interest ('listed' or ancient monuments in the UK). These may be of national or local importance. More mundanely existing names (of streets, areas, fields, farms) may have local resonance and associations.

Environmental images are the result of a two-way process between the observer and his environment. The environment suggests distinctions and relations, and the observer—with great adaptability and in light of his own purposes-selects, organizes, and endows with meaning what he sees.

### Identity & Integration

I should already be obvious, from case studies themselves that design from the place-identity perspective is shot through with no internal complexities and contradictions; there is no single ‘right answer’, though there may be many inappropriate ones. The lessons we can learn, therefore, are merely useful aids for making better informed design decisions, and for evaluating the pros and cons of alternative design ideas.

Adaptability

The image should preferably be open-ended, adaptable to change, allowing the individual to continue to investigate and organise reality: there should be blank spaces where he can extend the drawing for himself.

### 3.0 LITERATURE REVIEWS

#### 3.1 Selected Quotes

<table>
<thead>
<tr>
<th>Author</th>
<th>Citation</th>
</tr>
</thead>
</table>

3.0 LITERATURE REVIEWS

3.1 Selected Quotes

<table>
<thead>
<tr>
<th>Climate</th>
<th>&quot;Collectivization is the best means we have to conserve natural resources and slow global warming, so a vital role of ecological urbanism is to encourage people to live and help them thrive in cities.&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&quot;Climate change will exacerbate existing vulnerabilities and inequities because the impacts of climate change fall disproportionately on the poorest and most vulnerable members of society.&quot;</td>
</tr>
<tr>
<td>Permeability/Mobility</td>
<td>&quot;In societies aspiring toward modern forms of democracy, increasing mobility – in both geographic and socioeconomic terms – has become as critical to human emancipation as the more traditional liberal touchstones of civil liberty and equal representation.&quot;</td>
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<td>&quot;The design of urban streets has often been dominated by solutions that meet the needs of motorized traffic and the perspective of the highway/traffic engineer, with little consideration of other street activities or the contributions of other professionals such as urban designers.&quot;</td>
</tr>
<tr>
<td>Land Use</td>
<td>&quot;The quintessential human act of intentional manipulation of the design of space and place is nothing if not intimately connected with other species and the context in which we dwell.&quot;</td>
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<td>&quot;Building form is an important factor in generating and understanding density.&quot;</td>
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<tr>
<td>Open Space</td>
<td>&quot;In societies aspiring toward modern forms of democracy, increasing mobility – in both geographic and socioeconomic terms – has become as critical to human emancipation as the more traditional liberal touchstones of civil liberty and equal representation.&quot;</td>
</tr>
<tr>
<td>Identity &amp; Integration</td>
<td>&quot;The urban landscape that we humans share with ecological systems and plant and animal habitat forms our identity as individuals and becomes the image of the city.&quot;</td>
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<td>Safety</td>
<td>&quot;Adaptive design is a term to refer to an integrated, whole-system, learning-based approach to the management of human ecological interactions with explicit implications for planning interventions and resulting design forms.&quot;</td>
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<tr>
<td>Adaptability</td>
<td>&quot;Meeting the needs of the present without compromising the ability of future generations to meet their own needs.&quot;</td>
</tr>
</tbody>
</table>


3.0 LITERATURE REVIEWS

3.1 Selected Quotes

**Climate**

"What people seek are sun-traps. And the absence of wind and drafts are as critical for these as sun. In this respect, small parks, specially those enclosed on three sides, function well. Physically and psychologically, they feel comfortable."

"Good weather is one of the most significant criteria for assuring the ease of people’s movement in cities. Several climate factor influence the feeling of comfort: air temperature, humidity, wind chill and solar heat."

"In lively, safe, sustainable and healthy cities, the prerequisite for city life is good walking opportunities. Walking is the beginning. Man was created to walk, and all life events large and small develop when we walk among other people."

"We were born to move – not merely to be transported but to use our bodies to propel us across the landscape. Our genetic forebears have been walking for four million years."

**Permeability/Mobility**

"The central value of urban value is that of publicness, of people from different groups meeting each other and of people acting in concert, albeit with debate. The most important public places must be for pedestrians, for no public life can take place between people and automobiles….public circulation systems should be seen as significant cultural settings where the city’s finest products and artefacts can be displayed, as in the piazzas of medieval and renaissance cities."

"In lively, safe, sustainable and healthy cities, the prerequisite for city life is good walking opportunities. Walking is the beginning. Man was created to walk, and all life events large and small develop when we walk among other people."

"With every urban district there should be a wide range of uses. Diversity of use helps achieve the basic goal of increasing local autonomy. Mixed used local and district centers rather than separate zones."

"It is not at all certain that a rush back to urban density will produce better lives than did suburban dispersal."

**Land Use**

"There must be an integration of activities- living, working, shopping, as well as public, spiritual, and recreational activities–reasonably near each other. The best urban places have a mixture of uses. The mixture respond to the value of publicness and diversity that encourage local community identity. What bring life to an area is the life of people going about a full range of normal activities without having to get into an automobile."

"With every urban district there should be a wide range of uses. Diversity of use helps achieve the basic goal of increasing local autonomy. Mixed used local and district centers rather than separate zones."

"It is not at all certain that a rush back to urban density will produce better lives than did suburban dispersal."

**Open Space**

"In an urban environment, buildings (and other objects that people place in the environment) should be arranged in such a way as to define and even enclose public space, rather than sit in space."

"The green infrastructure or greenspace system is the essential backcloth to urban life, helping to maintain the neighbourhood ecosystem in equilibrium. The value of greenspace is enhanced if linked."

**Identity & Integration**

"People should feel that some of the environment belong to them, individually and collectively, some part for which they care and are ever responsible, whether they own it or not. Urban environment should be an environment that encourages people to express themselves, to become involved."

"Local distinctiveness is achieved through the people (past/present) and the types and patterns of activities."

"The right to the city cannot be conceived of as a simple visiting right or as a return to traditional cities. It can only be formulated as a transformed and renewed right to urban life."

**Safety**

"Feeling safe is crucial if we hope to have people embrace city space. In general, life and people themselves make the city more inviting and safe in terms of both experienced and perceived security."

**Adaptability**

"The good city is one in which the continuity of this complex ecology is maintained while progressive change is permitted. By ecology mean elements are connected through an immense and intricate network, which can be understood only as a series of overlapping local systems, never rigidly instantaneously linked and yet part of a fabric without edges."

"The city should have a well-proportioned and inviting city spaces that inspires all types of activities – flexible and fleeting."

"There is a rash of studies under way designed to uncover the bad consequences of overcrowding. This is all very well as far as it goes but it only goes in one direction. What about undercrowding?"
<table>
<thead>
<tr>
<th><strong>3.0 LITERATURE REVIEWS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.1 Selected Quotes</strong></td>
</tr>
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**Identity & Integration**

- “Identity is intimately tied to memory: both our personal memories (where we have come from) and the collective or social memories interconnected with the history of our families, neighbours, and ethnic communities. It is possible to enhance social meaning in public spaces with projects that are sensitive to all citizens and their everyday knowledge of animal life required to grasp animal standpoints or ways of being in the world, interact with them accordingly in particular contexts, and motivate political action necessary to protect their autonomy as subjects and their life space. Such knowledge would stimulate a rethinking of a wide range of urban daily life practices that impact animals and nature in its diverse forms.”

**Permeability/Mobility**

- “CPULs will allow high diversity, as it will benefit from differences and a new identity to enrich the occupation and appearance of its various productive and connective landscape elements by recycling wasted spaces of a city.”

**Adaptability**

- “Urban agriculture, the proposed productive element of CPULs, could take on any shape and occupy virtually any space in the city. They could happen anywhere within the urban context, leading to many cities boosting the multiple use of their build space and keeping valuable inner-city space clear of construction at the same time.”

**Land Use**

- “CPULs will be designed primarily for pedestrians, bicycles, engine-less and emergency vehicles, so as to allow healthy vegetation and varied occupation. The resulting near absence of noise, air and ground pollution, and of the dangers from traffic, i.e. accidents, would make CPULs not only most appropriate for agricultural production, but also a perfect leisure destination for the local population.”

**Open Space**

- “Networks of open space will be essential if cities are to remain desirable and environmentally sustainable. Landscapes, like buildings, will become multifunctional, thereby enabling beneficial exchanges between the constructed and natural environments.”

**Safety**

- “A cooler city is one where light surfaces and vegetation are combined to create shade, reflect sunlight and provide cooling through evaporation. Urban vegetation combined with light and reflective surfaces, can reduce surface temperatures by 10-20 degrees.”

**Climate**

- “CPUL will be environmentally productive dealing not only with local food, but also with issues such as greenhouse gas (CO2) reduction, improving air quality and air humidity, noise filtering and biodiversity.”


- “A cooler city is one where light surfaces and vegetation are combined to create shade, reflect sunlight and provide cooling through evaporation. Urban vegetation combined with light and reflective surfaces, can reduce surface temperatures by 10-20 degrees.”


- “The right to the city has become increasingly important to the conscience of urban planning, which actively negotiates the boundaries between social relations and spatial structures on behalf of the state.”


- “A city can be defined as becoming more sustainable if it is reducing its resources inputs (land, energy, water, and materials) and waste outputs (air, liquid and solid waste) while simultaneously improving its livability (health, employment, income, housing, leisure activities).”

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- “The future sustainable city is envisioned as a multicentered city linked by good-quality transit on radial and orbital lines, within the centers, walking-oriented characteristics would be favoured, and such new nodes would be located to provide work, shops and local services within bicycling distance or a shot, demand-responsive local transit trip of all present suburban areas.”

- “A city can be defined as becoming more sustainable if it is reducing its resources inputs (land, energy, water, and materials) and waste outputs (air, liquid and solid waste) while simultaneously improving its livability (health, employment, income, housing, leisure activities).”
### Climate

“For any planning discussions, urban climate results have to be translated to general planning aims in terms of the well-being of people. To what extent do dense building sites affect the heat island and thermal conditions of open spaces, and what potential does the concept have to improve thermal conditions and air mass exchange—for example along roads and parks?”

“Levels of sunlight, shade, temperature, humidity, rain, snow, wind and noise have an impact upon our experience and use of urban environments.”

### Permeability/Mobility

“Density needs to work in conjunction with other conditions and approaches such as mixed use, building form and design, and public space layout.”

“Combining urbanism and nature is an enormous challenge but fundamental to true sustainability. So, fine grained mixed use is sought in urban expansion in order for those environments to be lively, safe, sensorily rich, choice laden, economically and spatially efficient and ecologically diverse; sustainable in as far as the built environment per se, can believably be.”

“In response to the sterility produced by the functional zoning policies and practices of much post-war planning and urban development, the mixing of uses has become a widely accepted urban design objective. Areas may have mixed uses in either or both of two ways: by having a mix of single-use buildings or by having buildings which each contain a mix of uses (e.g. living over the shop). The latter is generally preferable.”

### Land Use

“Density needs to work in conjunction with other conditions and approaches such as mixed use, building form and design, and public space layout.”

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### Open Space

“The small scale additions help to reorganize the public space and reformat it into a more fine grained hierarchy suggesting clearer gradation from public, semi-public and semi-private to private space.”

“Public space design has become patterned around our expectations of standard figures in the environment, it is a deterministic response that takes little advantage of our increasing knowledge of individual and group needs.”

“Public spaces should also be ‘responsive’ - that is, designed and managed to serve the needs of their users. They identify five primary needs that people seek to satisfy in public space: ‘comfort’; ‘relaxation’; ‘passive engagement with the environment’; ‘active engagement with the environment’; and ‘discovery’.”

### Identity & Integration

“The small scale additions help to reorganize the public space and reformat it into a more fine grained hierarchy suggesting clearer gradation from public, semi-public and semi-private to private space.”

“Concepts of ‘place’ often emphasise the importance of a sense of ‘belonging’, of emotional attachment to place.”

### Safety

“A sense of security and safety is, therefore, an essential prerequisite of successful urban design. Increased security has, however, often been attained by privatization and retreat from the public realm. In urban design terms, privatization usually entails the control of certain territories or spaces by means of segregation (such as physical distance, walls, gates and less visible barriers to exclude the outside world and its perceived threats and challenges) and also by means of policing strategies and the use of surveillance cameras.”

### Adaptability

“Levels of sunlight, shade, temperature, humidity, rain, snow, wind and noise have an impact upon our experience and use of urban environments.”

“Combining urbanism and nature is an enormous challenge but fundamental to true sustainability. So, fine grained mixed use is sought in urban expansion in order for those environments to be lively, safe, sensorily rich, choice laden, economically and spatially efficient and ecologically diverse; sustainable in as far as the built environment per se, can believably be.”

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### Literature Reviews

<table>
<thead>
<tr>
<th>3.0 LITERATURE REVIEWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Selected Quotes</td>
</tr>
</tbody>
</table>
3.0 LITERATURE REVIEWS

3.2 Environmental Qualities Assessment
3.0 LITERATURE REVIEWS

3.2 Environmental Qualities Assessment

CLIMATE AND ENVIRONMENT
It is one of the most important environmental qualities which are to be considered. The climate and environment help to determine wellbeing and quality of life. Levels of sunlight, shade, temperature, humidity, rain, snow, wind and noise have an impact upon our experience and use of urban environments. (Carmona et al. 2003)

A city can be defined as becoming more sustainable if it reduces its resources inputs (land, energy, water, and materials) and waste outputs (air, liquid and solid waste) while simultaneously improving its legibility (health, employment, income, housing, leisure activities, accessibility, public spaces, and community). (Cuthbert, 2003)

Several climate factors influence the feeling of comfort: air temperature, humidity, wind chill and solar heat. (Gehl 2010). If cities are to invite people to walk and bicycle more as well as to develop lively and attractive city areas, the climate between buildings is one of the most important target areas. (Gehl 2010). Dense building sites affect the heat island and thermal conditions of spaces. Environmental impact at the global, urban, micro-urban and building scales. Special attention is paid to thermal impacts (internal and external temperature) and variables that affect human comfort. Factors, which determine the thermal effects of users: changes in air movement,

PERMEABILITY/MOBILITY
Well connected, well linked place plays an essential role in creating good and permeable urban design of a city. Mobility can be considered as a link and a place and has to be increased in both geographic and socio-economic terms. Everything should be within reasonable walking distance - variety of uses and activity. When everything is within walking distance people of different community, different age group, different occupation, and different culture tend to interact more.

“In terms of how linkage spaces are used in everyday life, there is an urgent need to foster the availability and appeal of public transport; both to increase choice for those people without guaranteed access to private cars, and also to reduce carbon emissions in the cause of co-dwelling with nature.” (Watson et al. 2007)

Encouraging residents to cycle not only reduces carbon emission, it brings street to life, builds safer neighbourhoods and improves health of city inhabitants. (Pelsmakers, 2015)

LAND USE
After study and analysis of the work of famous urban designers it was found that mixed use urban design forms of a good city design and produce life for people staying there. The mix and well connected neighbourhood in which all activities such as living, working, shopping as well as spiritual and recreational activities are integrated with each other leads to good urban design.

There should be short walking trips between facilities rather than relying on longer car based trips to live and work is in close proximity. Diversity of users helps achieve the basic goal of increasing local autonomy also encourage local community identity. Functional and zoning policy also plays an important role.

Fine grained mixed use is sought in urban expansion in order for those environments to be lively, safe, sensorily rich, choice laden, economically and spatially efficient and ecologically diverse; sustainable in as far as the built environment per se, can believably be. (McGlynn and Hayward, 1993).

OPEN SPACE
Open space can be a green space, playgrounds, public seating areas, public plaza. Green space important in dense urban areas. Public spaces and green spaces are patterned around open space.

Open space provides recreational areas for residents and helps to enhance the beauty and environmental quality of neighbourhoods. It forms a place for group meeting of users and reintegration of people with nature, different communities, and different culture and meets needs of their users.

In an urban environment, buildings (and other objects that people place in the environment) should be arranged in such a way as to define and even enclose public space, rather than sit in space. (Larice and MacDonald, 2015)
IDENTITY AND INTEGRATION
It often means a feeling of belonging; local distinctiveness is based on an observer and his environment which leads to reorganizing the public spaces; reformatting it into more fine grained hierarchy. Variety of building forms, architectural design and age of buildings, mixed housing types, sizes and tenures, and a mix of intensity of uses, combined to sustain a wide range of activities in close proximity to each other, imparting to each place its own unique character, identity and its sense of place.

Concepts of place often emphasise the importance of a sense of belonging of emotional attachment to place. (Carmona et al., 2003)

Identity is intimately tied to memory: both our personal memories (where we have come from) and the collective or social memories interconnected with the history of our families, neighbours, and ethnic communities. It is possible to enhance social meaning in public spaces with projects that are sensitive to all citizens and their diverse heritage, and developed with public processes that recognize both the cultural and the political importance of place. (Cuthbert, 2003)

SAFETY
Feeling safe is crucial in terms of both experienced and perceived security which can be achieved by privatization, segregation. Surveillance is necessary in terms of providing safety. Social relation and spatial structure-boundaries also helps to provide safety.

The design of streets and places can help to minimize crime and anti-social behaviours, making places and spaces feel safer, which in turn can build up and strengthen the physical, mental and social well-being of community members. Natural surveillance can expand with a presence of pedestrians, the thoughtful design of housing, other buildings and public spaces. This helps improve safety and provide a feeling of safety.

Well-designed and maintained places can make it easier for community members to meet and socialize in public places; it also enhances social capital and increase the probability of people feeling safe and secure.

ADAPTABILITY
Adaptability is concerned with the capacity to be adjusted to suit new situations. Urban areas accommodate complex patterns of diversity, mixture and economic grain. These areas are flexible, movable, and refit able. Adaptability requires redefining of time through shifting mind sets and reshaping of values.

City changes according to the change of interests and value of its actors (Cuthbert, 2003) Meeting needs of present without compromising the ability of future generations to meet their own need. (Carmona, 2014) The city should have a well-proportioned and inviting city spaces that inspires all types of activities – flexible and fleeting (Lynch, 1960)
4.0 CASE STUDIES

4.1 Introduction
4.2 Khan Younis
4.3 Le Medi
4.4 Madla-Revheim Masterplan
4.5 Toa Payoh
4.6 Masdar Development
4.7 Hong Kong IFC
4.8 Case Study Rating
4.0 CASE STUDIES

4.1 Introduction

Figure 06 World map shows case study location
## 4.0 CASE STUDIES

### 4.1 Introduction

<table>
<thead>
<tr>
<th>CASE STUDY</th>
<th>INDICATOR</th>
<th>RATING</th>
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<th>Criteria</th>
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</tr>
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<tbody>
<tr>
<td><strong>Climate</strong></td>
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</tr>
<tr>
<td>Local Climate Responsive</td>
<td>• Which morphological layers respond to local climate?</td>
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<tr>
<td>Human Comfort</td>
<td>• Implement energy efficiency strategies?</td>
</tr>
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<td></td>
<td>• Ensure the design of agreeable spaces to be in?</td>
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<tr>
<td><strong>Permeability/Mobility</strong></td>
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</tr>
<tr>
<td>Street Structure</td>
<td>• Are the streets well connected and permeable?</td>
</tr>
<tr>
<td>Modes of Commute</td>
<td>• Does the design favour pedestrian over vehicular?</td>
</tr>
<tr>
<td></td>
<td>• Integrate public transport systems?</td>
</tr>
<tr>
<td><strong>Land Use</strong></td>
<td></td>
</tr>
<tr>
<td>Mix Use Blocks</td>
<td>• What uses are mixed within the development?</td>
</tr>
<tr>
<td>Vitality</td>
<td>• Is the area active during day and night time?</td>
</tr>
<tr>
<td><strong>Open Space</strong></td>
<td></td>
</tr>
<tr>
<td>Open Space vs. Built Form</td>
<td>• What is the percentage of green open spaces to built form?</td>
</tr>
<tr>
<td>Green Open Space Typologies</td>
<td>• Linked and diverse types of green open spaces?</td>
</tr>
<tr>
<td><strong>Identity &amp; Integration</strong></td>
<td></td>
</tr>
<tr>
<td>Local vs. Global Identity</td>
<td>• How much does the design respond to local culture?</td>
</tr>
<tr>
<td>Legibility</td>
<td>• Use of distinctive urban form and architecture?</td>
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<tr>
<td><strong>Safety</strong></td>
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<tr>
<td>Public vs. Private</td>
<td>• Is there a clear distinction between private and public spaces?</td>
</tr>
<tr>
<td>Surveillance</td>
<td>• Are all public spaces overlooked and fronted by active edges?</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td></td>
</tr>
<tr>
<td>Robust Spaces</td>
<td>• Allow for temporary programs and spontaneous activities to take place?</td>
</tr>
<tr>
<td>Future Outlook</td>
<td>• Implement flexible layouts and typology of spaces?</td>
</tr>
<tr>
<td></td>
<td>• Account for future city growth and change?</td>
</tr>
</tbody>
</table>
4.2 KHAN YOUNIS CAMP

4.2.1 Introduction/Overview

The refugee camps in Palestine are living monuments of non-fulfilled human rights.” (UNRWA, 2007)

The rise of refugees in Gaza is the result of two wars in the area, the Arab Israel War in 1948 and The Six Day War in 1967. Since the mass influx of Palestinian refugees to Gaza the rise in population has created one of the highest densities in the world. Today the number of registered refugees in Gaza has hit 969,588 which accounts for 60% of the population and gives a density of 3,945 inhabitants per km2 (UNRWA, 2007).

To provide housing for the refugees, initial tented accommodation was established. Over time this lead to more permanent structures made from brick and concrete to be formed, although permanent in their appearance the structures are still classified as illegal settlements. Throughout the developing camps many self-sufficient industries have begun to flourish, this coupled with the UNRWAs investment in education and health facilities has seen the community grow and expand.

From 1987 to 2005 Gaza saw two intifadas (popular uprisings) which saw the Israeli Defence Leagues systematic demolish parts of the camps. This lead to international aid effort from the UNRWA to propose a new framework for design to facilitate housing the people left homeless by the conflict.

This case study highlights and analyses how the project aims to rehouse refugees that have been left homeless and start a process of creating permanent residents for the remaining refugees in the illegal settlement. The project aims to provide clean water, electricity, health care and education facilities to its residents while also allowing for the

Figure.07 Map shows location of Refugee camp in Gaza

Figure.08 Cement block houses replace tented refugee camp.

Figure.09 APalestinian searches through rubble of his destroyed home hit by Israeli strikes in Gaza Strip, on August 5, 2014

Figure.10 Khan Younis new camp

Architect: United Nations Relief and Work Agency
Client: Palestinian Authority
Location: Khan Younis, Gaza
Date: 2005 - Present
Size: 43ha - Figure to rise
Density: 700pph
## 4.2 KHAN YOUNIS CAMP

### 4.2.2 Environmental Qualities

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment</th>
<th>Comments</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td><strong>Climate</strong></td>
<td></td>
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</tr>
<tr>
<td>Local Climate Responsive</td>
<td>• Which morphological layers respond to local climate?</td>
<td>• Building typologies allow the choice of spaces for a family to reside in.</td>
<td></td>
</tr>
<tr>
<td>Human Comfort</td>
<td>• Implement energy efficiency strategies?</td>
<td>• Building typologies provide ample open space to allow cooling, this is common in middle eastern countries.</td>
<td></td>
</tr>
<tr>
<td><strong>Permeability/Mobility</strong></td>
<td></td>
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</tr>
<tr>
<td>Street Structure</td>
<td>• Are the streets well connected and permeable?</td>
<td>• Well connected street patterns that allow easy transition between the neighbourhoods.</td>
<td></td>
</tr>
<tr>
<td>Modes of Commute</td>
<td>• Does the design favour pedestrian over vehicular?</td>
<td>• All streets provide access for personal vehicles, limited number of official public transport systems as is typical in Palestine.</td>
<td></td>
</tr>
<tr>
<td><strong>Land Use</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix Use Blocks</td>
<td>• What uses are mixed within the development?</td>
<td>• Ability to allow the expansion of local businesses to mimic the ones within the existing camps.</td>
<td></td>
</tr>
<tr>
<td>Vitality</td>
<td>• Is the area active during day and night time?</td>
<td>• Poor diurnal cycle.</td>
<td></td>
</tr>
<tr>
<td><strong>Open Space</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Open Space vs. Built Form</td>
<td>• What is the percentage of green open spaces to built form?</td>
<td>• Neighbourhoods have communal green space.</td>
<td></td>
</tr>
<tr>
<td>Green Open Space Typologies</td>
<td>• Linked and diverse types of green open spaces?</td>
<td>• Considered “community spaces” that are for the residents that surround it.</td>
<td></td>
</tr>
<tr>
<td><strong>Identity &amp; Integration</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local vs. Global Identity</td>
<td>• How much does the design respond to local culture?</td>
<td>• Separate family building typologies allows a continuation of the tradition of the refugees.</td>
<td></td>
</tr>
<tr>
<td>Legibility</td>
<td>• Use of distinctive urban form and architecture!</td>
<td>• Low cost version of traditional architecture</td>
<td></td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public vs. Private Surveillance</td>
<td>• Is there a clear distinction between private and public spaces?</td>
<td>• Clear definition between public and private spaces</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Are all public spaces overlooked and fronted by active edges?</td>
<td>• Community space are surrounded by residential units</td>
<td></td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robust Spaces</td>
<td>• Allow for temporary programs and spontaneous activities to take place?</td>
<td>• Built to provide permanent residence for refugees but with the ability to facilitate the change of the occupants over time.</td>
<td></td>
</tr>
<tr>
<td>Future Outlook</td>
<td>• Implement flexible layouts and typology of spaces?</td>
<td>• Phasing of the scheme allows future growth</td>
<td></td>
</tr>
</tbody>
</table>
4.2 KHAN YOUNIS CAMP

4.2.3 Analysis

Figure 11. Land Use
Figure 12. Green Networks
Figure 13. Growth
Figure 14. Routes
Le Medi is a walled block located to the West of Rotterdam’s city centre. The scheme takes design influence from cultures and urban design frameworks far from its actual location. The scheme is the work of Dutch architects Geurst + Schulze who have drawn from their travels in North Africa to create a residential block that takes its composition from African roots but has a modern Dutch twist. The scheme accommodates 93 dwellings that share courtyards and roof terraces.

The walled perimeter of the block is open to the public throughout the day, but becomes private to its residents at night. The scheme is set up in a systematic approach that directly relates to how African communities live. As the user walks deeper into the architecture, the rooms and spaces become more private and secluded. A series of smaller streets lead to a central square that is lined by two rows of trees and a tranquil fountain. Directly off this square are smaller courtyards that provide more private spaces for residents to gather for more intimate daily rituals such as praying and eating.

The brightly coloured facades provide a positive sensory experience to the user, while at the same time enabling for a varied and interesting streetscape. The narrow street widths that are typical of African architecture to provide solar shading, have also proven to be a success in the cooler climate of Holland as they have helped to create a lively neighbourhood setting for residents to engage with one another.

Architect: Geurst & Schulze
Client: Comwonen Rotterdam; Woonbron; ERA Contour
Location: Rotterdam, The Netherlands
Date: 2008
Size: 1.2 ha
Density: 230 pph (approx.)
<table>
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<tr>
<th>Criteria</th>
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<th>Comments</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td><strong>Climate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Climate Responsive</td>
<td>• Which morphological layers respond to local climate?</td>
<td>• The scheme is orientated with long East-West facing blocks to ensure optimum solar gain</td>
<td>⬠</td>
</tr>
<tr>
<td>Human Comfort</td>
<td>• Implement energy efficiency strategies?</td>
<td>• The use of a walled block helps with solar shading in the Summer months</td>
<td>⬠</td>
</tr>
<tr>
<td></td>
<td>• Ensure the design of agreeable spaces to be in?</td>
<td>• Spaces of varying levels of ‘privacy’ enables control of comfort</td>
<td>⬠</td>
</tr>
<tr>
<td><strong>Permeability/Mobility</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Street Structure</td>
<td>• Are the streets well connected and permeable?</td>
<td>• Streets are well connected to existing urban blocks</td>
<td>⬠</td>
</tr>
<tr>
<td>Modes of Commute</td>
<td>• Does the design favour pedestrian over vehicular?</td>
<td>• Block is only open to residential access at ground level</td>
<td>⬠</td>
</tr>
<tr>
<td></td>
<td>• Integrate public transport systems?</td>
<td>• ‘Undercroft’ parking is available for residents to park their cars</td>
<td>⬠</td>
</tr>
<tr>
<td><strong>Land Use</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix Use Blocks</td>
<td>• What uses are mixed within the development?</td>
<td>• This is a purely residential scheme with 93 dwellings in total.</td>
<td>⬠</td>
</tr>
<tr>
<td>Vitality</td>
<td>• Is the area active during day and night time?</td>
<td>• Yes, during the day the gates to the walled block are open. However at night they’re locked to provide privacy</td>
<td>⬠</td>
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<tr>
<td><strong>Open Space</strong></td>
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<tr>
<td>Open Space vs. Built Form</td>
<td>• What is the percentage of green open spaces to built form?</td>
<td>• 80% Urban Form + 20% Open Space</td>
<td>⬠</td>
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<tr>
<td>Green Open Space Typologies</td>
<td>• Linked and diverse types of green open spaces?</td>
<td>• Open spaces vary from public realm spaces, private gardens and roof terraces</td>
<td>⬠</td>
</tr>
<tr>
<td><strong>Identity &amp; Integration</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local vs. Global Identity</td>
<td>• How much does the design respond to local culture?</td>
<td>• The scheme is rooted in African architectural design, but has a modern dutch twist to help connect its form with Holland.</td>
<td>⬠</td>
</tr>
<tr>
<td>Legibility</td>
<td>• Use of distinctive urban form and architecture!</td>
<td>• Unique architecture for its location</td>
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<tr>
<td><strong>Safety</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public vs. Private</td>
<td>• Is there a clear distinction between private and public spaces?</td>
<td>• The public square in the centre of the development is open to the public, which connects to more private spaces</td>
<td>⬠</td>
</tr>
<tr>
<td>Surveillance</td>
<td>• Are all public spaces overlooked and fronted by active edges?</td>
<td>• Yes the public square is overlooked by the front of residential blocks</td>
<td>⬠</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robust Spaces</td>
<td>• Allow for temporary programs and spontaneous activities to take place?</td>
<td>• The narrow internal streets encourage interaction between residents</td>
<td>⬠</td>
</tr>
<tr>
<td>Future Outlook</td>
<td>• Implement flexible layouts and typology of spaces?</td>
<td>• Flexible spaces providing varying degrees of privacy and uses</td>
<td>⬠</td>
</tr>
<tr>
<td></td>
<td>• Account for future city growth and change!</td>
<td>• This is one off development so may not accommodate future growth, but can be used as a precedent</td>
<td>⬠</td>
</tr>
</tbody>
</table>
4.3 LE MEDI

4.3.3 Analysis

Figure 19. Climate
Figure 20. Green Networks
Figure 21. Public v Private
Figure 22. Routes
Back in 2013 MVRDV + Space Group were asked to submit a masterplan proposal for the Norwegian town of Madla-Revheim, a small development area outside of Stavanger. The aim of the brief was to create a scheme that was self-sufficient and possessed high environmental qualities, while at the same time being capable of providing over 4000 homes.

The demand for new homes was as a result of the growth and success of the offshore oil industry in the region. This meant that ‘urban densification’ was necessary in area that previously had little development, but due to its proximity to Stavanger soon become a prime development site.

The development site is spread across 400 hectares, with two clear zones defining the concept behind the Masterplan. The ‘Urban Zone’ accommodates the 4000+ new dwellings in a strip around the perimeter of the site, while a ‘Green Zone’ is located in the heart of the development. The ‘Green Zone’ known as Madla’s Green accommodates large open green space, sports facilities, agricultural programmes and other community engaging activities.

By defining two clear zones, the architect has created a unique scheme that focuses around a ‘green heart’ that is easily accessible for all residents who live along the development strip around the perimeter of the site. This provides an inclusive and engaging atmosphere for all of its users, while at the same time encouraging a self-sufficient approach to a healthy lifestyle.
### 4.4 MADLA-REVHEIM MASTERPLAN

#### 4.4.2 Environmental Qualities

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment</th>
<th>Comments</th>
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<tbody>
<tr>
<td><strong>Climate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Climate Responsive</td>
<td>• Which morphological layers respond to local climate?</td>
<td>• Densification of building blocks to north of scheme, allows for optimum solar gain to the south</td>
<td>⬤</td>
</tr>
<tr>
<td>Human Comfort</td>
<td>• Implement energy efficiency strategies?</td>
<td>• Large ‘Green Zone’ helps to create biodiversity and reduces CO2 emissions</td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>• Ensure the design of agreeable spaces to be in?</td>
<td>• Focus on green open spaces create a vibrant and healthy lifestyle</td>
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</tr>
<tr>
<td><strong>Permeability/Mobility</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Street Structure</td>
<td>• Are the streets well connected and permeable?</td>
<td>• Streets are well connected, with a clear hierarchy of primary + secondary routes</td>
<td>⬤</td>
</tr>
<tr>
<td>Modes of Commute</td>
<td>• Does the design favour pedestrian over vehicular?</td>
<td>• Design favours pedestrian movement</td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>• Integrate public transport systems?</td>
<td>• The proposal does not specify the level of public transport in place</td>
<td>⬤</td>
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<tr>
<td><strong>Land Use</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix Use Blocks</td>
<td>• What uses are mixed within the development?</td>
<td>• Predominantly residential blocks, with educational blocks in the ‘green zone’.</td>
<td>⬤</td>
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<tr>
<td>Vitality</td>
<td>• Is the area active during day and night time?</td>
<td>• Yes the proposal mentions varying level of community engagement throughout the day.</td>
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<tr>
<td><strong>Open Space</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Space vs. Built Form</td>
<td>• What is the percentage of green open spaces to built form?</td>
<td>• 50% Urban Form + 50% Open Space</td>
<td>⬤</td>
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<tr>
<td></td>
<td>• Linked and diverse types of green open spaces?</td>
<td>• Open spaces vary from public realm, sports pitches, allotments, wildlife wetlands and SUDS</td>
<td>⬤</td>
</tr>
<tr>
<td><strong>Identity &amp; Integration</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local vs. Global Identity</td>
<td>• How much does the design respond to local culture?</td>
<td>• The development allows for a unique character that combines the proposed urban qualities with the existing rural qualities.</td>
<td>⬤</td>
</tr>
<tr>
<td>Legibility</td>
<td>• Use of distinctive urban form and architecture?</td>
<td>• Unique urban + green zones concept</td>
<td>⬤</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public vs. Private</td>
<td>• Is there a clear distinction between private and public spaces?</td>
<td>• It is unclear from the proposal how public and private spaces are defined.</td>
<td>⬤</td>
</tr>
<tr>
<td>Surveillance</td>
<td>• Are all public spaces overlooked and fronted by active edges?</td>
<td>• All public spaces are overlooked by built form</td>
<td>⬤</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robust Spaces</td>
<td>• Allow for temporary programs and spontaneous activities to take place?</td>
<td>• Community engaging urban agriculture programmes are set up</td>
<td>⬤</td>
</tr>
<tr>
<td>Future Outlook</td>
<td>• Implement flexible layouts and typology of spaces?</td>
<td>• Varying typologies of open space provide flexible possibilities for varying levels of engagement.</td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>• Account for future city growth and change!</td>
<td>• The surrounding context is very green and undeveloped</td>
<td>⬤</td>
</tr>
</tbody>
</table>
4.4 MADLA-REVHEIM MASTERPLAN

4.4.3 Analysis

Figure 25 Blue and Green Networks
Figure 26 Growth
Figure 27 Public v Private
Figure 28 Routes
Figure 29 Uses
4.5 TOA PAYOH

4.5.1 Introduction/Overview

Singapore, with a population of over 5 million people in 710 square kilometres of land strives to achieve this. The city has gone to great lengths to manage the demand and supply of land for present and future needs. A combination of long-term planning, responsive land policies, development control, and good design has enabled the city to have dense developments that are both functional and aesthetically pleasing and at the same time are not overcrowded. Singapore started out as an immigrant city and is now home to various ethnicities. Even though it is a global city there is still a clear sense of cultural identity in the form of Chinese culture that can be seen in historic buildings and hawker stalls preserved across the city.

The case study deals with Toa Payoh, an established town with attractive housing and vibrant commercial nodes that have access to a diverse range of amenities. Toa Payoh town's urban form follows a “checkerboard plan” in connecting the different residential areas with educational facilities, public spaces, civic centres, commercial areas and transportation hubs. “This variety in building mass, height, typologies and open space distribution breaks the monotonous and dense urban form.” (Lessons from Singapore, 2013)

The Toa Payoh Town Park is at the south end of the town, provides a central green public open space alongside the commercial hub and residential estates. Singapore in general is very hot and humid and this creates a biological diverse space that helps in cooling the surface temperature around it while at the same time making the city visually appealing.

The concept of defensible space is employed in the residential areas to allow for the community to be actively involved in keeping the neighbourhood safe.
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Comments</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Climate Responsive</td>
<td>- Which morphological traits respond to local climate? - Ensure the design of agreeable spaces to be in line with the local climate. - Implementation of subterranean levels is common throughout the city. - Use of water in public sculptures is common. - Cooler surface temperatures and reduced heat-island effect.</td>
<td></td>
</tr>
<tr>
<td>Street Structure</td>
<td>- Are the streets well connected and permeable? - Does the design favour pedestrian over vehicular? - Integrate public transport systems? - A fully integrated network of pedestrian links and commercial entities at transit centres help people move about more comfortably, encourage social interaction, as well as promote the use of public transport.</td>
<td></td>
</tr>
<tr>
<td>Land Use</td>
<td>- What uses are mixed within the development? - Is the area active during day and night time? - Through Singapore’s checkerboard planning, low-rise blocks and spaces are juxtaposed with high-rise residential blocks in a checkerboard pattern to give the illusion of space and make the high-rise environment less harsh. - Active mostly during the day.</td>
<td></td>
</tr>
<tr>
<td>Open Space</td>
<td>- What is the percentage of green open spaces to built form? - Linked and diverse types of green open spaces? - 46.5% Green cover, 53.5% Built Form. - Biologically diverse spaces. Make nature part of everyday life through the introduction of pervasive greenery. - 46.5% green over 53.5% Built Form.</td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td>- Is there a clear distinction between private and public spaces? - Are all public spaces overlooked and fronted by active edges? - Not very clear distinction of what belongs to the public and what is private property.</td>
<td></td>
</tr>
<tr>
<td>Identity &amp; Integration</td>
<td>- How much does the design respond to local culture? - Use of distinctive urban form and architecture? - Care has be taken to maintain historic parts of the development and implement Chinese culture and at the same time integrating foreign cultures.</td>
<td></td>
</tr>
<tr>
<td>Permeability/Modality</td>
<td>- Are the streets well connected and permeable? - Does the design favour pedestrian over vehicular? - Integrate public transport systems?</td>
<td></td>
</tr>
<tr>
<td>Climate</td>
<td>- Climate of Singapore is hot and humid and therefore implementation of subterranean levels is common throughout the city. - Use of water in public sculptures is common. - Cooler surface temperatures and reduced heat-island effect.</td>
<td></td>
</tr>
<tr>
<td>Adaptable</td>
<td>- Allow for temporary programs and spontaneous activities to take place! - Implement flexible layout and typology of spaces! - Account for future city growth and changes! - The city promotes outdoor/ temporary activities to take place in parks and public spaces. Spaces are adaptable.</td>
<td></td>
</tr>
<tr>
<td>Privacy</td>
<td>- Public vs. Private Surveillance - Is there a clear distinction between private and public spaces? - Are all public spaces overlooked and fronted by active edges? - Not very clear distinction of what belongs to the public and what is private property. - Easily observed due to the climate and well integrated landscape around due to the climate and well integrated landscape around due to the climate.</td>
<td></td>
</tr>
</tbody>
</table>
4.5 TOA PAYOH

4.5.3 Analysis

Figure 33. Land Use
Figure 34. Green Networks
Figure 35. Safety
Figure 36. Routes
Figure 37. Identity
4.6 MASDAR DEVELOPMENT

4.6.1 Introduction/Overview

“We studied the way animals adapt to and exploit their environment. Just as penguins huddle together for warmth in the Arctic, so camels huddle to create shade in the desert. In Masdar City, tall buildings will crowd together to provide shade in narrow walkways, openings into courtyards with fountains.” (Foster, 2011).

Masdar City is located 27 kilometers south-east to the city of Aby Dhabi, one of the most important emirates in the United Arab Emirates. In response to recent pressing climatic concerns, sustainable urbanism is no longer a choice but a necessity. Gulf countries are largely dependent on fossil fuels for energy supply. However, they have a favorable geographic conditions to use renewable solar energy. The Gulf region has now started the process of “transition from a 20th Century, carbon-based economy into a 21st Century sustainable economy” (Masdar City, 2010).

Masdar city was conceived as a self-sufficient city using climate responsive design strategies, renewable energy sources and modern technologies. It also incorporates elements of traditional Arab city design that have been reinterpreted in a modern way such as the wind tower. The vision was “To make Abu Dhabi the preeminent source of renewable energy knowledge, development, implementation and the world’s benchmark for sustainable development” (LAU, n.d.). The result was a city that should reduce carbon emission by 50% when compared to other cities in Abu Dhabi.

The project aim to accommodate 40,000 residents and 50,000 commuters. The design is pedestrian friendly with large green areas running through the site; the city actually operates without fossil-fuelled cars and is dependent on a strong public transport system with links each 200m.
### 4.6 MASDAR DEVELOPMENT

#### 4.6.2 Environmental Qualities

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment</th>
<th>Comments</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Climate</strong></td>
<td>Local Climate Responsive</td>
<td>• Which morphological layers respond to local climate?</td>
<td>• The street layout follows a southeast-northwest axis to facilitate the flow of wind and create shaded areas at street level. Buildings use GRC to prevent solar gain. Photovoltaic panels provide most of the electricity generated within the city along with geothermal energy.</td>
</tr>
<tr>
<td></td>
<td>Human Comfort</td>
<td>• Implement energy efficiency strategies?</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Ensure the design of agreeable spaces to be in?</td>
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</tr>
<tr>
<td><strong>Permeability/Mobility</strong></td>
<td>Street Structure</td>
<td>• Are the streets well connected and permeable?</td>
<td>• The street network is very permeable with an intersection almost every 100m.</td>
</tr>
<tr>
<td></td>
<td>Modes of Commute</td>
<td>• Does the design favour pedestrian over vehicular?</td>
<td>• The city is designed as a car-free space.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Integrate public transport systems?</td>
<td>• The city is easily reached by an underground public transport system (electric buses, PRT, rail, metro,)</td>
</tr>
<tr>
<td><strong>Land Use</strong></td>
<td>Mix Use Blocks</td>
<td>• What uses are mixed within the development?</td>
<td>• The project has a mix of landuse with 62% residential, 10% commercial, 10% community facilities, 7% offices and 4% light industry, 7% research.</td>
</tr>
<tr>
<td></td>
<td>Vitality</td>
<td>• Is the area active during day and night time?</td>
<td>• The uses are segregated across the site and mixed not vertically. However, a large proportion is residential.</td>
</tr>
<tr>
<td><strong>Open Space</strong></td>
<td>Open Space vs. Built Form</td>
<td>• What is the percentage of green open spaces to built form?</td>
<td>• 50% open spaces to 50% built form.</td>
</tr>
<tr>
<td></td>
<td>Green Open Space Typologies</td>
<td>• Linked and diverse types of green open spaces?</td>
<td>• Three green fingers run through the city to channel prevailing wind. They are connected to smaller squares. Other typologies could have been investigated.</td>
</tr>
<tr>
<td><strong>Identity &amp; Integration</strong></td>
<td>Local vs. Global Identity</td>
<td>• How much does the design respond to local culture?</td>
<td>• It is inspired by traditional Arab city planning in terms of compactness and mix of uses. It also respond to cultural norms of privacy with the residential buildings having wavy facades to prevent direct view into the living space.</td>
</tr>
<tr>
<td></td>
<td>Legibility</td>
<td>• Use of distinctive urban form and architecture?</td>
<td>• The open spaces are designed to the image of traditional Arab courtyards. Some key landmarks also exist (ex. wind tower).</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>Public vs. Private</td>
<td>• Is there a clear distinction between private and public spaces?</td>
<td>• Their is a continuous transition from public to internal private spaces within courtyards.</td>
</tr>
<tr>
<td></td>
<td>Surveillance</td>
<td>• Are all public spaces overlooked and fronted by active edges?</td>
<td>• Public Spaces are overlooked and fronted by commercial edges even in residential areas.</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td>Robust Spaces</td>
<td>• Allow for temporary programs and spontaneous activities to take place?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Future Outlook</td>
<td>• Implement flexible layouts and typology of spaces?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Account for future city growth and change?</td>
<td></td>
</tr>
</tbody>
</table>
4.6 MASDAR DEVELOPMENT

4.6.3 Analysis

- Figure 41: Climate
- Figure 42: Green Networks
- Figure 43: Landmarks
- Figure 44: Land Use
- Figure 45: Routes
4.7 IFC, HONG KONG

4.7.1 Introduction/Overview

“The result is a combination of top-down planning and bottom up solutions and market needs, a unique collaboration between pragmatic thinking and comprehensive masterplanning, played out in three-dimensional space” (Solomon 2012). Hong Kong became a “city with no grounds” which rendered it more exciting with the informal and unpredictable appropriation of the network by the inhabitants.

Hong Kong has a strategic location on the trade route between the East and the West which has largely contributed to its rapid economic and population growth. Hong Kong quickly attracted many immigrants from inland China hoping for better opportunities. 80% of Hong Kong area is composed of mountains and wetlands while only 20% is left for construction to host around 7,184,000 inhabitants. Therefore, in order to meet the increasing housing demand and to develop its economic prosperity despite the scarcity of land, the idea of “multi-stories building” was introduced to Hong Kong. The city is characterized by a three-dimensional pedestrian network composed of several ramps, escalators, walkways, suspended passageways “linking diverse population and activities through transit” (El-Khoury & Robbins, 2013; p.111). It is possible to walk all day without ever stepping a foot on the actual ground. This phenomenon began in the 1960’s when a main developer of the region (Hong Kong Land Company) built an elevated bridge connecting the second floor of a hotel to a nearby mall which led to increased rent values since several levels acted as “new ground levels”. Soon, the government saw the elevated walkway as a good strategy to separating pedestrian flow from vehicular traffic. (Frampton et al, 2012).

“The result is a combination of top-down planning and bottom up solutions and market needs, a unique collaboration between pragmatic thinking and comprehensive masterplanning, played out in three-dimensional space” as highlighted by Solomon (2012). Hong Kong became a “city with no grounds” which rendered it more exciting with the informal and unpredictable appropriation of the network by the inhabitants.

Figure 46(A) Master plan of IFC

Figure 46(B) Active streets in IFC

Figure 47 Public space appropriated by users
## 4.7 IFC HONG KONG

### 4.7.2 Environmental Qualities

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Assessment</th>
<th>Comments</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Climate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Climate Responsive</td>
<td>• Which morphological layers respond to local climate?</td>
<td>• Design does not respond to local climate. No energy efficiency strategies however the compactness of the design render it somehow efficient. Discomfort feeling from high humidity level, noise and pollution of vehicles, urban heat island effect and low wind ventilation.</td>
<td>⬤</td>
</tr>
<tr>
<td>Human Comfort</td>
<td>• Implement energy efficiency strategies?</td>
<td></td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>• Ensure the design of agreeable spaces to be in?</td>
<td></td>
<td>⬤</td>
</tr>
<tr>
<td><strong>Permeability/Mobility</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Street Structure</td>
<td>• Are the streets well connected and permeable?</td>
<td>• A three-dimensional elevated pedestrian network link the diverse activities and is separated from congested city streets. Walking represent 45% of transport modes</td>
<td>⬤</td>
</tr>
<tr>
<td>Modes of Commute</td>
<td>• Does the design favour pedestrian over vehicular?</td>
<td>• The public transport system (buses, street cars, ferries, vans, trains) covers 48% of city's daily trips.</td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>• Integrate public transport systems?</td>
<td></td>
<td>⬤</td>
</tr>
<tr>
<td><strong>Land Use</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix Use Blocks</td>
<td>• What uses are mixed within the development?</td>
<td>• The uses found are related to commerce, industry, tourism, housing, offices, leisure and transportation.</td>
<td>⬤</td>
</tr>
<tr>
<td>Vitality</td>
<td>• Is the area active during day and night time?</td>
<td>• The different uses and users make the city active around the clock. Also because of small living spaces, people meet outdoors.</td>
<td>⬤</td>
</tr>
<tr>
<td><strong>Open Space</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Space vs. Built Form</td>
<td>• What is the percentage of green open spaces to built form?</td>
<td>• Because of population growth and high demand of land, open space within the built area is very small (only 2sqm/person). Some pocket parks exist along the waterfront but are not linked to the city's natural environment.</td>
<td>⬤</td>
</tr>
<tr>
<td>Green Open Space Typologies</td>
<td>• Linked and diverse types of green open spaces?</td>
<td></td>
<td>⬤</td>
</tr>
<tr>
<td><strong>Identity &amp; Integration</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local vs. Global Identity</td>
<td>• How much does the design respond to local culture?</td>
<td>• The built from with its tall buildings resemble the image of other global cities such as New York. The Chinese identity is a bit visible at ground floor with space appropriation by dwellers.</td>
<td>⬤</td>
</tr>
<tr>
<td>Legibility</td>
<td>• Use of distinctive urban form and architecture?</td>
<td>• The city demonstrate aformal urbanism which reject traditional notion of legibility.</td>
<td>⬤</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public vs. Private</td>
<td>• Is there a clear distinction between private and public spaces?</td>
<td>• There is no clear distinction since space boudaries are blurred between top-down planning and bottom-up self-organizing systems. Most spaces are fronted by active edges.</td>
<td>⬤</td>
</tr>
<tr>
<td>Surveillance</td>
<td>• Are all public spaces overlooked and fronted by active edges?</td>
<td></td>
<td>⬤</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robust Spaces</td>
<td>• Allow for temporary programs and spontaneous activities to take place?</td>
<td>• Public space is very robust (sidewalks become workshops, malls become exhibition spaces, streets become restaurants...).</td>
<td>⬤</td>
</tr>
<tr>
<td>Future Outlook</td>
<td>• Implement flexible layouts and typology of spaces?</td>
<td>• New forms of public space emerges because of “the absence of ground” and traditional notions of street and square.</td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>• Account for future city growth and change?</td>
<td>• Land is very scarce, growth is happening vertically with the shrinking of spaces.</td>
<td>⬤</td>
</tr>
</tbody>
</table>
4.7 IFC HONG KONG

4.7.2 Environmental Qualities
4.0 CASE STUDIES

4.8 Case Studies Rating

Figure 52: Rating of case studies
5.0 DESIGN PRINCIPLES

5.1 Climate
5.2 Mobility/Permeability
5.3 Land Use
5.4 Open Space
5.5 Identity/Integration
5.6 Safety
5.7 Adaptability
When building in warmer climates, crucial steps are needed to ensure the principles of Urban Design are translated. As average temperatures in Lebanon exceed Britain key changes need to be made to ensure human comfort and a healthy exploitation of the local climate is considered within design. Jan Gehl expresses this by saying: “Good weather is one of the most significant criteria for assuring the ease of people’s movement in cities. Several climate factors influence the feeling of comfort: air temperature, humidity, wind chill and solar heat.”

By successfully combing these elements you can successfully reduce and facilitate a good standard of human comfort, as expressed by Sofie Pelsmakers as “A cooler city is one where light surfaces and vegetation are combined to create shade, reflect sunlight and provide cooling through evaporation.

Urban vegetation combined with light and reflective surfaces, can reduce surface temperatures by 10-20 degrees” (2015).

Beirut has an average daylight time of 8.2 hours and this can be used to reduce its impact on the environment. By providing renewable energy alternatives in the form of integrated solar panels a large quantity if not all the energy requirements for the residents can be achieved.

“Collectivization is the best means we have to conserve natural resources and slow global warming, so a vital role of ecological urbanism is to encourage people to live and help them thrive in cities” (Mostafavi, 2010). The Masdar City Development provides its residents with clean and free electricity due to its integration of a solar farm on the outskirts of the development. Due to its scale, local and community scale alternatives
Having a permeable development helps in many ways, it allows a well-connected street pattern to aid in a diverse number of routes to be available for pedestrians and vehicles to take which inevitably increases footfall which can promote business use and promote safety and vibrancy.

Providing walkable blocks within the development is also key to the permeability of the scheme as it encourages users to walk and cycle opposed to using motor vehicles. This intern will reduce the number of vehicles on the site and enable greater safety and allow a vibrant street community to flourish. This concept is described by Gehl as: “In lively, safe, sustainable and healthy cities, the prerequisite for city life is good walking opportunities. Walking is the beginning. Man, was created to walk, and all life events large and small develop when we walk among other people.” (2010). Walkable blocks also promote core values of people and recognises our connection to a place through the act of walking. Montgomery illustrates this as: “We were born to move – not merely to be transported but to use our bodies to propel us across the landscape. Our genetic forebears have been walking for four million years.” (2014)

A development with well-connected streets allows a greater and more sustainable footfall to use the area. This is prominent when looking at the IFC in Hong Kong. A project that once started as creating a single link from a hotel to a shopping centre to increase footfall and move the pedestrian access away from the busy and unsafe streets of the city. Since then many streets in the sky have been added to allow an easy transition from building to building. During weekends these routes transform to accommodate many groups of people meeting and even setting up camp for the day due to the shortage of open public space.

A clear hierarchy of streets allows for a development to be navigable for the public and less used roads can establish a sense of privacy. It is worth noting that a hierarchy of streets does not indicate size of roads that are dominated by cars but of streets such as high streets and residential. Carmona touches on this when saying: “The design of urban streets has often been dominated by solutions that meet the needs of motorized traffic and the perspective of the highway/traffic engineer with little consideration of other street activities or the contributions of other professionals such as urban designers.” (2013)
Creating a vibrant, safe and identity driven community within a new development requires several integrated processes. Ng observes this by commenting: “Density needs to work in conjunction with other conditions and approaches such as mixed use, building form and design, and public space layout.” (2010). A prominent design driver in achieving such, is the ability to create a place with a diverse land use. This is successful in allowing an area to facilitate active edges which provides a level of safety, it allows a prominent streetscape to be established due to the level of mixed community integration and it also promotes a reduction in the reliance of public and private transportation methods as reduced distances between several services are needed.

A vibrant streets culture is essential to not only to the existing culture of Arab cities but also for the communities of Syrian origins, which is heavily centred around streets being an area of community through markets, restaurants and religious interaction. Barton makes note of this process by saying: “It is generally recognised that mixed uses will: Reinforce the viability of centres with overlapping uses, providing multiple reasons for people to go and stay in the centre, allow people to make short walking trips between facilities rather than relying on longer car-based trips, create vitality and character in a place. Provide the opportunity for individuals to live and work in close proximity.” (2003). This is also the reinforced by Mgleyn as: “...fine grained mixed use is sought in urban expansion in order for those environments to be lively, safe, sensory rich, choice laden, economically and spatially efficient and ecologically diverse; sustainable in as far as the built environment per se, can believably be.” (1993).

An example of a project that integrates a level of self-sufficient local businesses, open space and residential accommodation is Khan Younis. This new development looks past the need simply for housing refugees but allows spaces to be expanded into to integrate markets, shops and open space as these were characteristics that were deemed essential to community and identity development.

This is present within the Madla-Revheim scheme as it offers a level of mixed use within the residential quarters ensuring the streets have a variety of use that have a strong diurnal cycle. Alongside the integration of mixed use and residential it also promotes the connectivity of schools and open spaces to provide a level of comfort and relaxation around educational facilities, inevitably helping to

**SAFETY**

Mixed use developments are also very successful in providing safety through its use of active edges to ensure that the street is overlooked and a level of security is maintained. Camona explains how this can be possible in a development by giving two examples as: “Areas may have mixed uses in either or both of two ways: by having a mix of single-use buildings or by having buildings which each contain a mix of uses (e.g. living over the shop). The latter is generally preferable.” (2003). Within our redevelopment scheme I believe this to be one of the most important aspect of our design qualities, as the safety of the new occupants is essential in allowing an organic identity and community to be created.
Jen Gehl describes open space as a ‘green infrastructure’ and how it is ‘the essential backdrop to urban life’. This highlights Gehl’s and many other urban designers’ belief in the importance of creating and preserving open space within the urban fabric. As cities continue to grow we as designers must prioritise the impact this urban densification will have on its resident’s mental and physical health. Achieving an 80/20 split for Urban and Green zones will be beneficial to both the economic viability of our scheme and also the environmental impact on its residents. Urban Green spaces are important to supporting the biodiversity of a place and encouraging a healthy lifestyle for its users. The methodologies used for green spaces evident in our Masdar and Stavanger case studies have helped our green zoning concepts evident in our Masterplan. However, we did not think it was practical to achieve the 50/50 urban to green split that Masdar could potentially achieve.

While the climate of our site may not match these case studies we will look to plant similar green zones throughout our scheme. From these examples we will look to incorporate features such as pocket parks, urban agriculture plots and public realm spaces that can be used for a variety of different activities and community programmes.

Trees and other forms of vegetation are crucial to create a positive eco-system and help to balance out the emissions created from the dense urban environment. Gehl talks about how trees ‘clean the air, define the city space and help accentuate important sites’. We believe this is an important concept that we wanted to implement into our design scheme. Trees are not only used as markers to line streets but they should also be used to create a positive micro-climate. Just as the Lebanese flag shows a green Cedar tree, we too would like to celebrate the use of vegetation in our scheme. Trees in Lebanon have to be fairly self-sufficient and robust to survive in the humid and dry climate. Popular trees in the city of Beirut often include Ficus and Pine trees. These large trees often provide a source of shade in urban city blocks, which provide pockets of cool air in the otherwise hot Lebanese climate.

"There must be an integration of activities- living, working, shopping, as well as public, spiritual, and recreational activities-reasonably near each other. The best urban places have a mixture of uses. The mixture respond to the value of publicness and diversity that encourage local community identity. What brings life to an area is the life of people going about a full range of normal activities without having to get into an automobile." (Larice et al. 2012)

OPEN SPACE V BUILT FORM

Case studies and literature reviews have been utilised to establish the ratio of built form to open space. Due to the high density of our site it is crucial that we remember the importance of green and blue spaces within the urban fabric. The Environmental Design Pocket Book talks about how in an ideal world all urban design projects should ‘allocate 30%-50% of a site to open space’ (S.Pelsmakers, 2015). With this in mind we were initially keen to accommodate 35% of our site to open space. However, from analysing similarly dense case studies such as Toa Payoh, Singapore we believe the percentage of green space may have to decrease to around 20%. This is still in keeping with the minimum of 15% stated in the The Environmental Design Pocket Book.

URBAN AGRICULTURE

The growing of food within an urban community encourages its users to engage with one another while at the same time creating a healthier and more self sufficient lifestyle. Barton talks about how urban agriculture also helps to ‘support local vitality’ of a place, with a particular focus on growers and local shops that sell the produce (Barton, 2003). This shows that urban agriculture not only has a positive effect physically on its users but also on the local economy. Local food growing also helps to improve access to food and reduces the unnecessary transport of food, hence further reducing traffic.
Identity is intimately tied to memory: both our personal memories (where we have come from) and the collective or social memories interconnected with the history of our families, neighbors, and ethnic communities. It is possible to enhance social meaning in public spaces with projects that are sensitive to all citizens and their diverse heritage, and developed with public processes that recognize both the cultural and the political importance of place. P.72 Designing Cities – Alexander Cuthbert

Cuthbert talks about how ‘identity is intimately tied to memory’ but what urban design features make a place memorable (2003)? The identity of a particular place provides its users with a sense of belonging and just as Jacobs talks about identity ‘encouraging people to express themselves’ it also helps to create a vibrant urban setting (Jacobs, 2012). The identity of a place is relative at both a local and national scale. Architectural features such as landmark buildings or historic connections provide identity at a national scale and can sometimes act as a magnet that draws people to an area. However local identity is also evident locally with elements such as names of ‘streets, areas, fields and farms’ which just as Barton talks about provide ‘local resonance and associations’ (Barton, 2003). It is this local scale that gives its users a sense ownership and pride within the community that they live.

The Khan Younis case study highlights how a unique mix of identities can be merged together when in crisis such as war or natural disasters. The scheme uses a Palestinian urban morphology but its users are from Israel fleeing the war torn Gaza Strip. We have looked at this case study as our project looks to deal with refugees coming into the already over populated Lebanon, with a particular focus on how an identity is formed away from its original location.

Identity at a local scale is one that is important to its residents and everyday users as it provides a sense of belonging and ownership toward a certain place. A strong local identity helps to create a vibrant and diverse community in which identity and culture are celebrated in features such as public events, common building materiality and the provision of flexible spaces. Global identity is important to a places economy, tourism and the feeling of belonging that the user can relate too. Urban design qualities such as landmark buildings help to create a global identity that is both connected to the places local identity and also provides a recognisable link to people around the world.

Legibility is the environmental quality that makes a place understandable and easy to navigate for its users. Legibility must respond to two different perspectives of view; the first is the physical form of an urban design footprint and the second is the ability to grasp the urban form without much regard for the physical form. Traditionally urban legibility was much simpler achieve, meaning that the most important public buildings were often accommodated in the large open public spaces. We have looked at an example of this in our Le Medi case study where the scheme is centred around a large public open space. This helps to make legible routes through the scheme with all street connecting in the centre with then more private routes and building uses linking off the public square.
5.0 DESIGN PRINCIPLES

5.6 Safety

It is important for all users of our scheme to feel safe within the environment in which they live. Just as Carmona mentions how safety is ‘an essential prerequisite of successful urban design’ we too will look to provide safe places for people to live (Carmona, 2003). The driving concept behind our proposal looks to deal with the large numbers of refugees in Lebanon as a result of the war in Syria. The refugees are causing much of the country’s capital Beirut to become overcrowded, meaning many are living in cramped and unsuitable accommodation. While this overcrowding is having a negative effect on the refugees, it is also causing tension between the Lebanese locals. The Younis Khan case study in the war torn Gaza Strip is an example we have looked at how best to resolve tensions and provide safety between two groups of people. As a result, we will look to provide a safe and inclusive community design that deals with some of these tensions between the two different cultures and groups of people.

PUBLIC V PRIVATE

Within a dense urban environment, we as designers have the power to control how public and private space is implemented and perceived. Buildings and other elements of the built environment can be manipulated in manner that ‘defines and even encloses public space’ (Allan, 2013). A good balance between private and public space is one that answers to the users need for privacy within the immediate vicinity of homes but also offers opportunities for interaction and enjoyment with other people. Our case study in Stavanger highlights how public open space is available in the heart of the development that is easily accessible to all users and offers a wide mix of open space typologies. However more private space is offered closer to the residential dwellings along the urban perimeter strip of the development.

PASSIVE SURVEILLANCE

By providing active edges along a varied building use streetscape we will look to achieve optimum passive surveillance throughout the day and night. As a result, we will look to create a lively community that is inclusive and engaging with one another, as opposed to a neighbourhood that is similar to a cul-de-sac design and has high levels of crime. For example, the Le Medi scheme in Rotterdam utilises an Arab street design of narrow streets which in some environments might be deemed unsafe. However, by designing active front facades with doors and windows overlooking the street below, this creates optimum passive surveillance while at the same time creating an engaging neighbourhood for people to live.
Adaptability is able to change, accommodate and adjust in complex patterns of diversity, mixture and economic grain. These areas are flexible, movable, and refit able. The idea of adaptable becomes known to all in response to pressures of climate change, population movement, economic volatility and war. These changes have a wider impact on urban settlements from the more abstract ideas of the perception and experience of place to planning more concrete urban infrastructure from buildings, services and movement systems.

In case of Lebanon, the Syrians refugees come and reside there. They come from different cultural background and diversity try to adjust in the new city. Jan Gehl observes that “The city should have a well-proportioned and inviting city spaces that inspires all types of activities – flexible and fleeting” (2010). Kevin Lynch notes that “The image should preferably be open-ended, adaptable to change, allowing the individual to continue to investigate and organize reality: there should be blank spaces where he can extend the drawing for himself” (1960).

**ROBUST SPACES**

Robust Spaces should allow for temporary programs and spontaneous activities to take place and implement flexible layouts and typology of spaces. This can be seen in the case study of Gaza where the refugees are provided permanent residence but with the ability to facilitate the change of the occupants over time. Flexible spaces providing varying degrees of privacy and uses can be observed in the case study of Ile Medit at Rotterdam, The Netherlands. Public space can be very robust (sidewalks become workshops, malls become exhibition spaces, and streets become restaurants) as visualized in case study of IFC Hongkong at Dubai.

**FUTURE OUTLOOK**

We need to also look whether the city adopts the future growth and change which will take place over years. This can be done by leaving surrounding context very green and undeveloped as seen in case study of Madla-Revheim, Norway. For Tao Payoh, Singapore, urban planners take into account the future growth of the city, managing the supply and demand of land. In Khan Younis, Gaza, planning of the scheme is done in phases which account for future city growth.
6.0 ARAB CITY MODEL ANALYSIS

6.1 Traditional Arab Cities
6.2 Physical Relationships
6.3 Climate Responsive Design
6.4 Dubai Sustainable Model Study
Islamic cities were not built according to a precise plan but rather developed in an organic and informal way; the different individual buildings combined naturally to form a larger structure because of similar underlying structuring principles. Like any other city, Arab city’s morphology is affected by both geographical determinants (climate and topography) and cultural determinants (customs and religious beliefs). Traditionally, there is a close relationship between what is built and what is believed, between the physical patterns of the city and the social and religious practices of the inhabitants.

The model of “Islamic city” goes back to 622 CE, when cities in Saudi Arabia started to follow Islamic design guidelines by interpreting religious texts and extracting concepts such as privacy, respect of neighbor, modesty, and love for nature (Bianca, 2000). Islam did not prescribe precise design principles but provided a matrix of behavioral archetypes that were translated to physical patterns.

Arabs are known for their long tradition of climate-responsive urbanism with compact buildings, narrow winding streets, shaded paths, courtyard buildings, and the use of vegetation and water to create cool micro-climates (Salat, 2010). The following pages will expand on these qualities.
In Islamic cities, there is a clear distinction between public and private realms. The mosque ("Jami") is the key public core, embraced by markets ("Souqs") that usually expands in a linear way along major routes. The street networks are kept to the minimum needed to connect the city’s main access points (traditionally the city’s gates) to the markets and to provide accesses to the residential quarters. The access from the public spaces to the private residential areas is twisted and “broken into successive hierarchical sections” to filter circulation gradually and to ensure privacy (Bianca, 2000). The private residential areas are shielded off from public spaces and protected against visual intrusion from the streets.

Within residential quarters, privacy was also ensured by having small elevated windows facing the street and by having the living spaces facing the inner courtyard. Nevertheless, the streets felt safe because there was a general understanding between residents of the ownership of each space. Also, resident were organized in harmonious communities where mutual respect was key.

Today this is no longer the case with cities accommodating more and more diverse people from different backgrounds and cultures. Having active streets and passive surveillance is important to create safe neighborhoods. Privacy can still be ensured by filtering people gradually into residential areas and shielding windows with trees for example.
6.0 ARAB CITY MODEL ANALYSIS

6.3 Climate Responsive Design

Streets

In traditional Arabic cities, the street patterns are hierarchical with a high contrast between main thoroughfares and house accesses. Streets are usually oriented in the direction of wind to ventilate the streets naturally; the streets are designed to "breath". Streets are also narrow with streets dimensions of 3.5m for the public busy streets and of 1.4m for the private alleys (El Kortbi, 2000). The W:H ratio is usually 1:5 in Arabic cities to ensure shading.

Buildings

The courtyard building is the favoured typology in Arab cities because of its introverted character that answer privacy concerns. Also, courtyard buildings are environmentally responsive in hot areas as they act as collector of cool air at night and source shade in daytime providing thus human comfort (Tabesh, 2015).

Open Space / Vegetation

In Arab cities, open spaces need to provide a comfortable environment for dwellers by creating cooler micro-climates. Vegetation is commonly employed to ensure shading, filtering and cooling of air. Vegetation is practiced in layers so that plants survive the hot climate: tall palm trees shade lower fruit trees which in turn shade shrubs and flowerbeds (Bianca, 2000).

Gardens take an important aspect in Islamic city design and are associated with the Qur’anic image of paradise portraying abundant water, fruit trees and shaded spaces where believers can relax and enjoy the beauty of nature. There was an economic, aesthetic but also a religious incentive to plant; by cultivating the land, one is “vivifying a dead land” which is a good act (Bianca, 2000).

Figure 81: Environmental Quality of Courtyard Buildings

Figure 82: Shading in Narrow Streets

Figure 83: Shading in Wider Streets

Figure 84: Planting Technique - Layering
Dubai urbanization process was driven by economic goals and housing necessities which compromised not only the environment but also the identity of the country with a skyline not very different from any other global city. This is linked to the planning decision-making system following a “neo-patrimonialism” model in which decisions are based on the closely linked interests of the state and the private sector resulting in a city that is a pure “spatial expression of economic strategy” (Pacione, 2005; p.264).

Many scholars have discussed the principles of sustainable urban forms. For Wheeler, these principles are “compactness, contiguity, connectivity, diversity and economic integration” while for others such as Jabareen sustainability can only be achieved through high-density development centred around diversity, mix of landuse and multiple transport modes. When reading sustainable urbanism literature, it becomes clear how the aim is to propose principles that work universally and which could be applied theoretically to all cities (Al awadi, 2016; p.257). However, the implementation of any of these principles should be context dependent since urban form must respond to geographical, cultural and socio-economic specificities. Most of the literature originates from Western ideologies which convey a very different context and set of beliefs to Arab cities.

A study done by Alawadi in 2016 aimed at rethinking Dubai’s urbanism to understand which “form-based urban design strategies can most effectively deliver greater environmental, social, and economic coherence for an integrated sustainable neighborhood” as the author claimed. The method used to generate the conceptual model was the Delphi, a structured communication technique which relies on a panel of experts who have to answer multiple rounds of questioning. The experts were selected from the regional context of the Middle-East for the reason stressed above. The result was eight principles to achieve a sustainable neighborhood: “compactness, connectivity, diversity, culturally relevant urbanism and climate-sensitive urbanism, green space, circular metabolism with eco-balanced design applications and adaptability” (Alawadi, 2016; p.358). However, one should be aware, that to implement these strategies, they should be supported by planning guidelines.
**Compactness:**
Experts suggested that a sustainable Dubai is a compact city that promotes densification, proximity and diversity of uses and accessibility. A compact form would have many benefits such as reducing heat gain, facilitating passive cooling strategies, increasing opportunities for social interactions and community building, supporting different type of modes of transport. However, some challenges may arise from cultural norms that favour large spaces knowing that usually men live in the same property as the family when they get married by building an extension to the family’s house; so big families need large lands to live together. Also, Dubai’s development has favored the “monumental” and the spectacular, going back to the compact.

**Connectivity:**
Street and block typology: Dubai’s current road network consist of multi-lane highway with very few intersections per square kilometre. Experts recommended that urban blocks’ size should be between 85 and 121m to enhance permeability.
Integration of diverse transports system: The current infrastructural system in Dubai only connects shopping areas and touristic places to the public transport system; it excludes residential areas. Experts recommended that neighborhood centres and mixed use corridors should also be linked to the public transport system. Pedestrian and cycling lines should also connect to the public transport system.
Promotion of cycling and walking: Dubai is extremely a car-oriented city. Promoting walking and cycling would support a less-intensive car oriented lifestyle. Currently there is no infrastructure in Dubai to support cycling or walking with the latter activity only taking place in touristic places such as at malls or at Jumeirah beach Residence (The Walk). Designers could reinterpret these models to fit at neighborhood level. However, half of the experts noted that there might be climatic and cultural barriers to the promotion of cycling and walking.

**Diversity:**
Dubai’s spatial expression is characterized by fragmentation which resulted from housing policies and economic strategies: Dubai does not mix the housing of expatriates (driven by the private sector in the so-called “free zone” areas) and the local population (housed in low density suburban neighborhoods) in the name of preserving the identity and “wholeness of the native community”. To avoid this “splintering urbanism” as coined by Graham and Marvin (2001), experts highlighted the importance of diversity of density, of housing and of uses to allow people from different background to live together and access the same facilities.
However, the mixing expatriates that are usually male bachelor labors staying temporarily with established families could be problematic socially and economically while also raising issues of belonging. To be able to attain diversity, it should be supported by a policy framework that would facilitate and allow immigrant workers to

**Culturally relevant urbanism:**
The urban development of Dubai illustrates well its wish for global branding that has somehow compromised the local culture. Respecting locality is important to boost civic identity, so experts recommended that Dubai should honor and revive its traditional urban forms to restore the spirit of the place (“genius loci”); a culturally sensitive urban form would not only visually mimic traditional forms but rather incorporate the fundamental spatial and formal principles (ex: courtyard urbanism) and respect the social values (ex. importance of privacy).
The adoption of these principles and values should complement modernity (evolution of cultural values, new technologies, etc.). To do so, local educators and planners should be more involved in the design and planning of the city instead of relying on foreign consultancy alien to the context of Dubai.

**Climate-sensitive urbanism:**
Climate-responsive urbanism is almost inexistent in the new developments of Dubai with high-rise stand-alone buildings that relies on mechanical operations to provide heating and cooling. Improving the environmental performance of the built environments and providing human comfort can be achieved by learning from the Arab traditional city morphology. Experts recommended the following design guidelines: orientation of street systems that respond to solar and air directions, compact built form where buildings provide shading, “tight-grain” with small streets, moderate density being more capable of incorporating environmental passive strategies and limited glaze facades to
7.0 CONCEPTUAL MODEL

7.1 Western Conceptual Model
7.2 Arab Conceptual Model Reinterpreted
7.3 Hybrid Conceptual Model
7.4 3Dimensional Visualization
ITERATION I

The first iteration was about establishing street network layout. A central open space was created from which vehicular roads were offset to create safer pedestrian areas and encourage walkability. The case studies and literature review highlighted the importance of walkability in promoting vibrancy and safety.

The street network is formed by main routes connecting the edges to the central area to allow maximum accessibility. The main open space is conceived in the image of the “Green Heart” of the case study of Stavanger that is robust to accommodate several activities such as sports, leisure activities, and agriculture growth. The central core with intensive pedestrian activities present the opportunity to create a transport hub with nodes being located at 300m intervals on the diagonal axis as recommended in Shaping Neighborhood.

ITERATION II

The second iteration was about establishing physical relationships between the different landuses. Barton’s theory of land use distribution was followed which suggests the creation of a core of intensive pedestrian activities, bordered by ‘land hungry activities” such as mix use developments with commercial activities and the outskirts reserved for residential small scale developments (2010).

Some leisure and religious facilities were also positioned along the main routes and on the edges to encourage activity through the site and to attract people and lead them into the main core.

ITERATION III

The third iteration was about refining the distribution of land use and creating a hierarchy of roads. As supported by the literature such in Manuel for Streets, having a clear hierarchy of roads increase the legibility of an area and give clear guidance. Also, a hierarchy of open spaces is established with smaller green pockets allocated for each quarter of the development.

Following the case study of Tao Payoh, the land use distribution follows a “checkerboard plan” with different uses spread across the development and connected together to prevent the creation of a monotonous urban form.
ITERATION IV

The understanding of the traditional Arab city’s spatial organization, summarized in the previous section, was abstracted to fit the grid format of the conceptual model. The sustainable neighborhood model developed by the Arab experts in the study undertaken by Al Awadi was also adapted to our grid.

These two models were combined with the model of Iteration III (based on western literature and the chosen case studies) to reach Iteration IV that is a hybrid model between Western and Arab models.

The model consists of two major roads to which connect secondary routes that run diagonally through the development. The open spaces are linked by green pedestrian/cycling routes and bordered by public functions. Mix use facilities are located along main routes and shield private residential quarters; the latter are clustered around open spaces and supported by communal services.
In reflecting back to the analysis of Arab cities, the grid of Fez city was selected in an attempt to break the rigidity of model IV. Arab cities are known for their organic forms and twisting roads to ensure privacy as explained earlier. Also, Cullen’s townscape theory support such organic layout of streets knowing that they create deflection, mystery and anticipation, encouraging people to experience the place.

The grid developed in Iteration IV was overlayed on the irregular street pattern of Fez. The grid was morphed and the result was an organic core around which are located public functions while the residential areas remained somehow regular. The private buffered from the public functions by green fingers.
ITERATION VI

The final conceptual model was about establishing a hierarchy of open spaces found in Arab cities. The different open spaces are linked by green fingers as it was highlighted in the literature review that having a connected network of open spaces is essential for their vitality. Three main green fingers run through the site as in Masdar city to act as the breathing lungs of the development. These spaces are envisioned to be robust spaces that are flexible enough to accommodate different use and even evolve over time; they can be appropriated by people as illustrated in the case of Hong Kong. Major roads run through the center of the site to dissect it into four quarters. The core is pedestrian activities, bordered by leisure and commercial facilities on one side and by institutional and educational facilities on the other side, next to a major transport node (black dot). Mix use spread along main routes and shield off residential functions clustered around private courtyards. A hierarchy of blocks was created with finer grain residential areas on the outskirts and larger grain areas around the core to support several functions.
7.0 CONCEPTUAL MODEL

7.4 3Dimensional Visualization

3-Dimensional ITERATIONS

The conceptual model was also thought of three-dimensionally to consider building heights and relation to open space dimensions. In the western model (iteration III), the highest density was to be located around the core to become the focal point of the development. In the Arab model of the sustainable Dubai, the highest density were not only located at the core but also along main roads to give more guidance. The model felt however too dense with lack of open spaces besides small pockets spread across the site. In the Hybrid model (Iteration V), the highest density was also allocated around the core next to the major transport node as the area is thought to house institutional and commercial functions. The buildings bordering the main central open space have lower densities to promote a pedestrian friendly environment. Nonetheless, the model seemed to be fragmented with buildings dispersed around green areas; the H:W ratio needed to be rethought to create more confined and integrated spaces.
8.0 SITE CONTEXT

8.1 Site Location
8.2 Site Conditions
8.3 SWOT Analysis
The chosen site belongs to the district of Bourj Hammoud, located north-east of the capital Beirut along the Mediterranean coastline. Bourj Hammoud is a compact and highly dense neighborhood.

History overview:
Originally the area was an agricultural land and it is only after 1928 that settlements appeared when Armenians refugees started settling in the area fleeing Ottoman persecution. The district witnessed since a drastic population growth with influx of rural migrants seeking better opportunities around the capital and influx of displaced population from Lebanese and regional conflicts (Palestine and Syria) (Harmandayan, 2009). The district is best known for having evolved from a settlement of makeshift shelters to a dense and active commercial hub.

Situation and Role:
Bourj Hammoud district has a strategic location, being only 3km away from the city center of Beirut. It is very well connected to the infrastructure system with main arteries from the North of Lebanon that reach Beirut through it. In fact, the district was divided in two distinctive zones by a major highway connecting Beirut to the North of Lebanon (the Dora highway): north of the highway is a classified industrial area (the coastal zone) while south of the highway is a residential/commercial area (the internal zone).

The chosen site is located in the coastal zone, so in the industrial area. The coastal zone is in itself also divided into two sections by the coastal route:
- The section between the Dora highway and the cadastral limits of Bourj Hammoud district is an industrial zone covering 58 ha. The existing uses are industrial enterprises, small workshops, and warehouses in addition to some office development along the highway. This section is characterized by large parcels with areas varying between 1000sqm and 30,000sqm and building heights between five and six floors.
- The section between the cadastral limits of the district and the shoreline is a coastal stretch covering around 52 ha. The existing uses are fishing harbor, a solid waste treatment factory and a waste dump hill. Historically, this shoreline was the last sandy beach of Beirut before becoming a landfill waste in the 1960’s hence disconnecting the neighborhood’s inhabitants from their waterfront (Asmar, 2008).

The chosen site is now a deserted waterfront; the image of the site is that of a segregated area, forgotten and occupied by abandoned and dilapidated industrial buildings. Looking at the conditions of the site today, it is quite surprising to know that this area used to be a major recreational spot for local residents being one of the rare open public spaces within the dense Beirut. Today, Bourj Hammoud district lacks completely any open space besides a municipality football field.

The degradation of the image of the area, the environmentally dangerous conditions (waste dump, gas tanks farm, etc.), the run-down industrial zone and the displacement of families, urged the Municipality to request the establishment of a comprehensive development masterplan for the waterfront. A change in the zoning was also requested because the maximum allowable built up area is 1.75% of the land area being classified as an industrial zone as shown in Appendix 1.

Since the 1990’s, several masterplans were proposed to revitalize the Bourj Hammoud waterfront. A masterplan was finally approved by the government in 1995; the major aim was to transform the garbage dump into a municipal Park, upgrade the living environment of the area to attract investments and build a sewage treatment plant. To realize this development, a private real-estate company (LINORD) was created. The masterplan was never realized for several factors including a lack of funding and conflicts between the different involved stakeholders. The only action was the assignment of the waste dump hill into an urban park.
Lebanon has a Mediterranean climate characterized by a hot summer and a cold rainy winter. The average temperature is 21°C; it can reach a maximum of 38°C in July and August and a minimum of 8°C in January and February. Lebanon is known to be a sunny country with an average of 300 sunhours per month. The average annual rainfall is 825mm and the average speed wind is 7.5 mph.

Many experts tie the area’s strong social and economic livelihood to its built form of narrow alleys, compact way of building. One of the most distinctive characteristics of the area is its personalized streetscapes made by a variety of storefronts and goods displayed on the streets.

Boruj Hammoud district has been in a constant transformation because of the continuous population movements that took place without any proper planning for a balanced development which marginalized the area into becoming “a district for the poor”. However, the area offers great potentials because of its proximity to the city center, its pivotal location near major transport roads, its adjacency to an active neighborhood and its visual/economic value being a waterfront.
8.0 SITE CONTEXT

8.3 SWOT Analysis

Strengths
- Proximity to Mediterranean Sea
- Operational Industrial buildings
- Presence of fishing Harbor
- Proximity to Residential area and employment
- Active mixed use area
- Proximity to handicraft production pole
- Major Nodes

5 MINUTE WALKING RADIUS
- Proximity to Residential area and employment
- Active mixed use area
- Proximity to handicraft production pole

10 MINUTE WALKING RADIUS
- Major Nodes

Weaknesses
- Waste dump and abandoned buildings
- Gas tank and environmental hazards
- Deteriorating residential areas affecting the image of the neighborhood
- Pollution caused by industrial area
- Infrastructural break
- Polluted river

Main axis route running through the coast of the country
Secondary routes connecting the site to the rest of the city
Main road connecting the Capital to the North part of the
### Opportunities

- Converting the waste dump into a Green Park
- Development of leisure spaces along waterfront
- Harbor area can be developed further for recreational activity
- Mixed use development can enhance the liveliness of the city and promote more interaction between different communities
- Provision of residential units close to the capital to support employment market
- Increased accessibility and connectivity to waterfront
- Unique character of handicrafts hubs with oriental souks
- Waterfront promenade

### Threats

- Vaste dump
- Gaz tank
- Degradation of the residential area
- Congestion and traffic
9.0 PLANNING AND SPACE REQUIREMENTS

9.1 Planning in Lebanon
9.2 Neighborhood Planning in Saudi Arabia
9.3 Planning Regulations
9.4 Data and Space Required
9.5 Data Tested in the Context of Lebanon
9.6 Required Land Use by Category
Lebanon is a highly urbanized country but its urban growth was not regulated by state plans or policies; the result was “suffocated urban areas” that lacks to provide the basic services to their inhabitants with many environmental and transport problems to say the least.

State policies are very minimalistic in urban planning despite the several actors concerned.

Institutionally, a public entity responsible for planning matters does not exist since its elimination in the 1960s. Today, planning issues are handled by many ministries (such as ministry of public transport) and several governmental agencies.

The main governmental agency, the Directorate General of Urbanism (DGU), is responsible for developing and revising masterplans all over Lebanon that provide only general guidelines and recommendations without being supported by any regulatory framework or policies. The planning system of Lebanon is outdated with planning tools going back to the French mandate in the 1940's. Since then, the planning sector witnessed minimal change despite the growth of population and the expansion of urban areas. Only in 1997, few years after the end of the Lebanese civil war, that the Council for Development and Reconstruction (CDR) was created with the aim to regulate the post-war reconstruction and urban growth; the outcome was a document entitled The National Physical Master Plan for the Lebanese Territory adopted in 2009; it is a comprehensive land-use plan proposing a general national guiding framework for Lebanon articulated around main eight guidelines.

On the regional level, there exist master plans and strategic plans that are also mainly concerned with land-use and zoning issues such as delimitation of industrial areas, of historic areas, of spaces allocated for infrastructure and traffic and the balance between urban and agricultural lands. On the regional level, planning competencies are given to the municipalities that have to review the master plans and advise as fit. The result is a patchwork of fragmented actions and plans.

To sum up, there is a lack of a planning body and of a regulatory planning framework, outdated policies, many actors working independently in addition to political and administrative divisions that can challenge a comprehensive urban planning at the regional level.

8 Guidelines

- Structure territory around main urban centers
- Respect the specificity of each region when developing it
- Provide public facilities in an efficient manner
- Develop an efficient public transport system
- Include all areas in the national economic development
- Preserve natural domain of the country
- Sustainable management of water resources
- Solve the issue of wastes

9.0 DATA AND SPACE REQUIREMENTS

9.1 Planning in Lebanon
As discussed previously in the report, the Lebanese planning regulations are lacking/outdated and the zoning guidelines for the chosen site for Issues 1 are obsolete. Therefore, the group decided to work with the planning system of Saudi Arabia and the Emirates, being closer to the Lebanese context than western policies. Also, we found that the planning system for the residential neighborhoods in Saudi and in the Emirates are quite similar to the traditional Arab city morphology; they are organized around a main central hub hosting public functions from which smaller clusters of more communal and private areas expand.

City planning in Saudi Arabia and the Emirates is based on breaking it down into smaller planning units to ease the distribution of services. The "neighborhood unit" was created around the concepts of walkability and community building. The aim is to provide necessary services (educational, health, religious…) within a walkable distance of 500m; and by accessing the same services, inhabitants build stronger social bonds and safer places.

Structure of Residential Units

The residential unit is in fact broken into several clusters of people and services grouped gradually together in a central manner to form a whole. The structure of the residential unit is as follow:

The smallest entity is the residential block which is a grouping of residential buildings. The residential neighborhood is composed of several residential blocks (3 to 5 blocks) with a population number varying between 10,000 and 20,000 inhabitants. Several residential neighborhoods (3 to 5 neighborhoods) make up a residential district with a population number between 30,000 and 50,000 inhabitants.

These different scales of residential clusters are each serviced by a common service hub which must be well connected to the street network and within a walking distance of maximum 500m. The service hub can have several spatial organizations as illustrated in the following page.
The proposed guideline model suggests a central service hub from which commercial facilities spread in a linear way along pedestrian/vehicular routes. Some services are also placed across the site, on the edges, to serve other neighborhoods and encourage investment across all the development.

**Central Spatial Organization**

The public and communal functions are grouped in the center of the residential clusters. The benefits of such a central mix of uses is the accessibility for all surrounding residents, reducing cost and land requirements and creating a social hub for all users. Also, this type of organization allows the different actors involved to group their efforts in terms of programming, financing and execution to achieve a more efficient scheme. Nevertheless, one should be aware of the increased traffic.

**Non-Central Spatial Organization**

The public and communal functions are spread across the residential clusters. The benefits of such a model is a reduced annoyance for residents and a chance to encourage investments across all of the development. However, such a spread of services is not efficient in terms of accessibility, proximity and required land size.

**Linear Spatial Organization**

The public and communal functions are evenly distributed along the main pedestrian routes. The benefits of such a model is a balanced distribution of services that promote walking in the image of the traditional linear market of Arab cities (“souqs”). This model also raises issues of catchment area and land size requirements with the functions being spread out.
Religious Facilities

Mosques should be located in an unpolluted zone away from bad smells and noises. Mosques should be easily reachable by pedestrians and well connected to other supporting services. It is advised that mosque buildings have a rectangular shape with the largest side directed to the Qibla (Mecca direction). It is also recommended that religious buildings should have an inner courtyard and be recessed from the streets to ease circulation and allow for additional space in case of an increased number of worshipers. Extra care should be given to the design of mosques and their surrounding in terms of green spaces, views and so on. The height and size of the surrounding buildings should not exceed those of Mosques as they should be treated as landmarks; it is preferred that mosques are surrounded or adjacent to open spaces.

There are two types of mosques: the local mosque supports a population of 1500 people and the main mosque supports 7500 people. Local mosques are located within residential areas whereas the main mosque is located near the activity center of the residential district.

Health Facilities

Health facilities should be adjacent to residential areas. They should be located in calm areas, therefore should be located away from educational and commercial facilities. The chosen location should be away from noise, pollution, dust and smoke. Health facilities should be easily accessible and thus located on a main road intersection. The building’s design should allow for natural ventilation and lighting to ensure human comfort. Health facilities should be planned next to green open spaces for the well-being of patients where they could walk, play and rest. Open spaces also allow for future expansions.

Cultural Facilities

Cultural facilities such as libraries should be located at the center of neighborhoods, in calm areas. They should be well connected to pedestrian routes and to public transport. Adjacent buildings should be stepped back for privacy purposes.

Educational Facilities

Nurseries:
Nurseries accommodate children between the ages of 3 and 6 years old. Nurseries should be located within residential areas to ease accessibility and to promote safe walking.

Schools:
Schools should be well connected to pedestrian routes to promote walking. They should also be connected to the city’s infrastructure roads to ease accessibility. Schools should be located in calm areas away from noises and pollution. It is advised to have public gardens next to schools. Adjacent buildings to schools should be set back or not be high rise for privacy purposes and to ensure adequate lighting and ventilation. It is advised that educational buildings’ height not to exceed three floors to allow natural ventilation and lighting. Schools playgrounds (outdoor and indoor) should be well shaded using shading devices or trees. It is advised if schools are built next to sport facilities.

Open Space and Recreational Facilities

Different scales and types of open spaces should be provided to answer different needs. These types include, but are not limited to, pocket gardens, public gardens, district parks, playgrounds, neighborhood squares and play areas. The different open spaces should be connected by pedestrian links and green routes to encourage biodiversity. It is advised to incorporate sports and recreational uses within open spaces to render them more attractive and viable.

Security Facilities

Security facilities include police stations and emergency services in case of fire. Planning should ensure that a sufficient number of these facilities is provided and evenly distributed to ensure a secure environment for inhabitants. The location of these facilities should ensure minimum time is required to reach the incident’s location (around 5min); they should thus be located along major roads.
### Land Use Space Requirements in Saudi Planning

The above table summarizes the space requirements for the different services that support residential areas. It specifies the number of population supported by the different facilities and the area required for each. The number of people to house for Issues 1 is 51,200; this number was used to calculate how many facilities is needed on site. The project will not accommodate for the "District services" because they are needed for a larger population of at least 100,000 people.

For the housing requirements, the group assumed that the project will house 70% Syrians and 30% Lebanese. Knowing the average household number of both groups (5.8 for the Syrians and 4.1 for the Lebanese), the project needs to accommodate 6179 houses for Syrians and 3746 houses for Lebanese.

When Syrians relocate to Lebanon, they usually come as single men and sometimes along with their families. The single men typically form groups together to afford renting an apartment in Beirut according to a report by UNHCR. Therefore, a household average of 5 is applicable in both scenarios.

In Lebanon, the common typology of housing is apartments. To know the average size of apartments in Lebanon, a report prepared by RAMCO, a Lebanese real-estate advisor, in February was used (see appendix 2). The average apartment size was decided on 180 sqm taking the average of apartments located in middle-class areas. For the Syrians, the average size of apartments was decided on 100 sqm to make them more affordable.

### 9.0 Data and Space Requirements

#### 9.4 Date and Space Required

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<tr>
<th>Level of Services</th>
<th>Land Use</th>
<th>Population Number</th>
<th>Minimum Required Area (sqm)</th>
<th>Minimum Required Area Per Person (sqm)</th>
<th>Catchment (m)</th>
<th>Built Percentage</th>
<th>Number of Facility Required (800pph)</th>
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</table>

**Total**: 103 298558

**Total Population**: 51200

### Mix of Population

- Syrian: 70% (35840)
- Lebanese: 30% (15360)

### People p/D

- Syrian: 5.8 (6179)
- Lebanese: 4.1 (3746)

### Residential Spatial Req.

- Syrian: Affordable 80% 100 sqm
- Standard 20% 150 sqm
- Lebanese: Affordable 80% 180 sqm
- Standard 20% 210 sqm

**Total Residential Spatial Req.**: 1,361,402 sqm

**Space Requirements for a population of 51,200**
To test the accuracy and the applicability of the Saudi planning space requirements to the context of Lebanon, a comparison was done with the adjacent neighborhood of Bourj Hammoud. This comparison was seen fit since the chosen neighborhood accommodates a density of 750 pph.

The comparison aimed to examine if the number of facilities requested by the Saudi planning is suitable for the context of Lebanon. The chart below compares the provision of main services in both the Saudi and Lebanese contexts. The number of facilities needed were somehow similar in both cases with the exception of Health and Educational services. The difference in numbers are justifiable when informed about the context of Lebanon.

Usually in Lebanon, because of the sectarian diversity and the tradition of confessional schools, each community provides its own educational facilities. However, providing a central educational system will help in transcending sectarian divisions and in promoting social cohesion.

Community centers are important facilities in Lebanon that provide educational, health and social services to support the community. Therefore, a reduced number of governmental facilities is required such as for the case of health services since the demand is partly answered by community centers.

For Leisure, the Saudi planning authority does not specify any requirements. The case of Bourj Hammoud was thus used as a baseline to know the number of such facilities required to support the population of our site.

Also, providing 13 religious facilities as required by the planning was found to be unnecessary; the numbers advised are calculated not only based on population numbers but also on catchment distances. Both the Saudi planning and the Bourj Hammoud on larger areas than our site area. The number of religious facilities was thus reduced but their sizes increased to accommodate the need of a density of 800 pph.

Nevertheless, the comparison shows that the planning requirements devised by the Saudi authority can be applied to the Lebanese context with some level of flexibility. Leisure and community services were thus included in the landuse provision for the site and the number of some facilities (such as religious facilities) reduced while increasing their sizes.
This diagram illustrates the space needed if we were to accommodate residential uses, services and open space requirements on the site on one level. The coloured squares represent 1 ha each and the black outline shows the limit of 64 ha. To fit all of the space requirements devised by the Saudi Planning Authority on a site of 64 ha, they need to be stacked in at least four levels.
10.0 APPLICATION TO SITE

10.1 Strategic Plan
10.2 Design Development
10.3 Final Masterplan
10.0 APPLICATION TO SITE

10.1 Strategic Plan

The group decided not to maintain any of the existing industrial buildings on site knowing that they are abandoned and in a dilapidated state. The non-operational buildings can be relocated elsewhere since the site offers great potential for development as shown in the SWOT analysis. Also in terms of legibility, the buildings do not carry any sentimental values for current residents as highlighted by a study prepared for the municipality of Bourj Hammoud in 2009 by Diran Harmandayan.

The site is looked down upon by the residents as it has separated them from accessing the waterfront and compromised the fishing harbor. These two characteristics of the site are the important landmarks that the project will enhance. The conceptual model was applied to site and adjusted according to site context and limitations.

Main Connections and Network of Open Spaces

Three major Green fingers run through the site to connect existing accesses from Bourj Hammoud neighborhood to its waterfront. A major road runs through the site that will include public transport such as buses to increase accessibility to site. A secondary route runs in periphery of the site and connect to the existing infrastructure of the city. Different typologies of open spaces (park, pocket gardens, courtyards) are connected by pedestrian/cycling routes and link to the city’s existing green spaces.

Landuse Distribution on Site

Institutional (such as education and health) and commercial functions are located along major roads and next to main transport nodes to benefit from increased accessibility. Mix use are distributed along main green routes to activate them and increase footfall. Leisure facilities are mainly located on the waterfront and next to the existing harbor and is envisioned to become a new hub for the city. The residential function is distributed across the site in the mix use blocks and are also clustered near the calmer area of the waterfront where they will benefit from sea views.
The street pattern was configured to enhance permeability and accessibility. The block sizes are within the recommended standards of 80-100m to enhance walkability. Larger grain is found along main roads to accommodate for a variety of functions while smaller grain is found near the waterfront where residential functions are placed.

Buildings along the highway are higher to channel in wind cooling the streets and to provide shading. Next to open spaces, the heights are reduced to 10-15m to create pedestrian friendly environments. At the end of the site, higher densities are considered next to the waterfront for the economic value presented by such a strategic location.

A clear street hierarchy is important as highlighted in previous sections. The main roads are 30m wide while smaller residential streets are 7m for environmental and cultural concerns as explained earlier.

The main building typology is the courtyard building that answers both climatic and social needs of the site. Some buildings were not configured as perimeter buildings so they can be more robust and accommodate perhaps changing functions over time.
10.0 APPLICATION TO SITE

10.3 Final Masterplan 1:2500
11.0 DESIGN PRINCIPLES APPLIED

11.1 Climate
11.2 Permeability/Mobility
11.3 Land Use
11.4 Open Space
11.5 Identity/Integration
11.6 Safety
11.7 Adaptability
Climate was considered as an important environmental quality when designing cities in order to create spaces that are comfortable for people to live in without the need to rely on costly technologies that Syrians might not afford. The Lebanese climate is hot and therefore care was given to produce an energy efficient design. Climate was considered at different morphological layers.

The overall strategy consisted of orienting the master plan’s grid along the southwest axis, which is the direction of the prevailing winds. Three “green fingers” run through the site, inspired from the case study of Masdar City, and act as the breathing lungs of the project by bringing in the prevailing winds through the city.

The streets widths, building heights and orientation were also considered to provide maximum shading and promote human comfort at the ground level. Climate was also considered at the building scale by using the courtyard typology that was proved to be efficient in traditional Arab city design.
11.0 DESIGN PRINCIPLES APPLIED

11.1 Climate

Shading
By orienting the masterplan grid south-west, the south facing facades are no longer perpendicularly hit by the sun reducing thus heat gain. The streets are narrow with an average size of 7m which ensure maximum shading. A sun study analysis showed that the streets are well shaded in summer and sunny in winter, creating comfortable spaces around the year.

Use of Vegetation
The use of vegetation, and in particular trees, is very efficient to regulate climate by providing shading in large open spaces. Also, it helps in cooling and filtering the air and can be used along water features for increased results.

Natural Ventilation
Natural ventilation is one of the most efficient ways to prevent overheating in hot areas. It was ensured by aligning the main routes along the direction of prevailing winds as explained earlier. Natural ventilation was also ensured in smaller open spaces such as in courtyards that act as collectors of cool air at night.
Making the development permeable and easy to navigate through is very important for legibility. Having a well-connected street pattern gives commuters a greater choice of possible routes and increase footfall. This promotes safety and vibrancy and have positive impacts on the scheme economically.

A clear street hierarchy is also an important factor that was taken in consideration while designing the scheme as it enhance the legibility of the area. It also helps in defining the transition from public to private spaces, which is essential in Arab city design.

The main focus of the scheme was to connect the site to the rest of the city, allowing the residents to access the waterfront that is a main landmark. The proposed green fingers on site follow this logic by connecting to existing routes. Clear networks of transport were also devised. The main vehicular routes run through and around the periphery of the site only. This encourages walking and cycling along the green pedestrian routes. Several modes of transport were considered to render the scheme more accessible and feasible.
11.2 Permeability / Mobility

Street Hierarchy - Space Syntax

The central area with the main religious landmark has the highest accessibility. Mixed use development are found around that space and are thus well accessible roads are located on the periphery of the development. The busiest areas are those were the main public functions are provided at the south of the site. Routes become more private as you approach residential areas.

Pedestrian Friendly Streets

Streets were designed to encourage walking and cycling. Pavements are large (4-5m) to support pedestrian activities. Vegetation is also used as a buffer to create more pleasing spaces. Traffic-slowing techniques shall be incorporated as well.

Modes of Transport

The project support different modes of transport (bus, car, cycling, walking) to make the site more accessible. Vehicles are restricted to two main roads while other routes promote cycling and walking.

Walkability

Walkability was ensured by having block sizes varying between 80 and 100m. The variation in sizes support a stimulating walking experience physically and visually.
11.0 DESIGN PRINCIPLES APPLIED

11.2 Permeability / Mobility
The landuse scheme was devised to increase interaction between different communities. Diverse land use helps in creating vibrant spaces. Active spaces are known to be safe spaces and will increase footfall within the site. Mixing uses also allows the interaction of different communities by accessing the same services. Mixed use development also supports public transport and has economical value by reducing for example costs endured on buildings if they were to function with a single use.

The master plan’s distribution of uses was in some aspects inspired by Arab city design. The main open space is located next to main mosque. The area is bordered by mixed use facilities that spread along major routes. The south of the site accommodates more public functions such as heath facilities, commercial and institutional buildings that could also support the adjacent neighborhood. Around the harbor and along the waterfront various buildings with leisure facilities are provided to increase the number of people and activate the area. Religious buildings can be seen through the site promoting interaction between different cultures. Educational buildings are clustered in two main location within the site next to open spaces to provide a better environment for learning. The residential buildings are placed in the calmer areas next to the waterfront.
The objective was to create an interconnected green network that include different typologies of open spaces and can sustain different activities.

The three green fingers on site help to connect the residents with the waterfront while also cooling the environment as they are aligned with the direction of the prevailing winds. We have tried to incorporate urban agriculture within our scheme for its multiple environmental, economical and social benefits. Green spaces are activated by surrounding functions and act as an outdoor extension of these.

Vegetation is essential in creating a positive ecosystem. Trees in Lebanon have to be fairly self-sustaining and robust to survive in the hot climate. Popular trees in the city of Beirut often include Ficus and Cedar trees. Trees are a source of shade but are also effective in cooling the environment around.

The case studies of Masdar and Stavanger helped to form a benchmark for the concepts used in our Master plan. While the climate of our site may not match these case studies we will look to plant similar green zones throughout our scheme. From these examples we will look to incorporate features such as pocket parks, urban agriculture plots and public realm spaces that can be used for a variety of different...
11.0 DESIGN PRINCIPLES APPLIED

11.4 Open Space

Private Courtyards
Privacy is important in middle eastern culture, providing private courtyards for more intimate encounters and interactions between neighbors is part of the daily life of Arabs.

Central Park
The largest open space is located near the main mosque and is activated by the bordering mixed use. It can also incorporate urban agriculture and support diverse activities because of its flexibility.

Cascading Rooftops
An elevated layer of open spaces was created by the introduction of cascading rooftops that can promote visual interaction while limiting physical access.

Pocket Gardens
Pocket gardens are located within residential areas to offer better visual qualities within residential areas and can be used by children as a playground.

Sports Facility
The leisure facility can accommodate sports facilities and playgrounds for the children of the neighborhood. Bringing children together help in bringing parents from different backgrounds together.
11.0 DESIGN PRINCIPLES APPLIED

11.4 Open Space
The identity of a place is relative at both a local and national scale. Architectural features such as landmark buildings provide identity not only at a local level but also at national scale by acting as a magnet that draws people to an area.

The case of Khan Younis highlights how a unique mix of identities can be merged together when in crisis such as war or natural disasters. The case study is important as we are trying to introduce Syrian refugees into the scheme, focusing on how to create an identity that is relatable to both cultures.

We have related our master plan to the Arab morphology. Emphasis was given to the hierarchy of spaces and the need for a central public space from which mixed use streets spread to then break off into smaller tertiary routes to give access to the residential clusters. Key landmark buildings on site were identified and placed in accordance with the logic of Arab morphological model.

A townscape analysis was also conducted to see whether we were successful in creating interesting streetscapes and ensure privacy, a crucial cultural need in Arab context.
11.0 DESIGN PRINCIPLES APPLIED

11.5 Identity

Architectural Language
Several landmark buildings were distributed through the site to enhance legibility and are located in strategic areas to support public functions. The proposal also aims at including reinterpreted traditional Arab buildings.

Townscape Qualities
Streets were designed according to Cullen’s townscape qualities to create exciting spaces. They also demonstrated that high level of privacy is ensured with most of the streets having a closed vista which can also create an element of anticipation and excitement.

Street Culture
Street pavements were designed to be wide (4-5m) to be able to accommodate various activities. An important activity is the setting up of shops along the street to attract more people which is highly rooted in Arab culture as illustrated in the picture above.
It is important for all users of our scheme to feel safe within the environment in which they live. The scheme looks to introduce refugees into the site as a result of the war in Syria. The introduction of these refugees to the site might create tensions with the existing Lebanese community. Therefore our master plan attempts to provide a safe environment for both of these communities to cohabitate taking their cultural differences into consideration. The Khan Younis case study in the war torn Gaza Strip is an example that showcases how best to resolve tensions and provide safety between two groups of people.

In terms of our master plan, the Arab morphology’s use of street hierarchy was used to create a sense of privacy throughout the scheme. Active edges play an integral role in assuring that the streets are safe. Buildings are stepped with terraces to allow for passive surveillance. A mix of uses surrounds the central open space. This helps in keeping the streets active and safe throughout the day. The buildings were designed to ensure that both Syrians and Lebanese could interact with each other in a safe environment.
11.0 DESIGN PRINCIPLES APPLIED

11.6 Safety

Hierarchy of Streets
A clear street hierarchy is important to create a distinction between private and public spaces and thus promote safer neighborhoods.

Mixed Use Scheme
Mixed use development support a variety of functions that render the area more active. Active spaces are safer places with people present around the clock.

Passive Surveillance
Passive surveillance is the most efficient way to ensure safety by having living areas overlooking public spaces.

Active Edges
Active edges create safer streets because of the activities taking place and presence of people in constant flux.
Having a robust scheme is essential to deal with city change and growth. The open spaces within our masterplan were conceived to be robust spaces, mainly the linear park at the south of the site that was transformed from a “dead” space under the bridge to an active and flexible space. Several functions can take place such as informal markets, exhibitions, performances, community activities; it is a multi-functional space that can be adapted and appropriated by the residents.

The main open spaces were conceived in that manner with minimal regulations to allow a higher degree of flexibility and freedom.

Also, the project includes full blocks to be able to support change of function or users over time.

The project deals with the issue of Syrian refugees in Lebanon, thinking of phasing was thus important to understand how the project will be implemented to answer the quickest the needs of refugees. The proposal also highlights areas for future intensification; these areas can become dense being located next to major roads.

Future Possible Increase in Heights
Phasing

The most pressing issue when it comes to dealing with refugees is sheltering. The first phase of the project intends to quickly construct residential units to the south of the site along the existing road for them to be able to access the services in the adjacent neighborhood. The strip will thus first accommodate residential facilities that can then be transformed into commercial or institutional facilities once more dwellings are created within the site.

The idea is to always provide a cluster of residential with its basic needs as highlighted in the planning section (some educational, religious and health services) so it can be self-sufficient. When several clusters of residential units are created, public functions can be added to support them and so on.
12.0 CONCLUSION

12.1 Reflections

12.1 Application Rating
Reflection on Methodology

Issues I allowed us to develop a methodology for the design of a high density development with good environmental qualities. The brief given to us was expanded to answer a pressing issue, that of accommodating for an increasing number of refugees settling in already dense and “suffocating” cities. The case of Syrian refugees in Lebanon was taken as an example.

To understand what good environmental qualities represent, literature review helped us in better understanding the theory and strategies behind good urban design scheme. The qualities were then further explored by investigating relevant case studies that helped rooting theory in practice. Also, a study of Arab city design was also done to better inform our design decisions. These exploration helped in informing the conceptual model that was then applied to the chosen site.

The resulting masterplan was an informed and researched model that answer site specific conditions but also “universal” concerns of good urban design practice. The underlying process can be transferred and applied elsewhere.

Reflection on Design Concepts

Desirable environmental qualities were translated into design qualities. A conceptual model was created from these design qualities. The incorporation of these design qualities was sometimes challenging because a hybrid model was created merging best practices from both Western and Arab models.

The most successful design qualities that were easily implemented were climate strategies, permeability and network of open space typologies. Some concerns and discussions were held around the notion of identity and how to create a hybrid one. The mix use scheme was also a point of debate knowing that traditional Arab cities similar functions were clustered together although western models encourage mix of use for the many benefits it presents as highlighted earlier. The proposed hybrid model tried to accommodate for both approaches by locating mixed uses next to major roads and applying the single use scheme to private residential areas.

Areas for Future Research

Several issues could have been investigated further but was not possible due to the limited time-frame of Issues:

- Streets were designed to accommodate cars only if needed with streets being conceived as shared spaces. Residential streets with a width of 7m are not able to accommodate a large percentage of car ownership. However, in Lebanon, owning a car is part of the “prestige”; not being able to own a car might be somehow problematic. Possible incentives should be investigated to discourage use of cars and encourage other modes of transport.

- The block structure achieved in the final masterplan has more of a “western” feeling with large blocks of 100*100m. The group judged the outcome feasible knowing that Lebanon is not a typical Arab city but rather a hybrid city between European and Arab models. However, further analysis of the block structure could have been done in an attempt to achieve a grain closer to that of Arab cities.

- Mixed use was considered to be an important aspect of the project. Additional understanding of such a mix and of potential conflicts between different was required.

- The relation between Urban Design and Planning needed also further research; the design strategies need to be supported by policies, specially in the context of refugees. For example, to have a more feasible scheme of housing Syrians and Lebanese next to each other, policies should allow Syrians to bring their families along since single men are sometimes feared.

- A more detailed analysis of both the Lebanese and Syrian culture and way of living could also have been done to better inform identity and integration issues.
Climate
Having a climate responsive design was one of the most important objectives to create a sustainable scheme. This was ensured by considering issues of orientation, natural ventilation and self-shading design. Climate was considered at the different morphological layers (streets, buildings, open spaces) to ensure the creation of a comfortable environment.

Identity
The project provided several shared accessible public spaces where Syrians and Lebanese can come together and interact. The design also incorporated traditional Arab qualities that helped in the creation of strong communities (house terraces, neighborhood courtyards, market spaces, etc.) The public spaces being flexible allow the community to adapt them becoming places of expression.

Safety
Safety was ensured by providing mix use functions around open spaces to have people around the clock. The design ensured maximum active edges since active spaces are usually regarded as being safer. Safety is also enhanced by passive surveillance with residential units overlooking into public spaces.

Land Use
Mix of uses was regarded to be important to create more active and safer places. Also, mix use developments are more efficient along with allowing people from different backgrounds to access the same services and thus encourage interaction. Some issues concerning privacy may have been raised and the type of mix uses could have been studied further.

Adaptability
The project was conceived in phases to answer quickly the pressing situation of Syrian in Lebanon by providing first the basic sheltering needs. The design also accommodate for future growth by indicating potential areas to be further densified. It also presents robust spaces with flexible open spaces that can accommodate different uses and needs.

Permeability/Mobility
The project is highly permeable with walkable block sizes (around 100m). To encourage walkability, human comfort was ensured by providing cool shaded pedestrian friendly streets. The project also enhanced the connection of the area to the rest of the city by connecting it to existing infrastructure. The proposal incorporates several mode of transport to increase accessibility.

Open Space
Different typologies of open spaces were provided (parks, terraces, courtyards, gardens) and were interconnected by pedestrian routes. The open spaces are not only aesthetic and for leisure purposes but are also productive by incorporating urban agriculture. The design also enhanced the accessibility to the waterfront, a major open space for the city as a whole.

12.2 Application Rating
REFERENCES


Mostafavi, M. Doherty G. (2010). ecological urbanism


Tiesdell, S. (2006). The urban design reader


Pelsmakers, S. (2012). The Environmental Design Pocketbook

Cuthbert, A. (2003). Designing cities

Carmona, M (2010). Public Place urban spaces

Hayward R (1993). Making better places : urban design now

Ng, E (2009). Designing high density cities


Salat, S. (2010). Sustainable Arabic urban design at neighborhood scale

Khalaf, R. (2012). Traditional vs modern Arabian morphologies

10.7 ADAPTABILITY

The below graphs were extracted from a report prepared by UNCHR in 2016 about the living conditions of Syrians in Lebanon.

### Statistics Concerning Living Conditions of Syrians in Lebanon

- **Saftey Level**:
  - 67.54% Lebanese Surveys
  - 21.54% Syrian Surveys

- **How Safe do you Feel?**
  - Not safe
  - Relatively unsafe
  - Safe

- **Refugees in camps feel less safe**

### Relation with Lebanese Neighbors

- **Access to Services**
  - Health
  - Education
  - Public Utility
  - Aminetary
  - Economy

### Average Apartment Sizes and Prices in Several Areas of Beirut

<table>
<thead>
<tr>
<th>Area</th>
<th>Average Price Per SQM</th>
<th>Average Apartment Size (SQM)</th>
<th>Average Apartment Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rawdet al Baida</td>
<td>$6,750</td>
<td>414</td>
<td>$2,794,500</td>
</tr>
<tr>
<td>Mankara</td>
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<td>$2,050,000</td>
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<td>Beirut Central District</td>
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<tr>
<td>Ain al Mreisseh</td>
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<td>$2,369,000</td>
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<td>Sursock</td>
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<tr>
<td>Saffie</td>
<td>$4,900</td>
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<td>$877,100</td>
</tr>
<tr>
<td>Verdun - Ain el Tineh</td>
<td>$4,570</td>
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<td>Clemenceau - Koura</td>
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<tr>
<td>Rizk Hospital - Nazareth - Corniche du Fleure</td>
<td>$2,850</td>
<td>206</td>
<td>$907,700</td>
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</table>

Source: FAVCO, Le Commerce du Lévant, DLCMVEST
### 10.7 ADAPTABILITY

Site Located in Zone C

Source: Bourj Hammoud Municipality

<table>
<thead>
<tr>
<th>Zone</th>
<th>Allowed uses</th>
<th>Allowable maximum building footprint as % of land area</th>
<th>Allowable maximum built areas as % of land area</th>
<th>Set backs</th>
<th>Maximum allowable building height</th>
<th>Minimum buildable parcel size*</th>
<th>Minimum buildable parcel width and depth</th>
<th>Minimum size for parceling</th>
<th>Minimum parcel width and depth for parceling</th>
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<tbody>
<tr>
<td>C</td>
<td>Industry commerce</td>
<td>75%</td>
<td>1.75%</td>
<td>3m</td>
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<td>500m²</td>
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<td>D</td>
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<td>2%</td>
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<td>-</td>
<td>200m²</td>
<td>8m</td>
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<td></td>
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<td>B2</td>
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<td>16m</td>
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</tbody>
</table>

**Zoning Regulations**

**Notes:**
- See attached Bourj-Hammoud zoning map
- Building regulations allow construction on parcels smaller in size (area and depth and width) down to 2/3 of the area and sizes stipulated in the building regulations, but not less than 7 meters in