

# SUSTAINABLE DENSIFICATION

## BURAIDAH: INTEGRATED NEIGHBOURHOOD

# الكثافات العمرانية المستدامة

بريدة: الحي المتكامل

FUTURE SAUDI CITIES PROGRAMME  
DEMONSTRATION PROJECT



وزارة الشؤون  
البلدية و القروية  
Ministry of Municipal & Urban Affairs

مستقبل المدن السعودية  
FUTURE SAUDI CITIES



**UN HABITAT**  
FOR A BETTER URBAN FUTURE

Future Saudi Cities Programme  
Demonstration Project: **Buraidah**

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*And Allah has made for you from your homes a place of rest and made for you from the hides of the animals tents which you find light on your day of travel and your day of encampment; and from their wool, fur and hair is furnishing and enjoyment for a time.*

**Quran, 16:80**





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# INTRODUCTION



## 1.1 Scope of the Demonstration Project

As an extension of the Buraidah City Profile, the demonstration project will apply the United Nations Human Settlements Programme (UN-Habitat) principles on sustainable neighbourhood planning, applicable to the Saudi context. One of the primary goals of the project is to demonstrate how to implement possible solutions for shifting urbanisation in Saudi to a sustainable development track, without adopting heterotopic models. Instead, it intends to develop locally rooted traditions and culture and the design components. Also, the project was developed alongside the Strategic Vision for Buraidah, tapping into the four strategic recommendations, and spatially analysing them at the neighbourhood scale.

Policy recommendations for improving urban planning strategic frameworks, and the development of implementable projects, need to be structured through a multi-scalar lens that views the city as a continuum, growing from the neighbourhood to the urban and the broader city-region scale. This ensures spatial coherence, and coordination of various actions at the different scales, therefore maximising the impact of structured and systemic urban transformations.

As such, the project focuses on the establishment of a comfortable urban environment with a variety of housing typologies and diverse public spaces, exemplifying a different approach to neighbourhood development, which includes contextual characters, local climate and cultural peculiarities, all the while meeting the needs for a more compact, integrated, inclusive, and sustainable urban development model.

## 1.2 Objectives of the Demonstration Project

The demonstration project targets problematic issues that are widespread in the Saudi urban context. As such, the project will set an example of how to address and respond to the challenges represented by urban sprawl and the monotonous urban environment typical of many Saudi cities, by designing an urban expansion that is, simultaneously, well-connected to the existing city and as sustainable as possible.

The project intends to set a positive reference model for neighbourhood planning in Saudi Arabia. This will be done by focusing on a diversified housing offer, linked to public transport and to a variety of social and public facilities distributed within a consistent system of green networks, resulting in a mixed-use neighbourhood. In addition, the project will explore ways in which urban planning, as well as urban and architectural design, can contribute to an articulation of appropriate urban development models for planned city extensions in Saudi Arabia. Using this framework, the project's objectives are to:

- Foster sustainable urban planning and design through adequate densification and mixed-use;
- Provide design solutions rooted in traditional culture and the local context;
- Provide an example of how urban design projects are generated; building on what is already existing on site (natural elements, landmarks, etc.);
- Provide an example of neighbourhood planning based on the three-pronged approach (design, legislation, and finance).

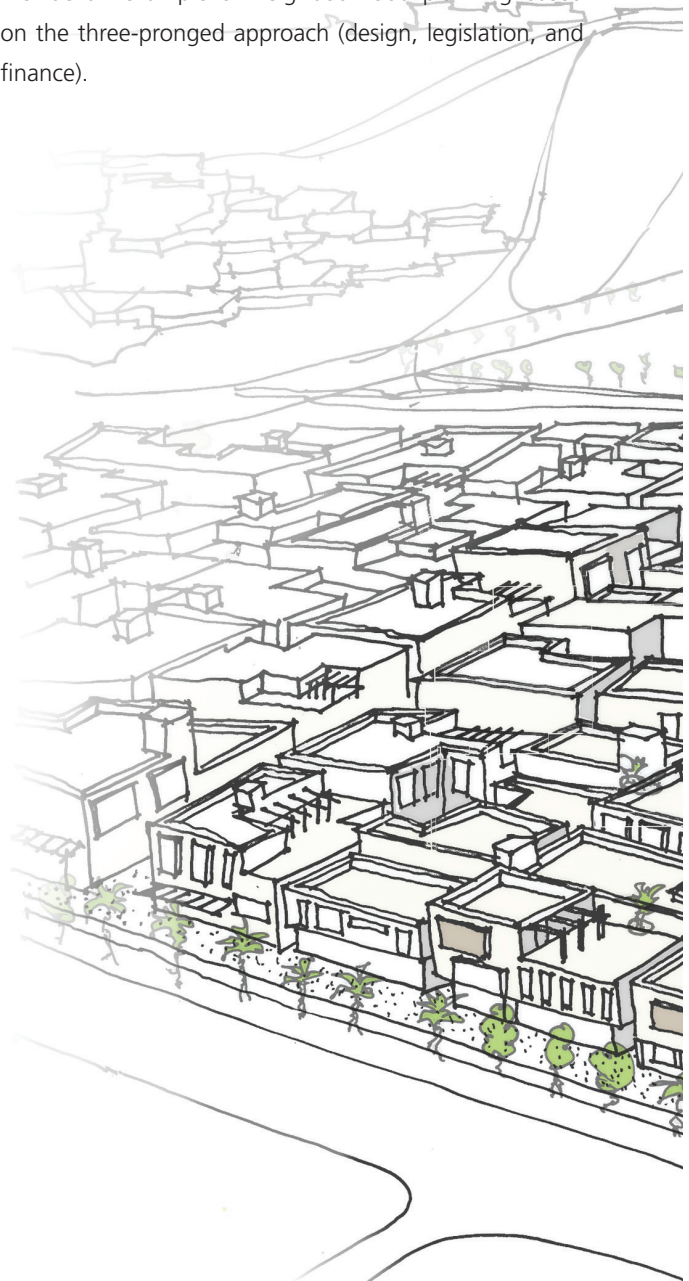
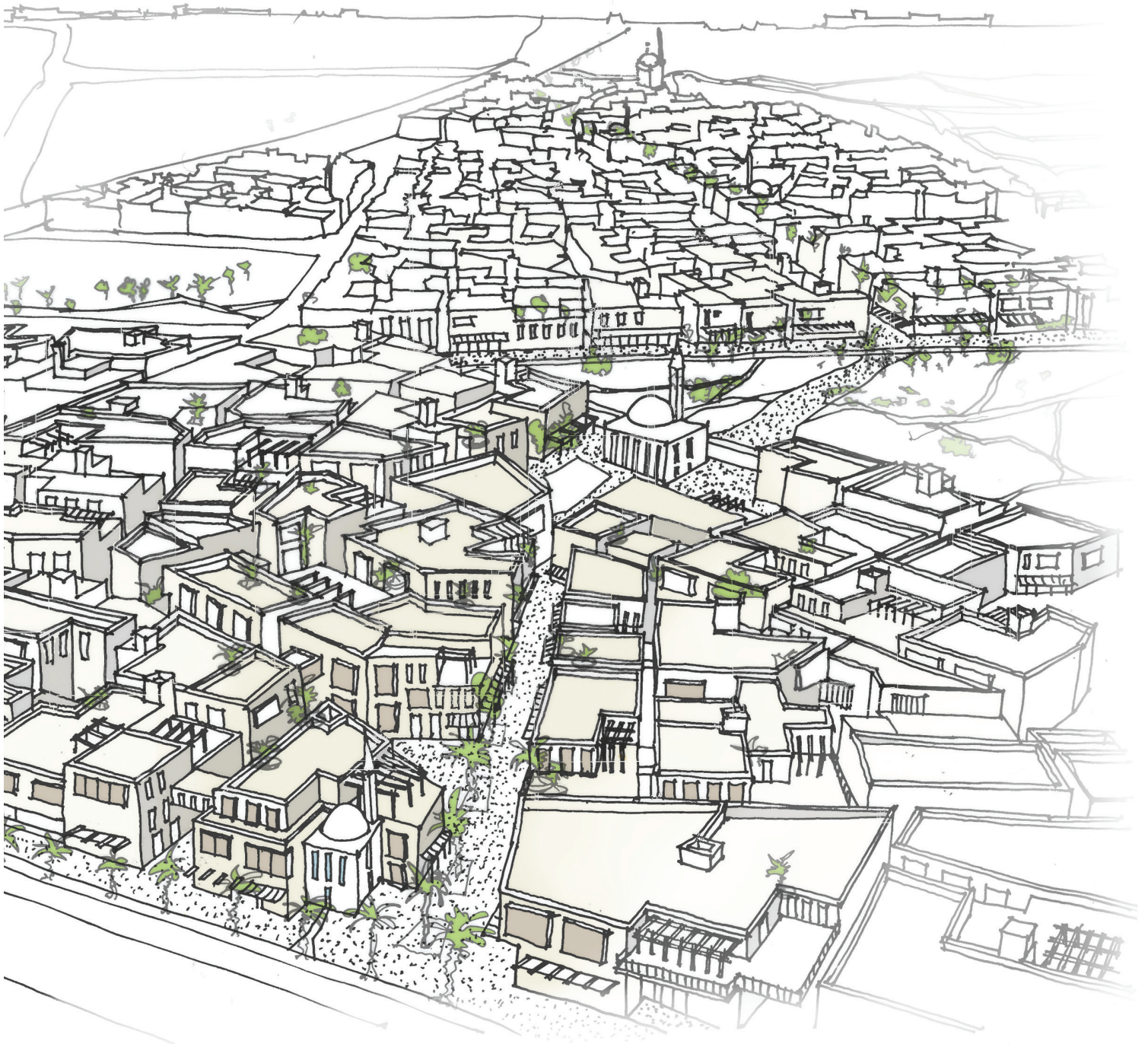


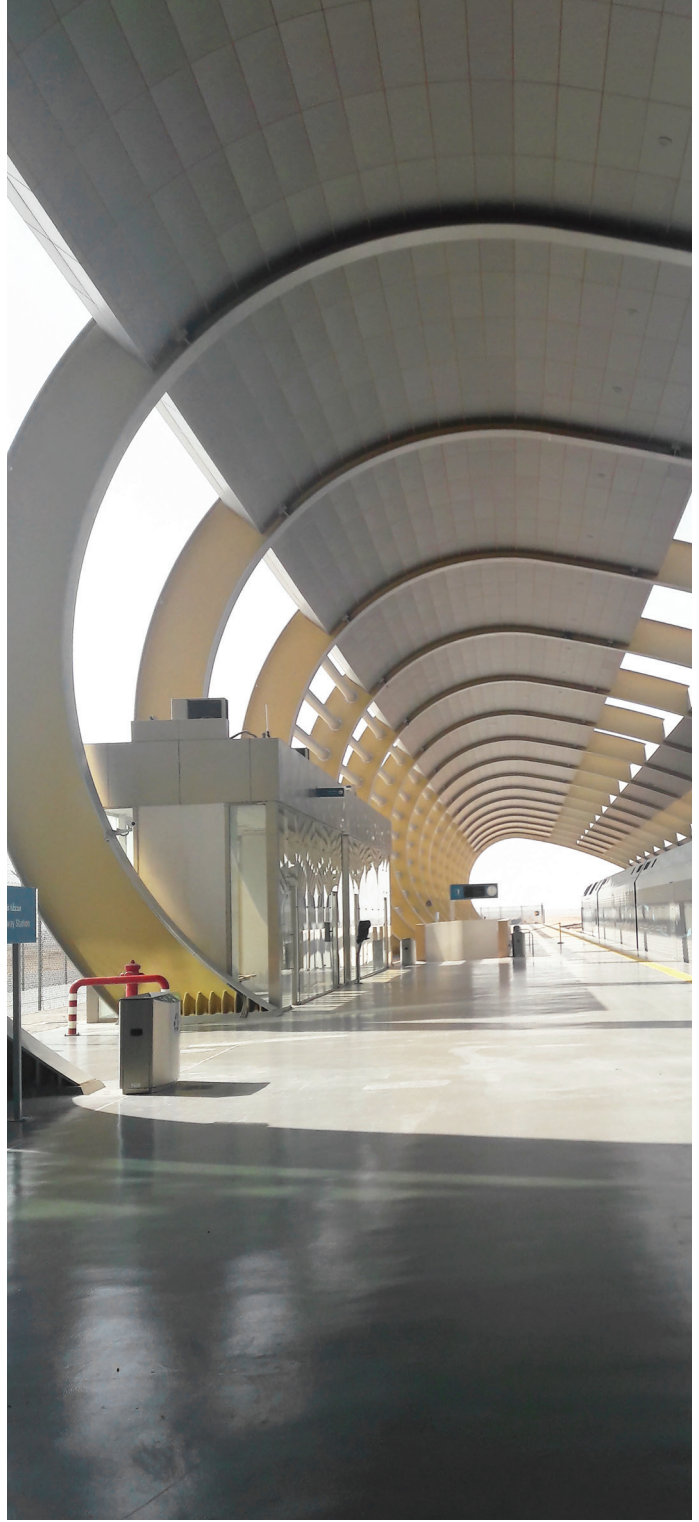
Fig. 1. Concept sketch of the project proposal





# 2

## LINKAGE TO THE STRATEGIC VISION FOR BURAIDAH



Developed as an extension to the Buraidah City Profile, the project taps into the Strategic Vision for Buraidah and elaborates a system of strategies for the city's future development. As such, the project will be an example of how to concretise conceptual strategies into design guidelines and implementable projects. Following the four strategic recommendations for Buraidah, below is a description for each one of the conceptual strategies, including their interpretation and translation into specific neighbourhood design principles.

## 2.1 The Compact City

The demonstration project exemplifies how adequate densification, aligned with the UN-Habitat density recommendations (150 p/ha), can be linked and supported by an intermodal public transport system, and provided with an adequate ratio of green and public spaces. Being in such proximity to the city core, and being one of the main concentrations of educational facilities, the promotion of a high-density neighbourhood is deemed appropriate. The project develops design guidelines to increase density, and suggests a balanced and mixed-use residential neighbourhood, taking into account local context and culture in setting the spatial organisation of both the neighbourhood and blocks typologies. The proposed mixed-use blocks typology demonstrates the balance between residential and commercial uses, following the UN-Habitat's guidelines for Sustainable Neighbourhood Planning and Design.

## 2.2 The Connected City

The vision for Buraidah proposes a revised public transport system, setting up a basic intermodal network that relies on two main lines of BRT (Bus Rapid Transit) connected to a neighbourhood distribution system (feeder) of small electric buses, and supported by an extensive network of pedestrian paths and walkways at the neighbourhood level. The strategy aims at building better connectivity and promoting principles of sustainable development across the city. At the project scale, one of the feeder networks for the BRT lines is set to go through the considered quadrant, connecting the neighbourhood to other urban transport nodes and development clusters, and with the central area of the city. This way, the area of the demonstration project will be well connected to both the rest of the city, and to important strategic elements such as the main railway station, the Al Qassim University, and the Buraidah National Airport. The intermodal transport system connects the project with the different areas, services, and facilities, at the city scale and within the neighbourhood. As such, most streets are envisaged as vibrant urban corridors, integrating local public transport, urban services, commercial spaces, leisure activities and public spaces.

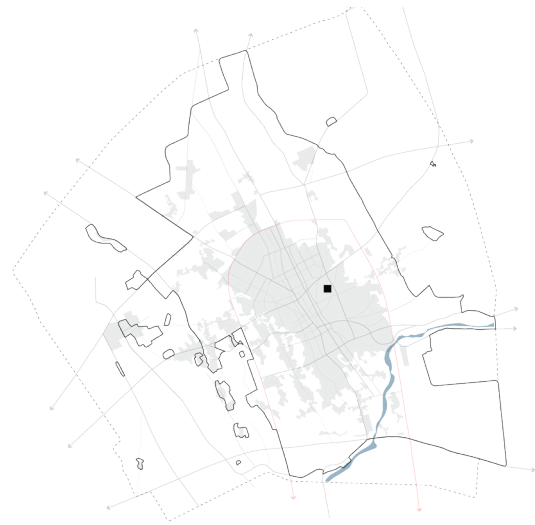


Fig. 2. Location of the site within the city boundary

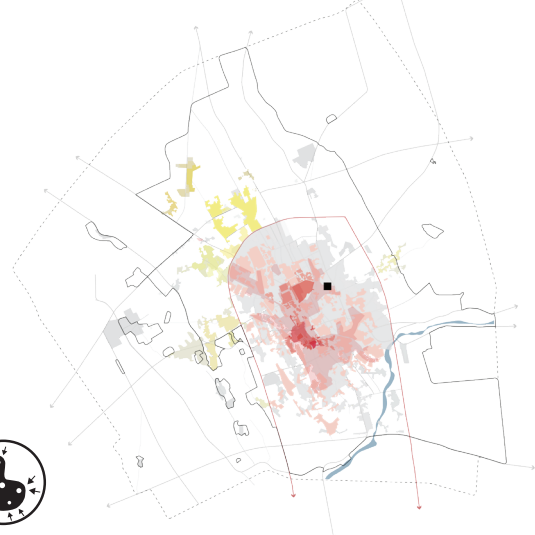


Fig. 3. The Compact City



Fig. 4. The Connected City



Buraidah rural landmark

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### 2.3 The Inclusive City

The vision for Buraidah speaks to the necessity of developing an inclusive and cohesive city. From a socio-economic inclusion point of view, the city is currently fractured, as certain areas lack integration and access to the inner city, while others lack sufficient, accessible, and usable open green spaces and public services. The project aims at creating an environment where all citizens have equal opportunities to access the benefits of a good urban environment, regardless of age, income, gender, social status, or education, resulting in an inclusive city for all. The neighbourhood physical plan is developed around the centre, with the goal of creating a dense, integrated and well serviced urban area that will attract more people close to services, facilities, public spaces, and job opportunities.

### 2.4 The Resilient City

Although fragmented and endangered by possible development encroachment, agricultural activity within the urban fabric, is one of the peculiarities of Buraidah. The Buraidah Strategic Vision perceives the preservation of current agricultural and natural assets as a priority to increase the quality of the environment and to diversify the local economy by leveraging and enhancing the agricultural identity of the city. These agricultural and natural features offer an opportunity to develop a system of green infrastructure, connecting agricultural lands, private farms, wadis, wetlands, existing parks, and remaining patches of natural vegetation, and revitalising agricultural lands. Such an approach would preserve neglected green spaces, transforming them into a connected green system dedicated to improving the quality of life and enhancing the overall environmental and climatic performances of the city. As the site for the demonstration project presents various large areas that are naturally vegetated and wetlands, these will be preserved and transformed into pedestrian alleys, public green walkways, and natural water management infrastructure.



Fig. 5. The Inclusive City

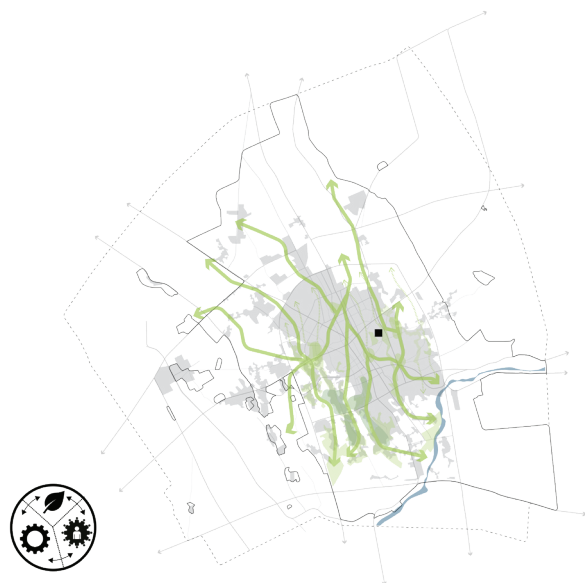


Fig. 6. The Resilient City



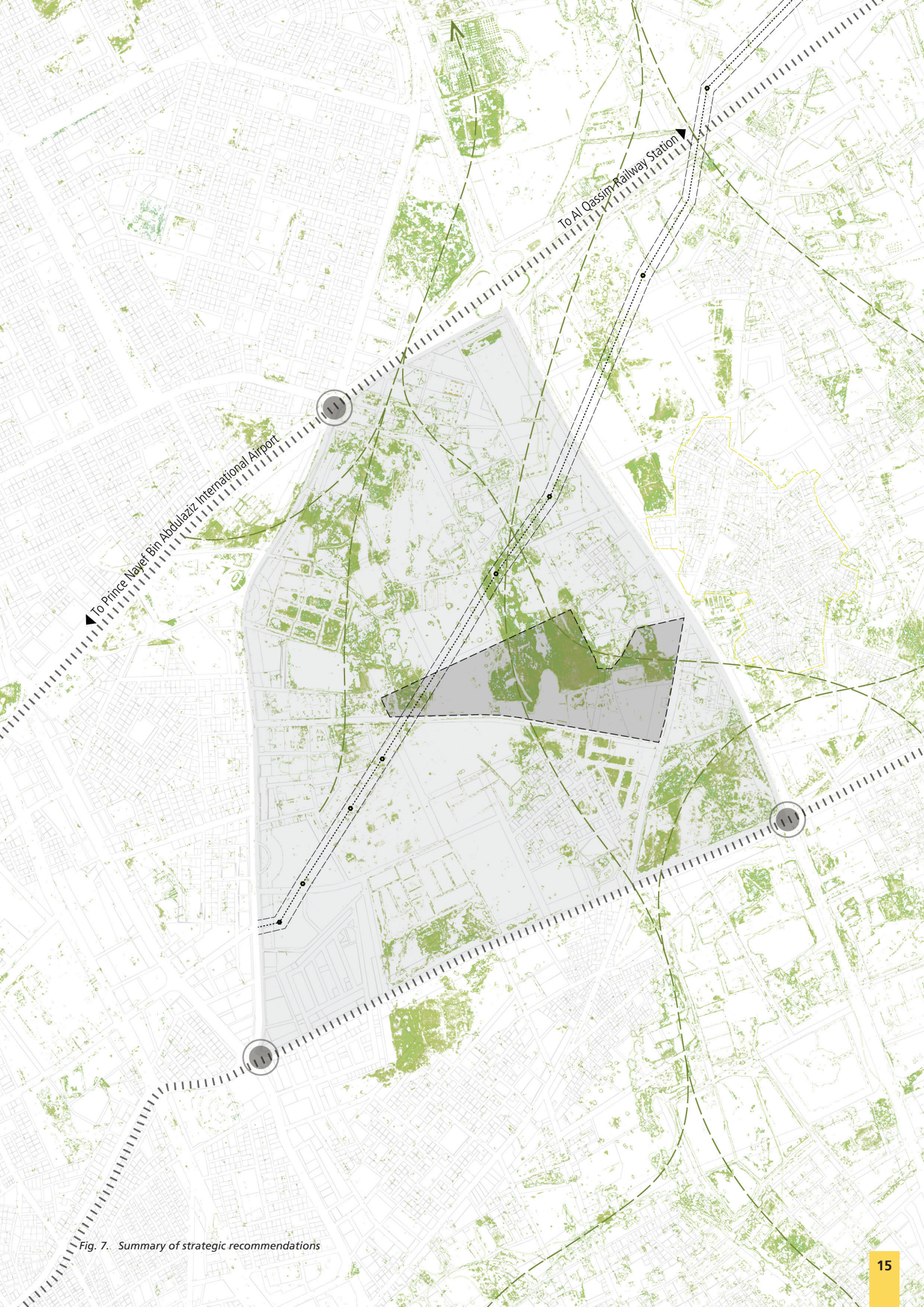


Fig. 7. Summary of strategic recommendations



# 3

## MOLDING THE FUTURE SAUDI CITY



### 3.1 The Site: Working with Existing Elements

The location for the implementable project was selected within the city of Buraidah, after consultation with MoMRA. The site is located in close proximity to the city's core, giving an opportunity to demonstrate, through a practical example, how to implement densification and connectivity strategies, within the existing city. The site is located to the East of the city and the central King Abdulaziz Road, and is defined by a quadrant, limited by four transport axes: King Fahd road on the North, At Tarafiyah Road on the West, the Internal Ring road on the East and At Taghirah road on the South.

At the moment, the site is vacant and is characterized by a lack of internal road links resulting in lack of connectivity with its pre-existent neighbouring unplanned areas. Analyzing the possible connections of the area to the surroundings, a series of possible links to existing services and facilities in close proximity are identified as:

- Industrial and business concentrations;
- Healthcare facilities; and
- Recreational and cultural clusters (King Abdullah National Park and Buraidah Cultural Centre).

Several urban nodes, with different sets of functions, surround the area within the selected quadrant although currently disconnected from the site. Considering the wider quadrant defined by the four main roads described above, on the North-Western side, is a concentration of health facilities, where the Al Qassim Health Affairs and Ministry of Health buildings are located. Alternatively, another node of industrial and commercial facilities sits on the Southwest part of the quadrant. Lastly, a vibrant network of local, Friday and Eid mosques lie along the At Tarafiyah Road and An Naqa.

On the Northern end of the site are several private date farms, complete with local restaurants and rest houses, forming a green axis for recreational and cultural activities that connect to the new development through pedestrian green walkways. These also link to other similar activities, and recreational and sports facilities, developing on the same axis further to the North and the South East. The site is crossed by a high-tension power line, which starts in the central part of the city, and passes over several urban areas. The existing high-tension line divides the site into two areas, and characterizes itself as a planning contingency, influencing the land use and the general design concept for the planned neighbourhood, as devoting the land underneath the power line to residential functions could cause health risks. For this reason, a buffer corridor of 50m (considered from the centre) was established along the power line.

As mentioned, a system of wetlands and fragmented residual patches of natural vegetation were observed on the site, also indicative of the presence of a high water table. Existing

green systems were considered as generative elements for the project, being maintained and redesigned as public open spaces, preserving and protecting the wetland system from urbanisation. The project leverages on these natural features to support the generation of a unique microclimate, using them as elements for developing a natural stormwater management system, within the future neighbourhood.



Fig. 8. Transport connectivity within the context



Fig. 9. Functional relations within the context

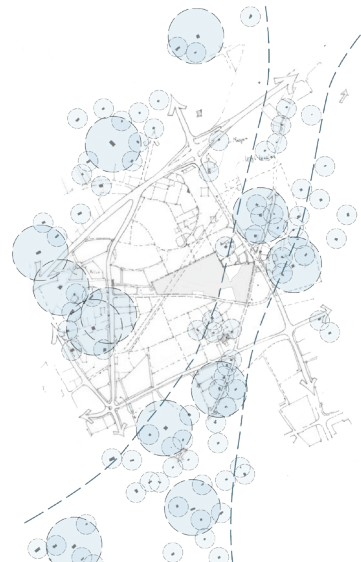
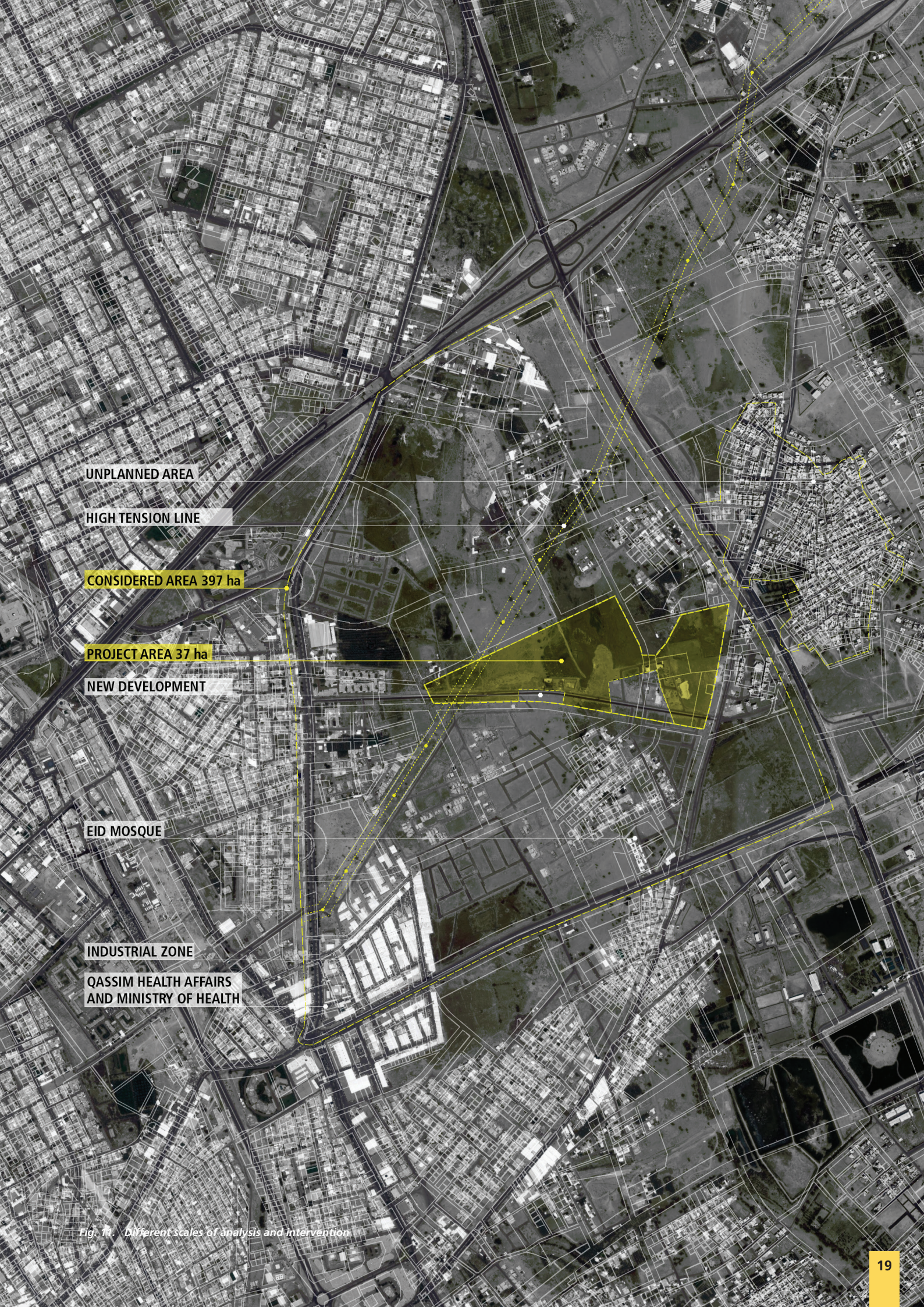


Fig. 10. Religious network within the context



UNPLANNED AREA

HIGH TENSION LINE

CONSIDERED AREA 397 ha

PROJECT AREA 37 ha

NEW DEVELOPMENT

EID MOSQUE

INDUSTRIAL ZONE

QASSIM HEALTH AFFAIRS  
AND MINISTRY OF HEALTH

Fig. 11. Different scales of analysis and intervention

### 3.2 Structuring Connections with the Surroundings

Two divergent planning realities were identified in the broader area of the quadrant, according to the planning documents and parcels mapped in GIS:

- A series of new proposed roads lacking integration with the existing network, forming a regular urban structure; and
- Areas where new developments were emerging without consideration for the plan.

This situation typifies a widespread phenomenon in Buraidah, where the contradictions between what is in the plans and what is the existing reality on the ground, lead to numerous planning challenges, manifesting at the broader city scale in both sprawled developments and a general lack of cohesion in the urban structure.

One of the goals of the demonstration project is to show how an accurate design approach can connect to the existing and

proposed situation, becoming a tool for re-aligning the two. To set the preconditions for the neighbourhood design, an efficient, interlinked, and hierarchical road network was set in place, building linkages with the existing road system, forming new parcels and networks and enhancing existing landmarks and environmental elements. The project, predisposed this way, will be set on a well-linked, porous and connected urban structure that relates to the overall neighbourhood design. The project also introduces a set of additional links - a connection to the public transport, and an organised transit system for private vehicular traffic through the area.

In addition to relinking the road and transport system, the project also provides an example of how to maintain linkages with an overall urban green network, or a system of green infrastructures. As the current presence of the high tension power line provides the opportunity to keep the Western part of the site un-built, what could have been a development constraint becomes the way to create a consistent green corridor, linking existing vegetation and wetlands with other surrounding green areas, and supporting the structure of a network of parks and gardens at the neighbourhood level.



Fig. 12. Existing urban context



Fig. 13. Discrepancy between the existing urban context and proposed parcels



Fig. 14. Relinking the existing urban context and proposed parcels



Fig. 15. Creating a consistent structure

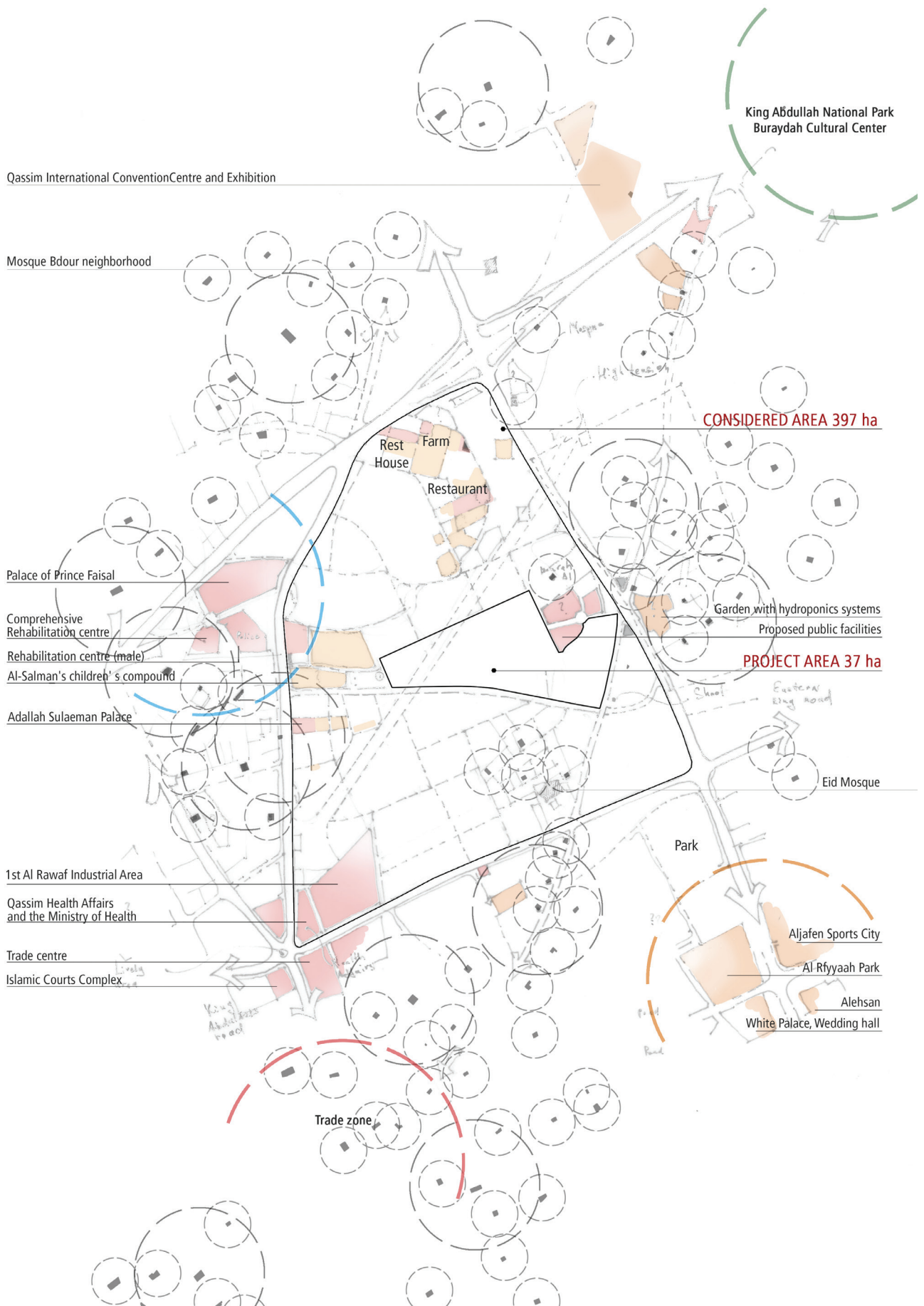


Fig. 16. Synthesis of the functional relations





# 4 PLANNING A NEW NEIGHBOURHOOD: THE PROJECT PROPOSAL





Legend:












-  Housing
-  Green internal courtyard
-  Social and public facilities
-  Mosques (Friday and local)
-  Parks and gardens, "green links"
-  Main pedestrian boulevards
-  Kindergarten
-  Primary health care
-  Schools (elementary and middle)
-  Library
-  Local police station

Fig. 17. Masterplan for the project



## 4.1 A Compact, Connected, Integrated, and Socio-Ecologically Sustainable Neighborhood

The proposed approach for designing the development of the demonstration project is based on UN-Habitat’s five principles for sustainable neighbourhood planning, supporting 3 key features to a sustainable city: (compact, integrated, connected). The five principles are:

1. Adequate space for streets and an efficient street network
2. High density (at least 15,000 people per km<sup>2</sup>)
3. Mixed land-use
4. Social mix
5. Limited land-use specialisation

To support this, pre-existing elements on site were brought to light with the intention of rooting the planning and design of the new neighbourhood in an ecosystemic approach. This was done by exploring the implementation methods of socio-ecological infrastructure at the neighbourhood scale, making use of green infrastructure, and nature-based solutions for improved climatic performance, as well as stormwater management, where possible.

### 4.1.1 Establishing new urban patterns

The guiding principle used in setting up the structural patterns for the new neighbourhood was a replication of some aspects characterising the typical patterns of the historic Islamic city in a contemporary fashion, from the initial thought process to the choice of associating pedestrian patterns with an articulated hierarchy of roads and the public transport system. As such, within the neighbourhood, the project envisages four types of roads: vehicle road-links, pedestrian avenues, pedestrian pathways, and narrow pedestrian walkways, which lead to internal vegetated courtyards within the residential blocks. Outside the perimeter of the neighbourhood, another hierarchy of urban roads links to the overall road and public transport network at the citywide scale.



Fig. 18. Built pattern

### 4.1.2 Balancing vibrant mixed-use and privacy of residential units

Supporting this structural pattern, and following a traditional form of spatial organisation, the residential blocks are designed



Fig. 19. Commercial land use along walkways

to include commercial functions, creating a mixed-use environment on the main walkways, while keeping the internal space within the blocks entirely for residential purposes. This distribution of space produces a vibrant and lively environment along the alleyways surrounding the neighbourhoods and on the central pedestrian axes and paths, while maintaining a certain degree of privacy in the outdoor courtyards.

### 4.1.3 A gradient of public, semi-public and private spaces

As part of the structural elements, the project proposes a networked system of public spaces of various sizes, with different roles and characters. Most of the open green spaces, including the linear green pathways, were designed starting from the existing fragments of wetlands and residual patches of vegetation. The design of the public space network emerged from connecting and revitalising these scattered fragments, with the purpose of upgrading and reconnecting the neglected existing green infrastructure system, linking it to the overall system of public spaces along the main pedestrian avenues. This system defines a consistent and articulated green spine, framing the dominant architectural element of the Friday mosque, and linking it as a passageway to both the other green spaces and the green alleys crossing the neighbourhood perpendicularly. Overall, the articulated network of public spaces is divided into open and serviced neighbourhood spaces, that can be both green or paved (parks and squares hosting neighbourhood functions), linear public spaces (intending both streets and green pedestrian pathways), and more private spaces at the centre of the residential blocks (the semi-private courtyards, shared by those residing in the same block).

### 4.1.4 Public social facilities

According to the current regulations and urban standards in Saudi Arabia, the project includes several social facilities necessary for sustaining the neighbourhood needs. As such, the project envisages many kindergartens and schools, a clinic, a library, and a police station. Social facilities are planned to be easily accessible, at walking distance, and either close to or consisting of green areas and public spaces, (parks, plazas, squares, etc.). The eight mosques (seven local mosques and the main Friday mosque) are all connected amongst them and to the neighbourhood, by the two central pedestrian spines, forming an easily accessible and vibrant network of religious spaces, lined with parks and other public spaces.



Fig. 20. Public spaces and internal courtyards

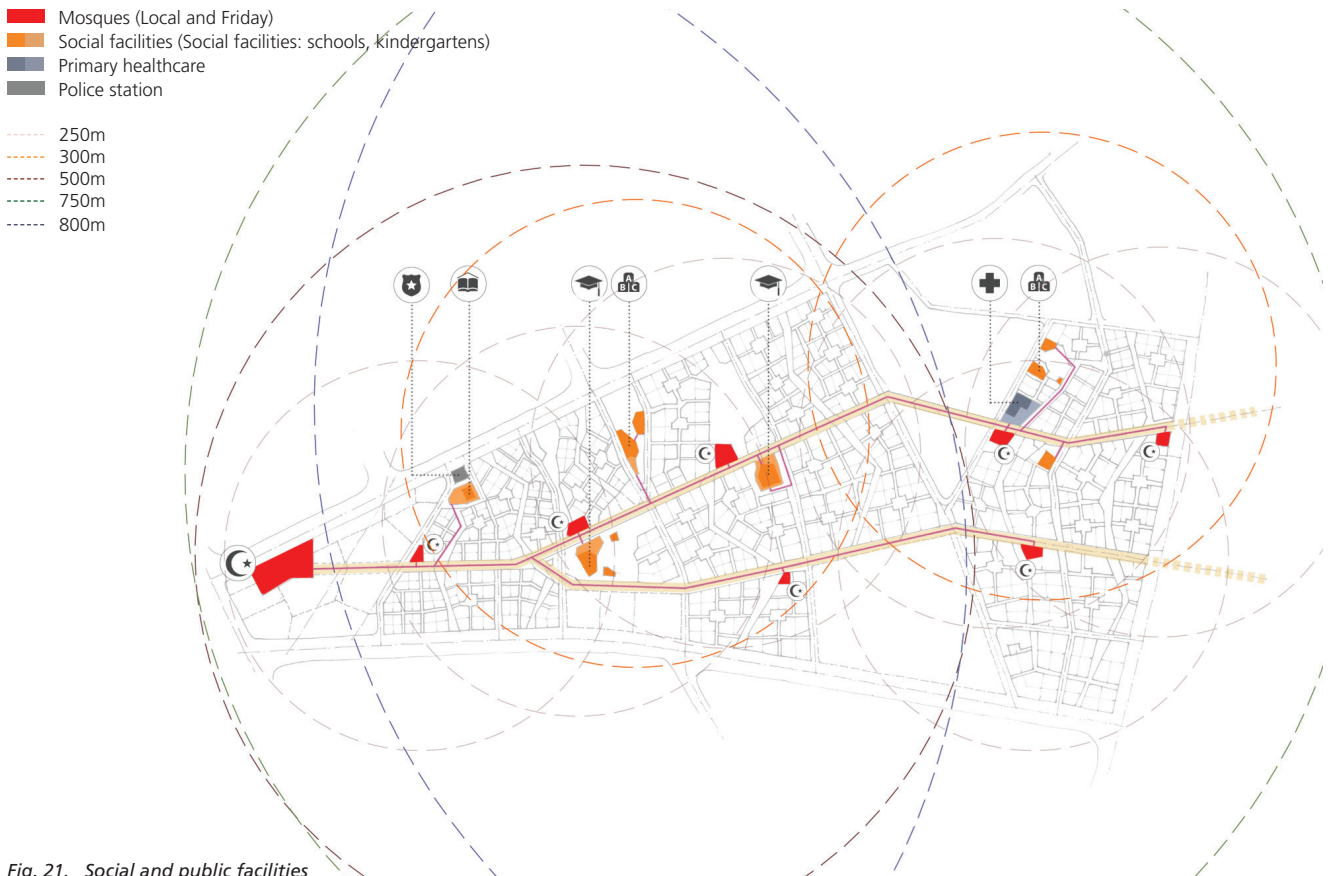


Fig. 21. Social and public facilities

*And within the land are neighboring plots and gardens of grapevines and crops and palm trees, [growing] several from a root or otherwise, watered with one water; but We make some of them exceed others in [quality of] fruit. Indeed in that are signs for a people who reason.*

*Quran, 13:4*





## 4.2 Working with Nature

### 4.2.1 The green infrastructure system

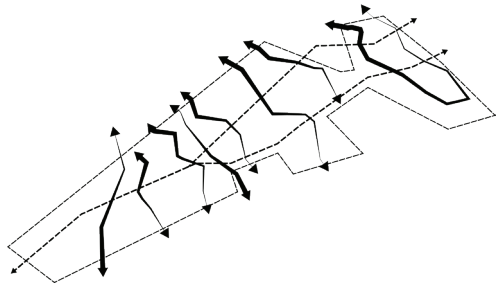


Fig. 22. Green axes

As mentioned, the demonstration project supports and enacts the general citywide Strategic Vision. Referring, in particular, to the Resilient City strategic framework, the proposed network of green and public spaces showcases ways to implement integrated green infrastructure systems in new developments. Green infrastructure is usually defined as infrastructure that has the purpose of lessening the burden of urban development on the environment,

and/or has the aim of providing ecosystem services such as runoff management, air temperature reduction, carbon sequestration, and habitat provisioning. Some definitions of green infrastructure do have a broader meaning, including natural ecosystems along with green spaces, such as parks and private gardens. Examples include green roofs, green alleys, greenways, wetlands, bio-retention ponds, and porous pavement. Green infrastructure provides a broad variety of ecosystem services, (literally, the benefits people obtain from ecosystems) including water management and water quality improvement, air temperature reduction, improved energy use efficiency, air pollution and carbon sequestration, noise reduction, habitat provisioning, the provision of recreational and educational opportunities, food production, and aesthetic improvement of the built environment. The demonstration project leverages on the revitalisation of existing wetlands, and their transformation into a connected system of green infrastructure, including religious services, public activities, and an integrated system of open public spaces, with recreational and educational activities.


-  Parks and gardens
-  Green alleys (green axes)
-  Green internal courtyards
-  Irrigation links "courtyard - green axes"
-  Irrigation links "green axes - parks"
-  Irrigation links "wetland - avenue - green axes- parks"



Fig. 23. Green and blue infrastructure



### 4.2.2 The natural water management system

From the perspective of Natural Water Management (NWM), green infrastructure refers to methods of managing water, favouring the restoration of natural ecosystems, or at least of their key functionalities regarding water management. It consists of land management, and/or engineering measures using vegetation, soils, and other natural materials, to restore the natural water retention capacity of the landscape. Natural Water Management measures use natural and human-made materials to enhance or improve longitudinal and lateral hydrological connectivity, restoring natural hydrologic processes including infiltration and runoff control, but also soil/water purification processes.

At the neighbourhood scale, green infrastructure using NWM approaches can support sustainable drainage systems, that mimic nature by soaking up and replenishing water-tables, and by giving opportunities to store excess or recycled water and use it for neighbourhood functions, like irrigation of green spaces. In the demonstration project, green spaces are designed to protect and restore the natural hydrology of the site, capturing stormwater through the use of engineered systems that mimic natural hydrologic ones,

recharging the existing water table, and making possible the harvesting and storing of excess rain and stormwater.

In addition, while the demonstration project is at the master plan feasibility study stage, some conceptual ideas are shown at the scale of the buildings. Rainwater collection systems are in fact thought as complementing the buildings, by installing rainwater collection tanks on the buildings' rooftop. During the rainy season, water should be collected in the water tanks, designed in a typical Islamic wind-catchers style. Collected water flows to a water-tank system hosted in a technical space underground through a special shaft. Water can then be pumped or released (depending on the topography), to irrigate vegetated alleys, public parks, gardens, and the adjacent internal courtyards. Internal courtyards can, in turn, generate a cool microclimate influencing the climactic performance of the buildings. The section below shows how the possible irrigation system could work, displaying a replicable idea for the local context.

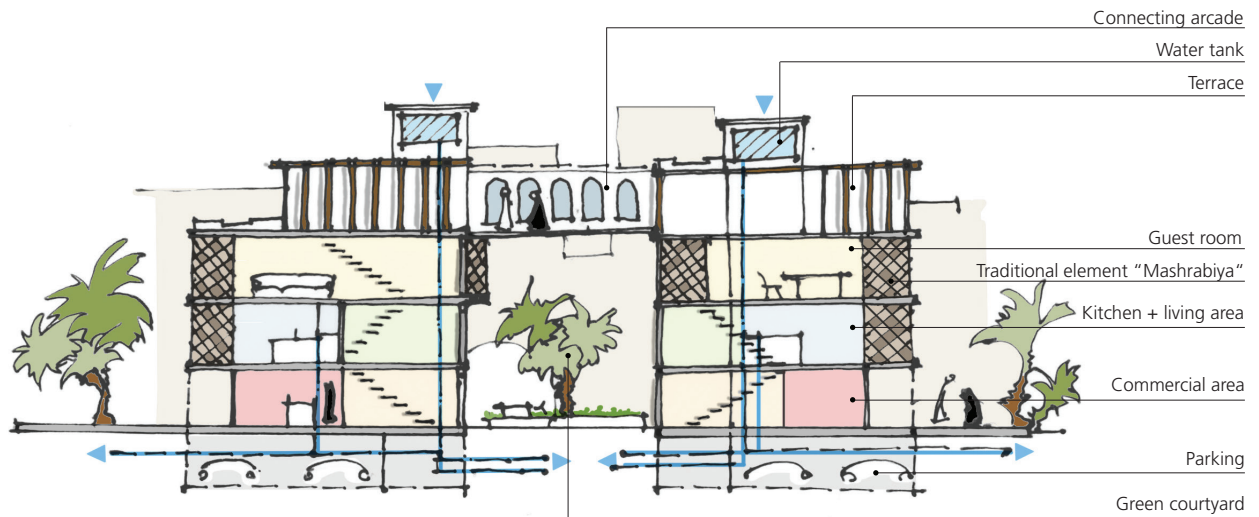


Fig. 24. Concept sketch of the irrigation system

### 4.3 Articulating Connectivity and Accessibility

#### 4.3.1 Transport movements

The demonstration project is designed to maximise non-motorized transport movements by creating a dense and well-connected network of pedestrian pathways, sidewalks, and alleys. At the same time, six vehicular transit road-links grant cars the possibility to cross the site, also leading to the underground parking system, sitting under the residential blocks, together with the water-tank system supporting irrigation. Each underground parking has direct access from the transit road-link or specially arranged roads. However, the organisation of the neighbourhood and the well-connected pedestrian system prevents the need to use cars within the neighbourhood.

According to the Buraidah Strategic Vision, the revised public transport system foresees three public transport stops in close proximity to the planned neighbourhood, making the city at large accessible for the neighbourhood through a local bus system. The demonstration project proposes, therefore, to have three bus stops (each one is 400 - 450 meters), along the main urban road on the southern edge of the site. The road on the northern edge of the site is planned to be a large avenue with commercial functions on the first floor of the adjacent buildings, and a variety of public spaces. This vibrant avenue will be one of the activity axes linking the site of the project to future new developments in the surrounding area.



Fig. 25. Transport movement

### 4.3.2 Pedestrian dynamics

The structure of neighbourhood streets is inspired by traditional Islamic patterns, with narrow pedestrian streets and green courtyards inside the residential blocks. The pre-existing natural environment preservation structured both the shape and directions of the green pedestrian paths. Besides the overall vehicular street hierarchy, the pedestrian network has its variety and hierarchy as well. As such, the demonstration project proposes three types of pedestrian routes:

#### 1. Main Pedestrian Avenues

These pedestrian spines, conceived as the two main spines of the neighbourhood, shape the main structure of the urban pattern. The pedestrian spines are 15 meters wide, vegetated, and surrounded by commercial functions, creating lively and articulated activity corridors by linking various public and green spaces, social facilities and mosques.

#### 2. Pedestrian Paths

These pedestrian paths, approximately 4-5 meters wide and populated with commercial activities (small shops, convenient stores, and daily services), connect residential blocks to each other. The proposed width was set to help create the shade necessary for protecting and incentivising pedestrian movements in harsh arid climates.

#### 3. Intra-block Pedestrian Walkways

These walkways have a width ranging from 2-4 meters. They have a semi-private character and lead into the internal courtyards, shared by the residents of the same residential block. Also in this case, the proposed width helps obtaining the necessary shade to protect and support pedestrian movements during the hottest hours of the day.



- Main pedestrian transit links
- Walking paths along the "green axes"
- Pedestrian links
- Intra block connections with courtyards

Fig. 26. Pedestrian movement

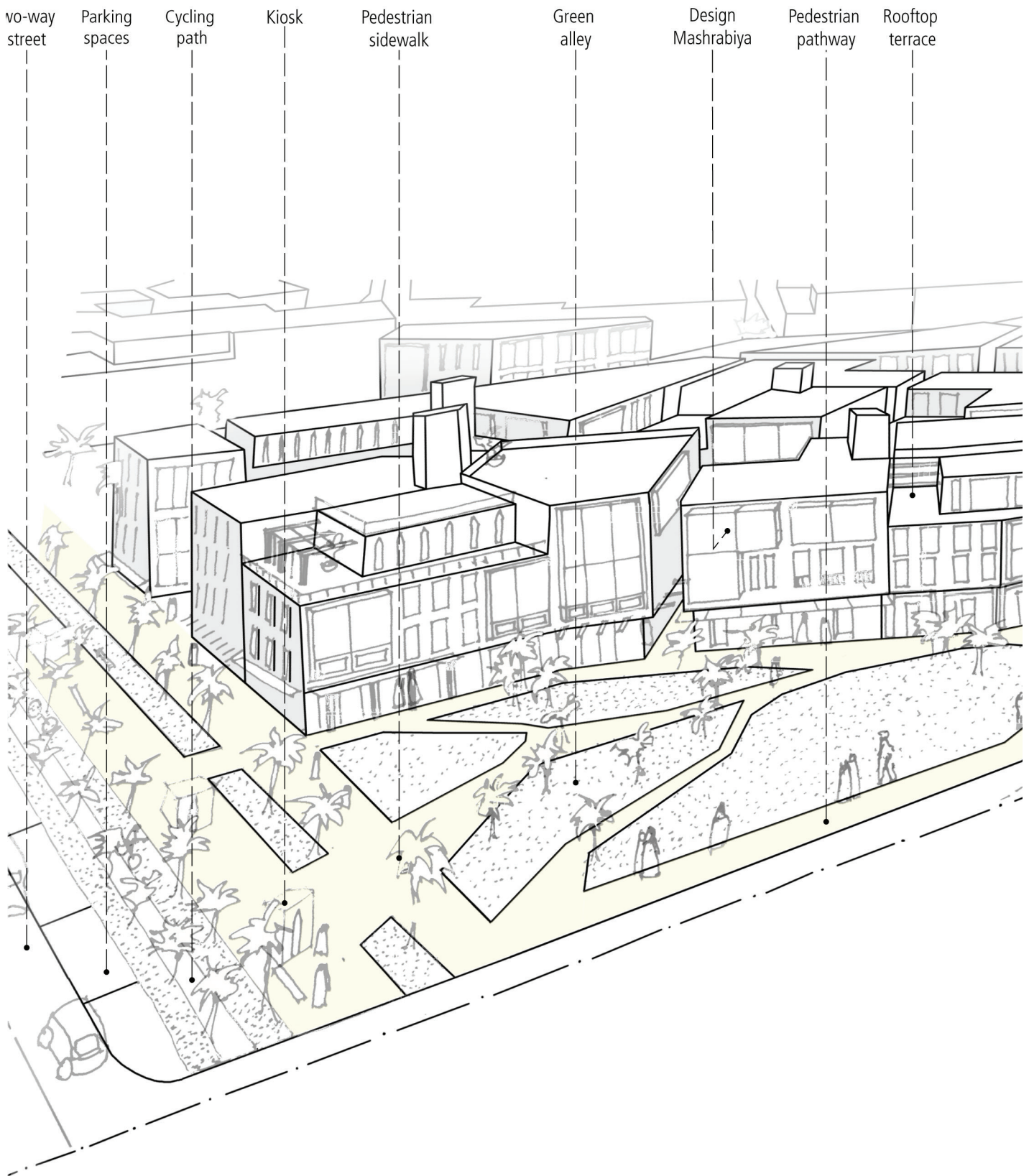


Fig. 27. Concept sketch along the green alley (Section 1)

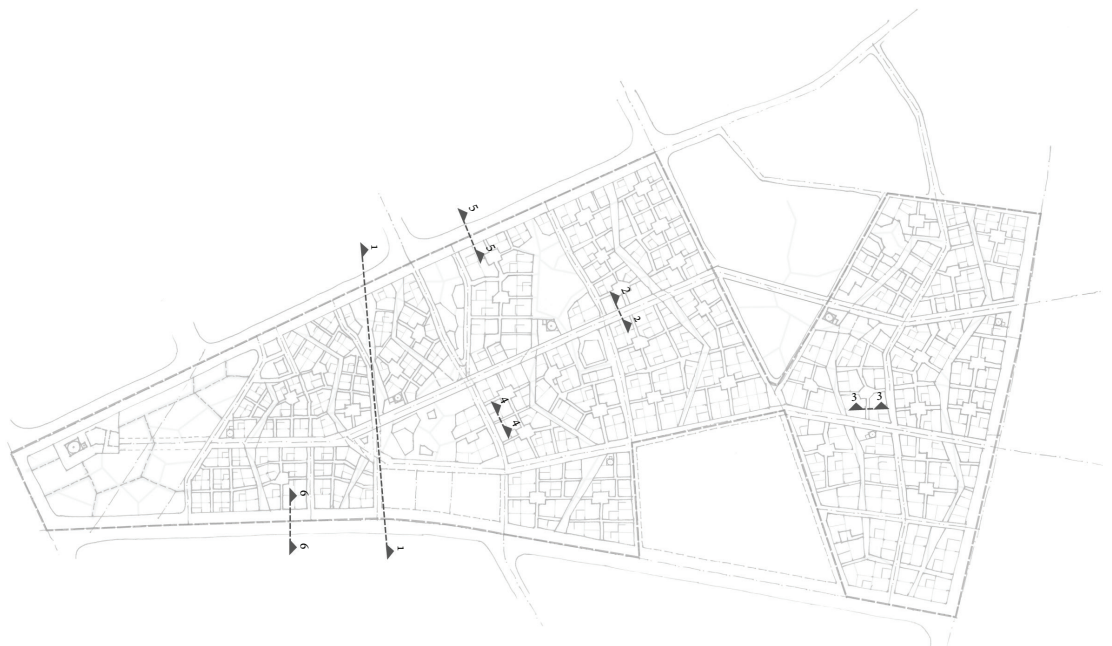
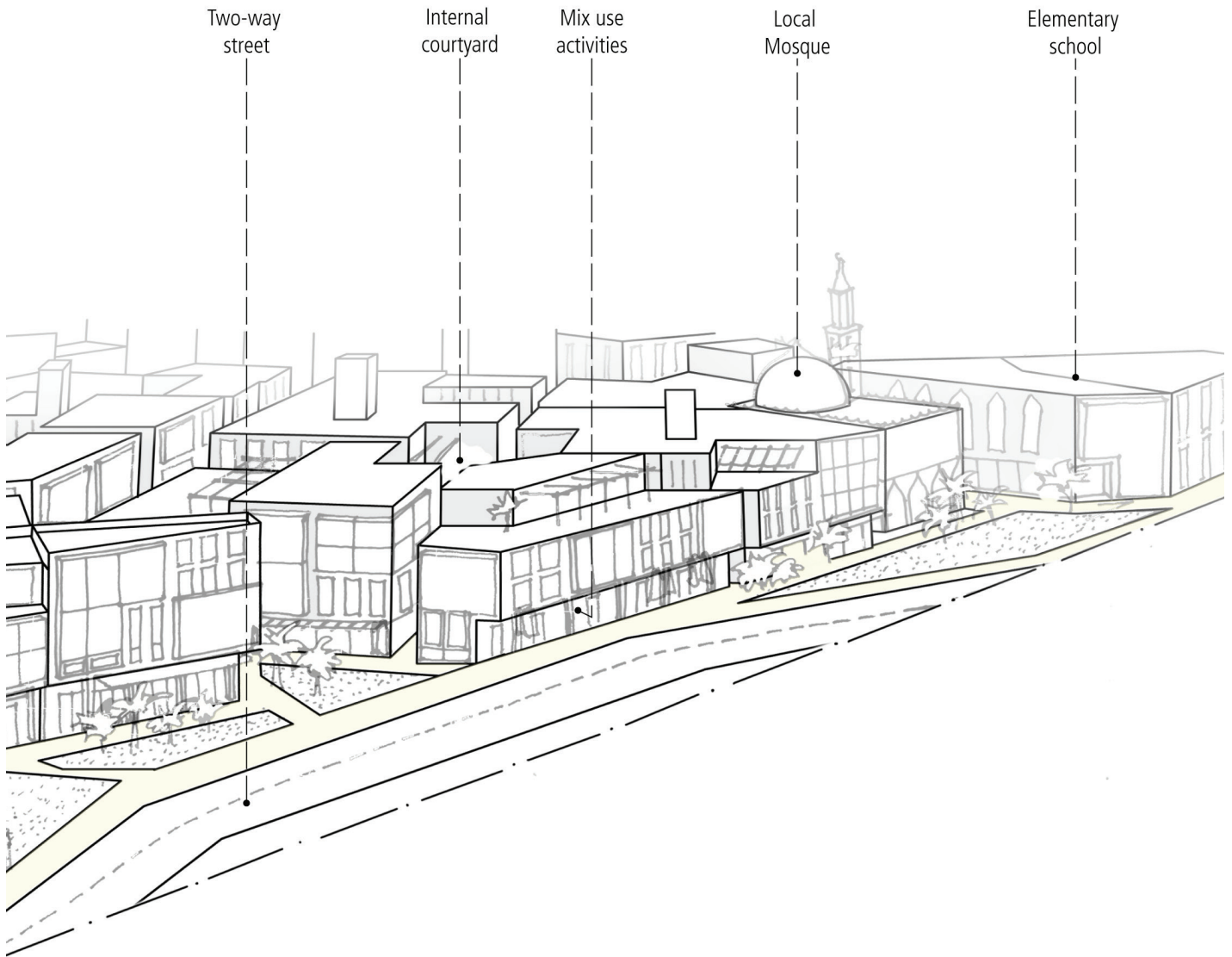


Fig. 28. Sections' key plan

### 4.3.3 Designing street networks for people

The majority of streets in Saudi Arabia are designed for cars, especially within the areas of new development. The emerging urban landscape is characterised by the imbalance between the increasing amount of highways and the limited quantity and quality of public spaces for people. Minimizing the auto-dependency by designing pedestrian-friendly urban streets, and promoting sustainable ways of transportation, can help cities that are coping with different challenges, such as poor climate change, reduced quality of life, economic inefficiency, unreasonable energy consumption, and spatial inequality.

In the overall street network organisation, the project shifts the parameters of designing urban streets from the rationale of structuring the optimum vehicle movement to the focus on human movement. As such, the new street network is considered to be a public space, dedicated to increasing the overall quality of life by integrating various functions and uses. The proposal provides extensive access to and through the neighbourhood, whereas the road network is supported by a variety of public spaces enhancing street livability and providing a vibrant and articulated streetscape, to be filled by diverse economic activities. This is exemplified via the following typical sections, for five variations of streets, showing how they accommodate pedestrian, vehicular, public transport, and cycling mobility, differently: 1. Pedestrian avenue; 2. Neighbourhood pedestrian pathway; 3. Intra-block pedestrian walkway; 4. Two-way Street; 5. Transit-oriented four-lane street, with public transport.

Section types 1, 4 and 5 showcase bidirectional cycle tracks, and in both sections 4 and 5, trees protect the cycle tracks (palms).

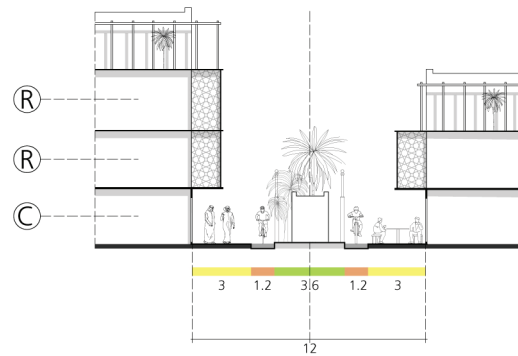
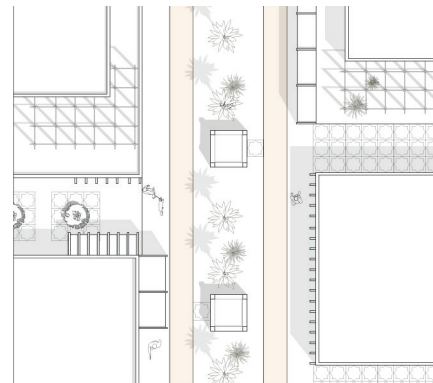


Fig. 29. Pedestrian boulevard (Section 2)

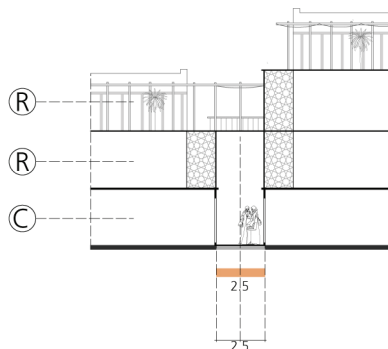
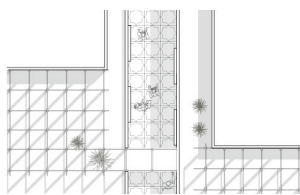


Fig. 30. Intra block pedestrian pathway (Section 3)

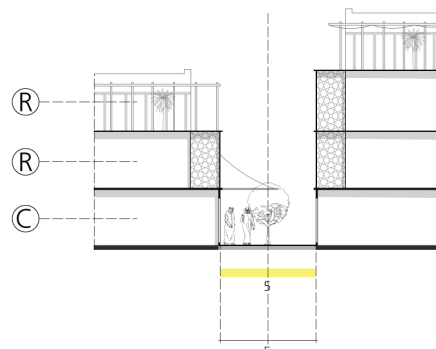
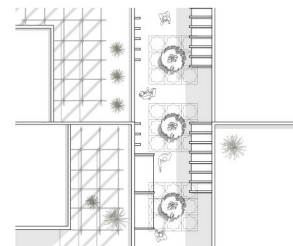


Fig. 31. Intra block pedestrian pathway (Section 4)

Proposed pedestrian sidewalks, with a width 4.5 m (section 4), can include kiosks and market stalls of different sizes. Kiosks can be aesthetically adapted to the traditional forms, including architectural elements characterised by Islamic patterns. Local shops and small commercial activities will activate the street and will provide more functions to support the adjacent public spaces. The vertical elements (trees, street lighting, etc.) are used to demarcate the public transport transitways (bus), clearly distinguishing it from the sidewalks/cycling paths. The recommended width of the parallel parking lane is 2.5 m. Parking places are generally concentrated underground and along the major transit roads, while the space within the residential neighbourhood is a car-free area.

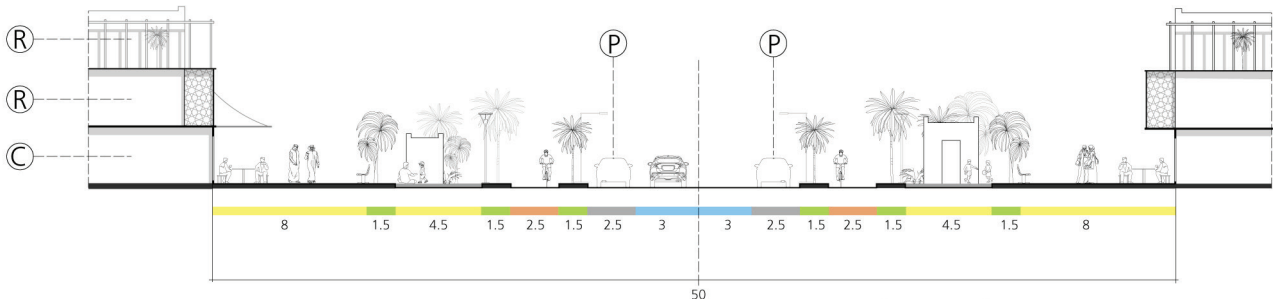
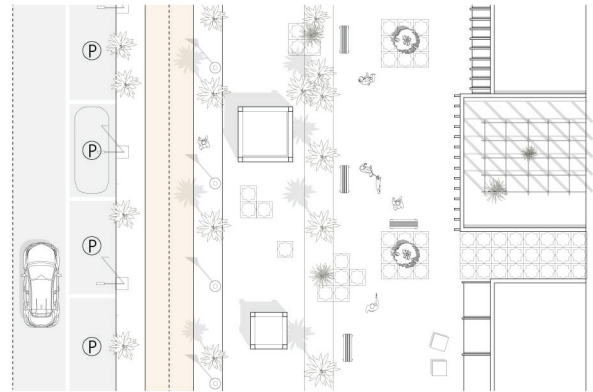
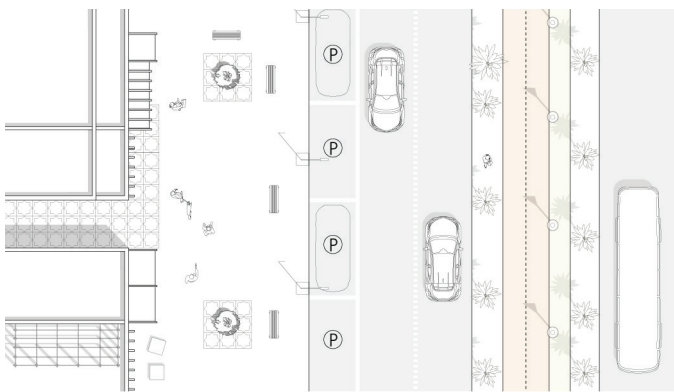


Fig. 32. Two-way vehicular street (Section 5)



Pedestrian avenues serve as public spaces with various activities; pathways are the main connectors that also host smaller-size shops, while walkways within the residential mega blocks are free from commercial activities and lead to the internal private courtyard. Green infrastructure overlays pedestrian routes to support a walkable city, and improve the quality of the urban landscape. Sidewalks, adjacent to the vehicle movements, have dimensions ranging from 8-11 meters, including an extensive interface between the buildings' front area and the street, which can also host vegetation and urban furniture, supporting activities like cafes, terraces, sandwich bars, etc. Planting provides necessary shade, also favouring a feeling of screening and enclosure from the street.

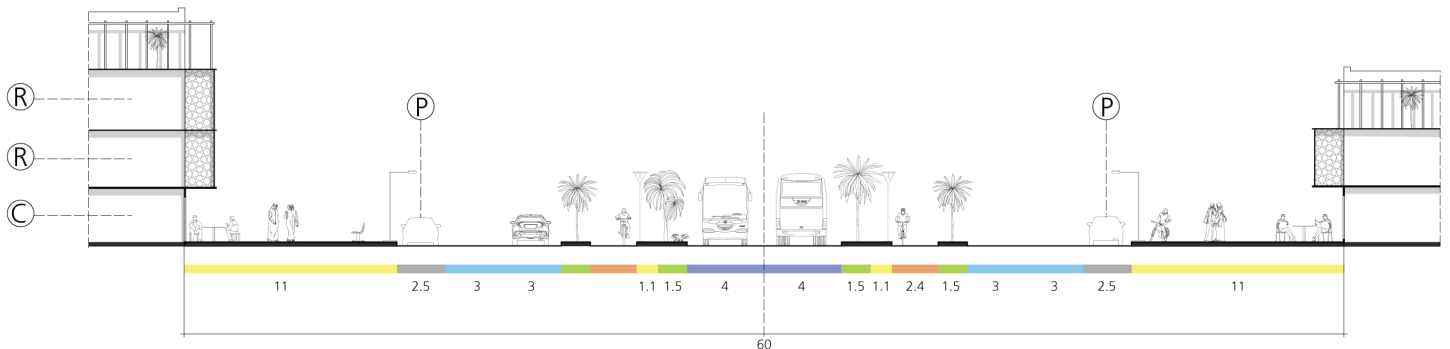
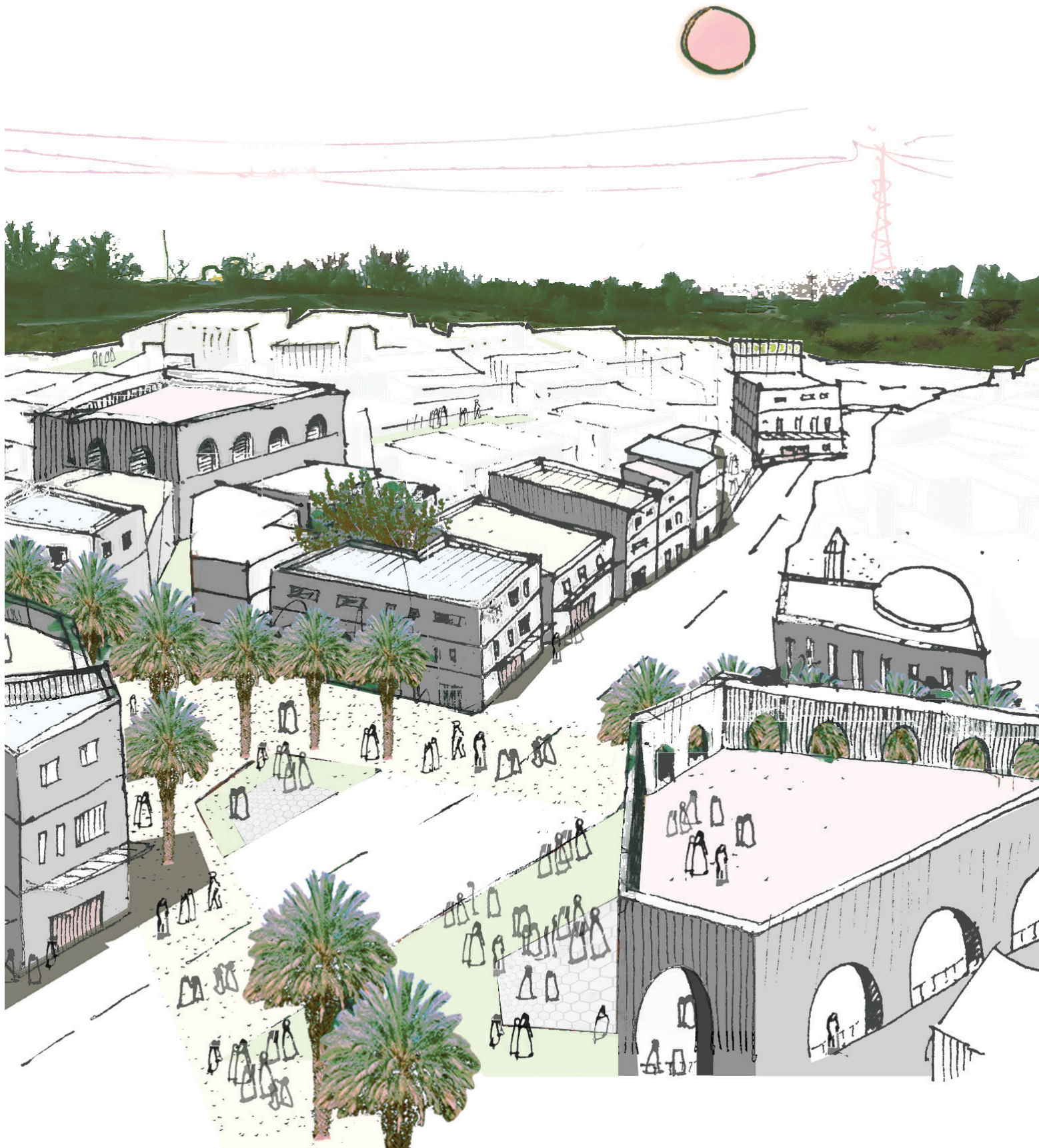


Fig. 33. Two-way vehicular street (Section 6)



Fig. 34. Concept sketch of the project







# 5

## LAND USE DISTRIBUTION



### 5.1 Housing Typologies

The residential variations within the project consist of two main families of housing typologies. The first family of housing typologies is the Villas with three sub-typologies, while the second targets Apartments with four sub-typologies. Mixed-use components and organisational parameters for interior space distribution are planned differently for the two families of typologies:

**Typology 1 - Villas:** Commercial functions are located along the perimeter of the residential block taking into consideration the local context. The internal vegetated courtyard is left entirely residential, to create more privacy.

**Typology 2 - Apartments:** Apartment blocks are proportionally distributed in the project. The majority of the blocks are located along the major pedestrian/transport links. The first levels of the blocks are fully dedicated to commercial/retail activities.

The Villas constitute the majority of the typologies, following traditional preferences of residents, with revisions to the typology adapting it to a denser urban environment.

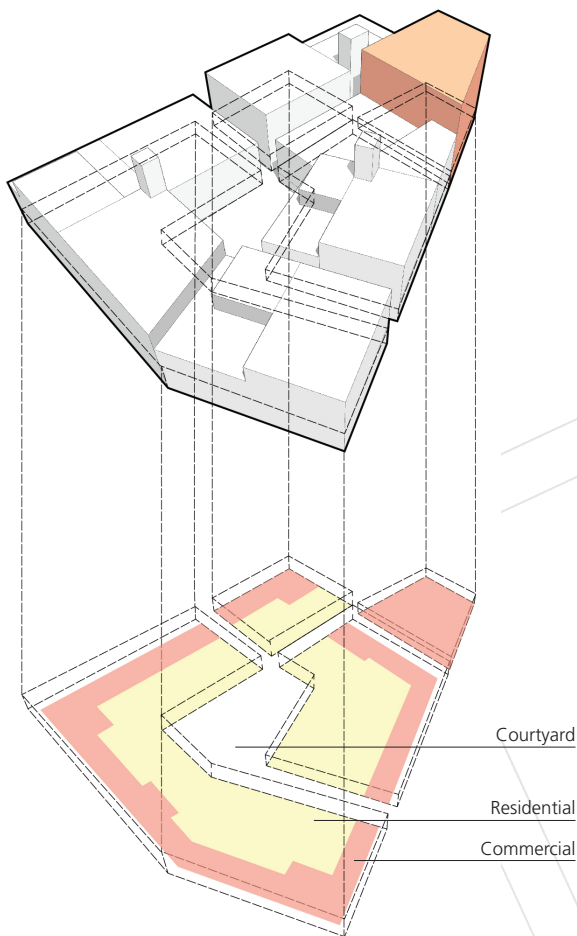
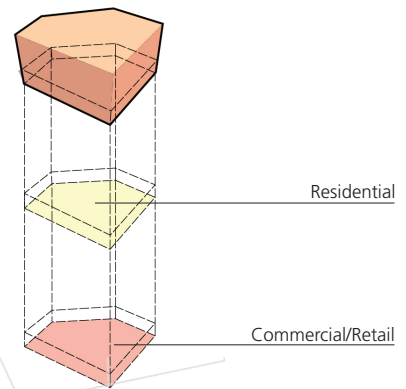


Fig. 35. Residential / commercial balance within the megablock (villas)



36. Residential / commercial balance within the apartment block



### 2.6.2 Zoning

**Residential:**

*1-72 Residential megablocks:*

- Villas "Large" (for 8 people)
- Villas "Medium" (for 5 people)
- Villas "Small" (for 3 people)
- Apartment blocks within megablocks with commercial 1<sup>st</sup> floor

*1-22 Apartment blocks:*

- Apartment blocks with commercial 1<sup>st</sup> floor
- Apartment blocks with retail on the 1<sup>st</sup> floor

**Religious infrastructure:**

- Mosque building
- Adjacent public space
- 1M Local Mosque
- 1FM Friday Mosque

**Green zones:**

- Parks and gardens
- Green alleys
- Wetland park

**Infrastructure:**

- Road network
- Pedestrian paths
- Pedestrian avenues

**Social and public facilities:**

- School/kindergarten building
- Adjacent public space
- Health care building
- Adjacent public space
- Police building
- Adjacent public space
- Library building
- Adjacent public space
- 1S School
- 1K Kindergarten
- 1H Primary healthcare
- 1P Police station
- 1L Library
- 1HT Hotel

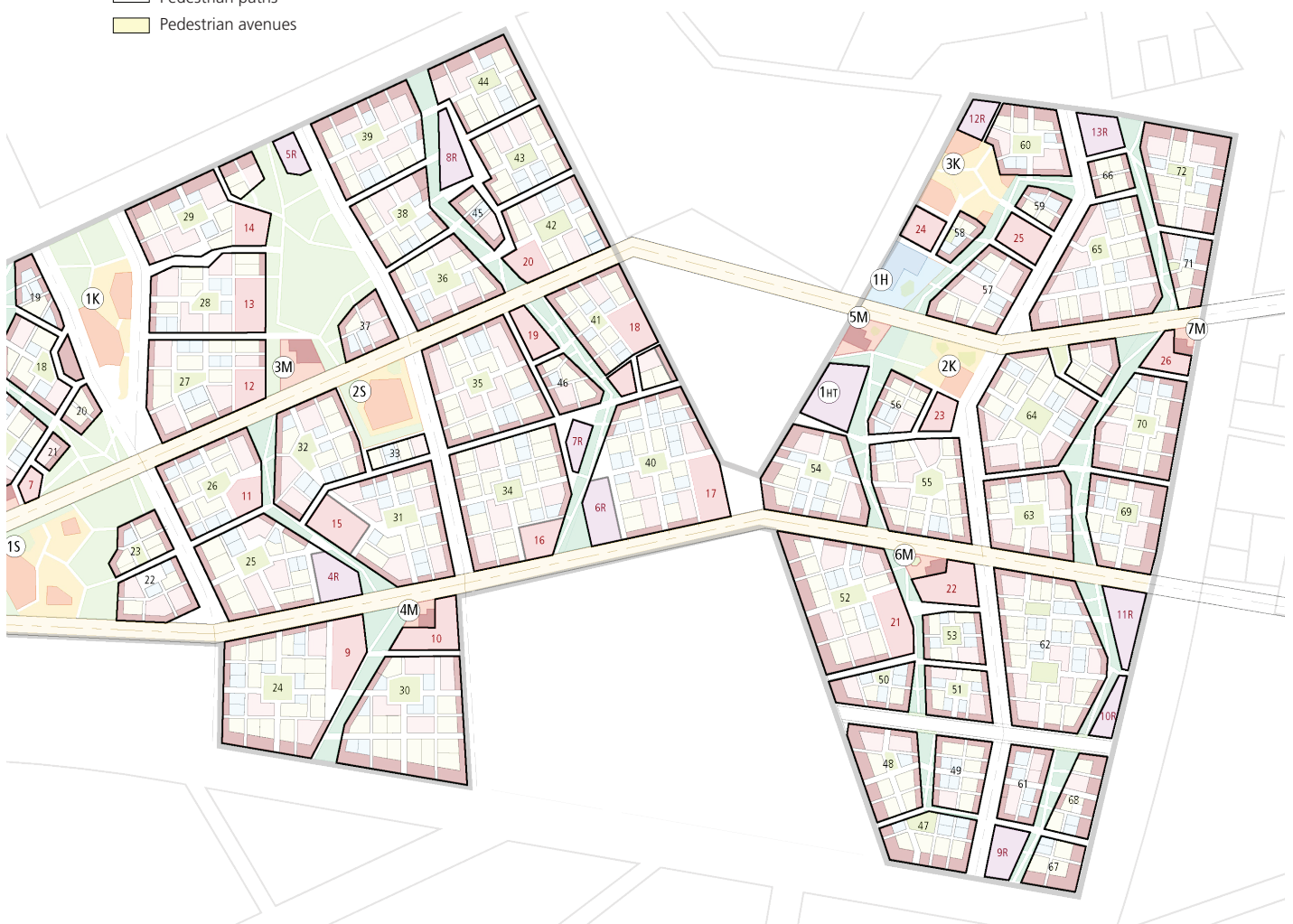


Fig. 36. Functional zoning

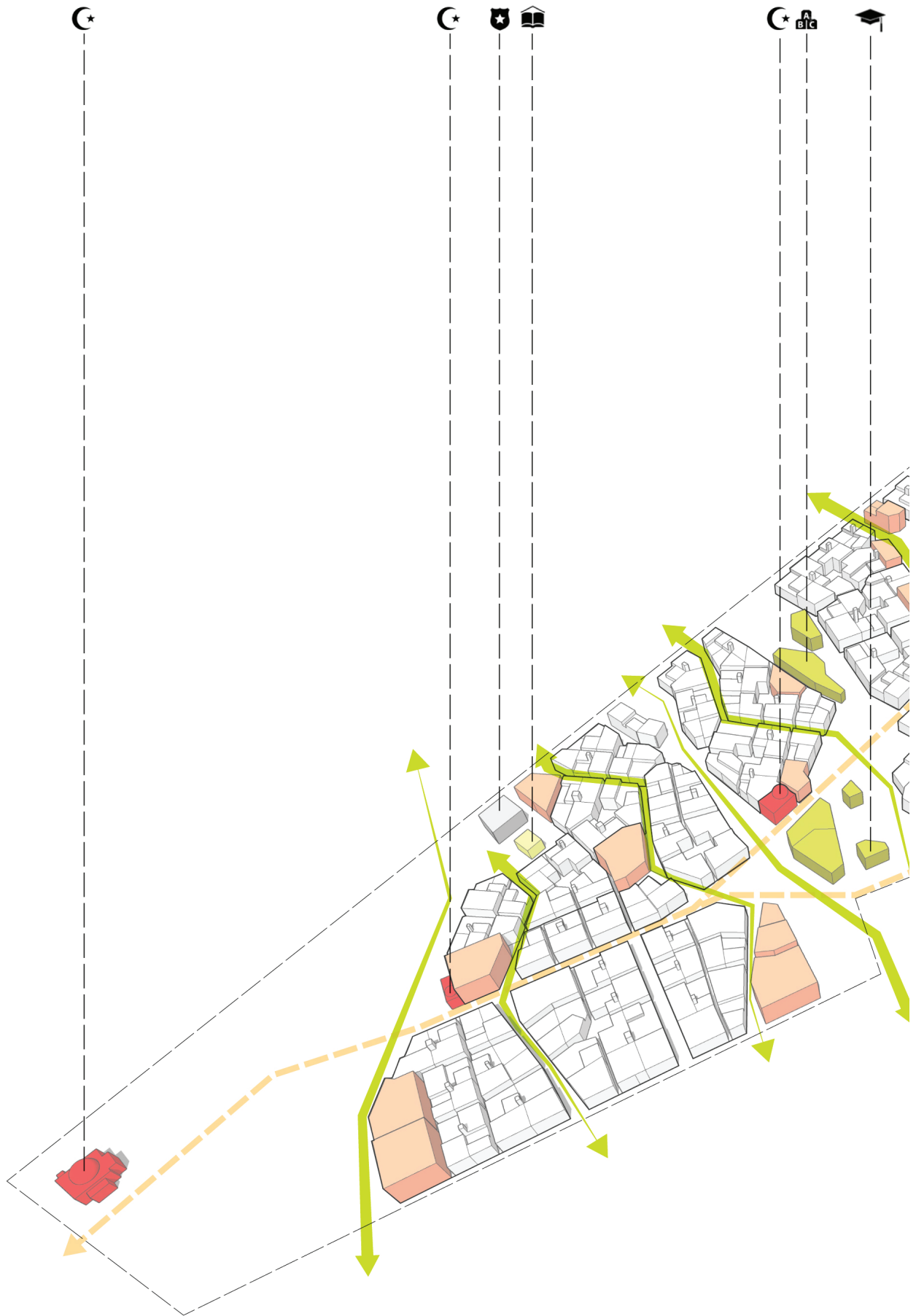
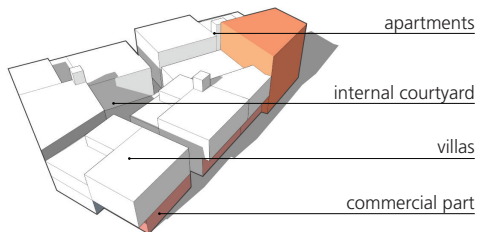
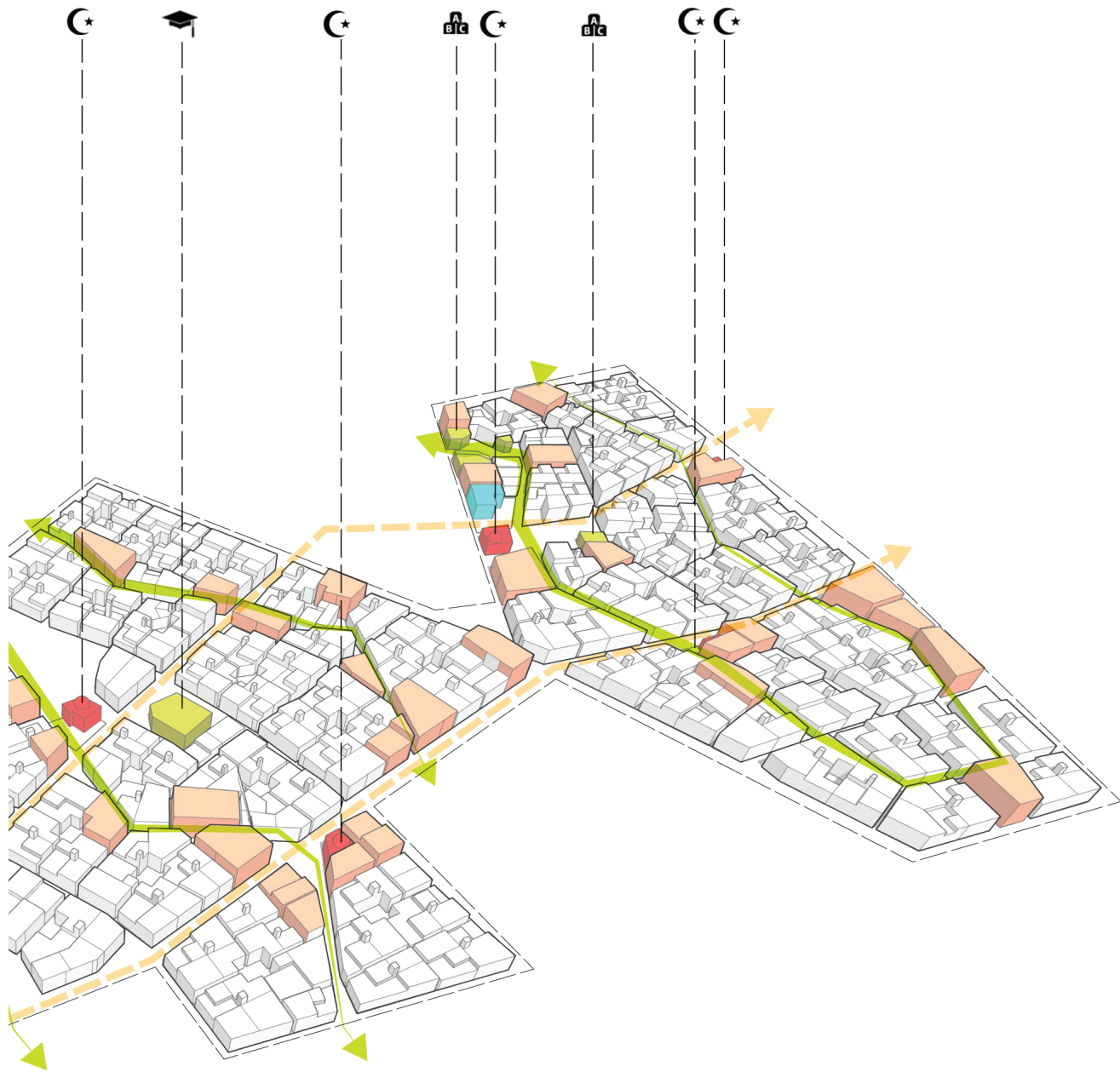
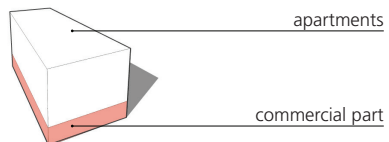


Fig. 37. Public facilities distribution

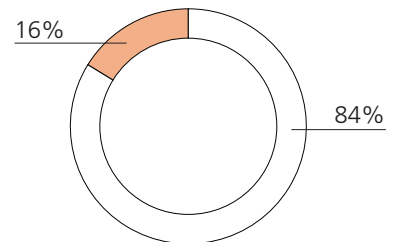


Number of megablocks: 74  
 Total number of villas: 787  
 Total population: 3843  
 Footprint: 78390 m<sup>2</sup>  
 Average number of storeys: 3,5  
 (including 1<sup>st</sup> floor of commercial services)



Number of apartment blocks: 26  
 Total number of apartments: 392  
 Total population: 1862  
 Footprint: 15183 m<sup>2</sup>  
 Average number of storeys: 4,5  
 (including 1<sup>st</sup> floor of commercial services)

*Distribution of housing typologies within the project area (footprint):*



■ Apartments □ Villas

## 5.2 Managing Residential/Commercial Land Uses

The project explores how the Saudi concept of villas can be transformed into a typology that follows UN-Habitat's recommended density levels, responding to the general need for densification, without disregarding cultural preferences. This design decision aims at introducing a model for mixed-use urban fabric in residential areas, which is not generally well accepted in the Saudi society.

Three types of Villas exist in the project:

- Large Villas (footprint of 200m<sup>2</sup>), for large families of 8 people;
- Medium-sized Villas (100m<sup>2</sup>), for families of 4-5 people; and
- Small Villas for families of 3 people.

Each is designed according to the different preferences, needs, and lifestyles of Buraidah residents. Over time, different units belonging to related or enlarged families, can be connected by arcades leading from the living room of one villa to the opened terrace of another.

The interior space of the villas is distributed to create comfortable private zones for women and convenient, and more public spaces for men. The diagram shows how villas carefully separate spaces in line with Saudi tradition: circulation space with kitchen and compact living room on the first floor, bedrooms and family space on the second, and a restroom with a terrace leading to the roof on the third. Having the circulation area within the house (a separate corridor with the stairway), allows women to have more privacy, and for men to get access directly to the family space or large living room on the third floor (space for guests, gatherings, etc.). The entire space of the villa is divided between a private area (with a living room for family and bedrooms) and a more public zone, (a terrace with restroom/leisure area). The restroom and the terrace can be accessed directly through the circulation area, which can be closed by the special folding screen, to create more privacy for the residents of the house.

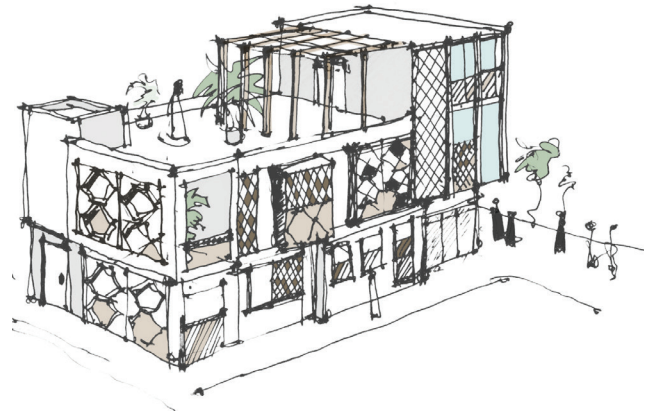


Fig. 38. Example of the "medium" villa

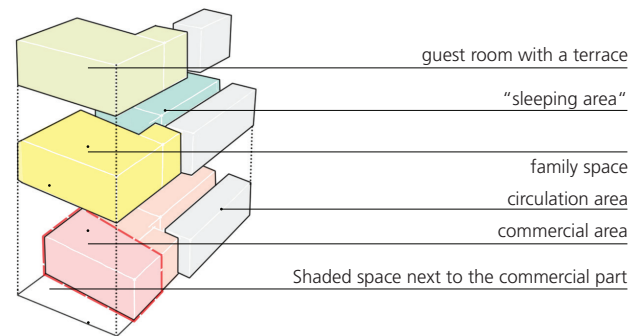


Fig. 39. Distribution of the space within the villa

Distribution of the villas within the project:

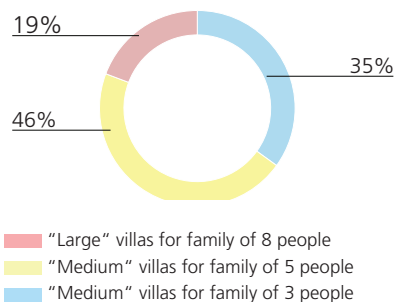


Fig. 40. Distribution of the villas within the project





Fig. 41. Detailed plan of the proposed megablock

Section

1<sup>st</sup> floor

**Type "Small" house**

For family of 3 people  
 Footprint: 65m<sup>2</sup> (Residential part)  
 Built-up area: 162.5m<sup>2</sup>

①



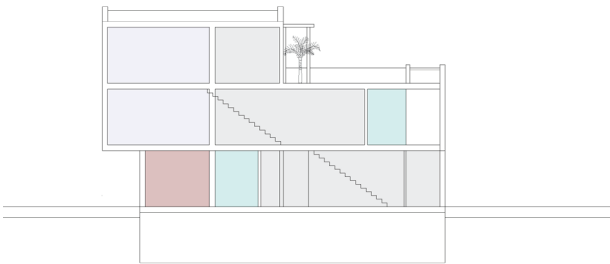
- 1. Corridor - 5.8m<sup>2</sup>
- 2. Kitchen - 9.4m<sup>2</sup>
- 3. Dining area - 20.7m<sup>2</sup>
- 4. Closet - 3.3m<sup>2</sup>
- 5. WC - 2.4 m<sup>2</sup>



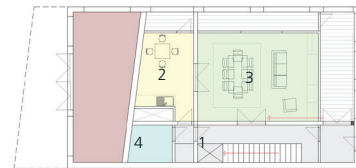
**Type "Medium" house**

For family of 5 people  
 Footprint: 100m<sup>2</sup> (Residential part)  
 Built-up area: 250m<sup>2</sup>

②



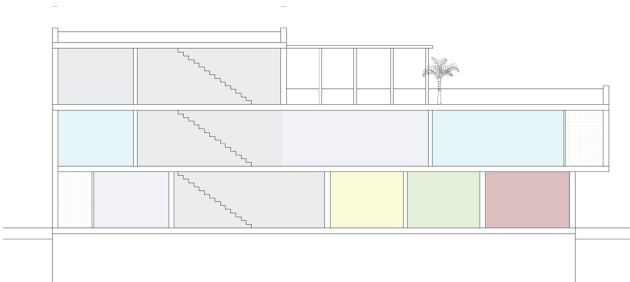
- 1. Corridor - 17m<sup>2</sup>
- 2. Kitchen - 12.1m<sup>2</sup>
- 3. Dining area - 30.5m<sup>2</sup>
- 4. WC - 4.5 m<sup>2</sup>



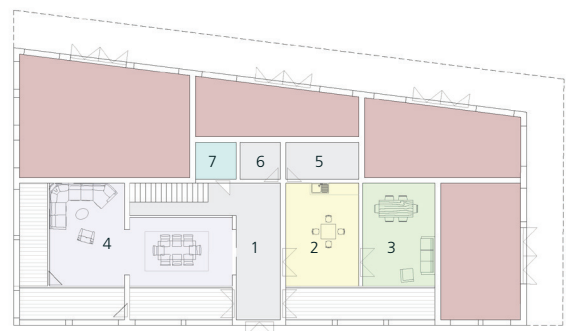
**Type "Large" house**

For family of 8 people  
 Footprint: 200m<sup>2</sup> (Residential part)  
 Built-up area: 500m<sup>2</sup>

③



- 1. Corridor - 22.6m<sup>2</sup>
- 2. Kitchen - 21.5m<sup>2</sup>
- 3. Dining area - 21.3m<sup>2</sup>
- 4. Living room - 42 m<sup>2</sup>
- 5. Closet - 7m<sup>2</sup>
- 6. Elevator - 4m<sup>2</sup>
- 7. WC - 4.3m<sup>2</sup>



commercial space    kitchen    guest room/ family space  
 circulation area    dining area    wc /bathroom

bedroom  
 terrace / mashrabiya

Fig. 42. Housing typologies (villas)

2<sup>nd</sup> floor

- 1. Corridor - 11.8m<sup>2</sup>
- 2. Living area - 26.5m<sup>2</sup>
- 3. Bedroom - 19.8m<sup>2</sup>
- 4. Bedroom - 10.1m<sup>2</sup>
- 5. WC - 4.3 m<sup>2</sup>

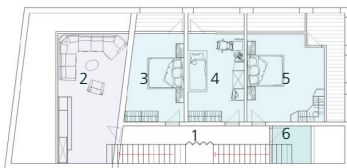


3<sup>rd</sup> floor

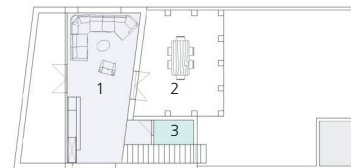
- 1. Restroom - 19.7m<sup>2</sup>
- 2. Terrace - 19.3m<sup>2</sup>
- 3. WC - 2.2m<sup>2</sup>



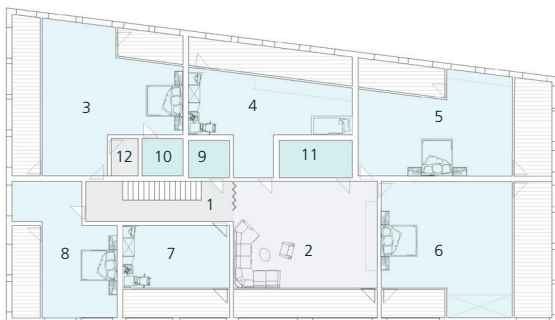
- 1. Corridor - 17m<sup>2</sup>
- 2. Kitchen - 12.1m<sup>2</sup>
- 3. Dining area - 30.5m<sup>2</sup>
- 4. WC - 4.5 m<sup>2</sup>



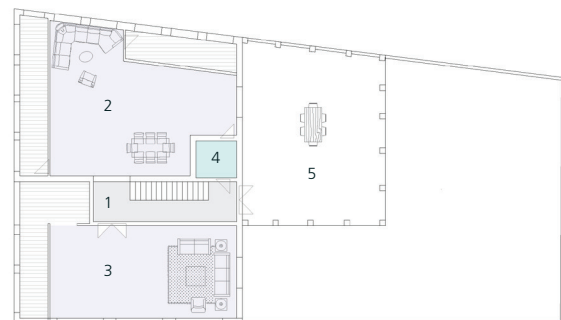
- 1. Restroom - 29.2m<sup>2</sup>
- 2. Terrace - 25.7m<sup>2</sup>
- 3. WC - 2.8m<sup>2</sup>



- 1. Corridor - 12.5m<sup>2</sup>
- 2. Living room - 43.6m<sup>2</sup>
- 3. Bedroom - 44.8m<sup>2</sup>
- 4. Bedroom - 32.7m<sup>2</sup>
- 5. Bedroom - 39.7m<sup>2</sup>
- 6. Bedroom - 45.4m<sup>2</sup>
- 7. Bedroom - 19m<sup>2</sup>
- 8. Bedroom - 28.1m<sup>2</sup>
- 9. Elevator - 4m<sup>2</sup>
- 10. WC - 4.3m<sup>2</sup>
- 11. WC - 7.8 m<sup>2</sup>
- 12. Closet - 2.8m<sup>2</sup>



- 1. Corridor - 12.3m<sup>2</sup>
- 2. Restroom - 60 m<sup>2</sup>
- 3. Restroom - 49m<sup>2</sup>
- 4. Elevator - 4m<sup>2</sup>
- 5. Terrace - 65m<sup>2</sup>



### 5.3 Comparison with Existing Neighbourhood Development Models in Buraidah

The Saudi oil boom and subsequent rapid urbanisation have profoundly impacted the modes of development, bringing radical changes to traditional urban patterns, living trends, and habits. Part of the contextual analysis for the demonstration project is based on the observation and comparison of two different case studies in Buraidah, with the purpose of further comparing them with the demonstration project. As such, a neighbourhood in the central and older part of Buraidah, with its traditional urban pattern, was the initial case study for the demonstration project, while the other case study was a low-density, new development extension. Both patterns (modern and traditional) are based on the same kind of zoning, (entirely residential neighbourhoods) with some mixed-use functions along the perimeter facing the main roads. However, the new development contradicts some of the sustainability principles, especially concerning lack of comfortable public spaces, a dominance of vehicular movements over human comfort, and a lack of diffused mixed-use environment. Instead, the central neighbourhood presents a more efficient use of land, better access to facilities, and an overall more compact and human-scale fabric, although facing the need for more and better connected public spaces.

#### 5.3.1 Central neighbourhood

The aerial photo (Figure 43), shows the central part of Buraidah, and demonstrates it as high-density and organised with a sort of vernacular urban pattern, typical of Islamic cities. Though the kind of zoning for both the traditional and the new neighbourhood is similar, the central neighbourhood presents a more vibrant urban structure due to the scale of blocks and roads. A mixed-use environment is concentrated along the main streets, leaving the more internal residential areas with fewer social, and commercial facilities. The urban pattern is composed of several different housing typologies: mostly freestanding units (villas), and a few apartment blocks. Public spaces are scattered within the neighbourhood and have appropriate dimensions for developing comfortable pocket parks, although they lack connectivity amongst them, and the majority of them is currently being used as a parking space.

#### 5.3.2 New development extension

Urban sprawl in Buraidah is characterised by the emergence of low and medium density neighbourhoods, like the one depicted in Figure 44, especially in the western city extension. Often referring to Doxiadis schemes, who developed urban design strategies, and guidelines for managing urban growth and change within the master plan for Riyadh, (undertaken between 1968 and 1972), new neighbourhood development schemes are based on modernistic, rational approaches, and are not particularly suitable for the context either climatically, socially, or culturally. These new areas have increasingly defined an urban pattern typified by the same layout, replicated over and over. A typical new develop-

ment neighbourhood applies the rigid Doxiadis' urban structure framework, with a high concentration of wide vehicular roads, regular geometry, and over-dimensioned public space at the centre. Though the neighbourhoods seem to showcase an efficient street hierarchy, a closer look at the urban structure highlights a lack of diffused public space and a mixed-use environment within walking distance, as the blocks are 500 x 600 meters in average. Generally, commercial functions surround the external perimeter of the neighbourhood, leaving the internal area purely for residential purpose.



Fig. 43. Central area



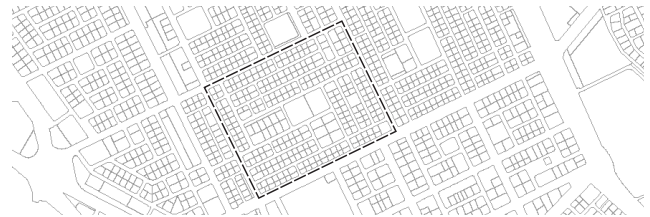
Fig. 44. New Development

75 0 75 150 225 300 m

### 5.3.3 Density benchmark analysis

The demonstration project attempts to combine some aspects of the two neighbourhoods, bringing together the concepts of high-density and vibrant mixed-use neighbourhood with a traditional spatial organisation, and to adapt UN-Habitat's five principles (UN-Habitat, 2014) to something comfortable and familiar to the local context. While utilising the same land extension devoted to the new development under examination, the demonstration project refers to a traditional urban structure to create a vibrant urban environment, re-framing elements pertaining to traditional urban patterns into modern ones. In addition, the comparison represented in the graphics below shows how the land use distribution, the residential, and the commercial density, as well as the number of public services and facilities, are consistently higher in the demonstration project, notwithstanding the higher quantity of open public and green spaces.

1. New development  
Area: 18 ha, Population: around 1350 (270 units x 5 people)



2. Demonstration project  
Area: 18 ha, Population: around 2700



Fig. 45. Location of the selected sites

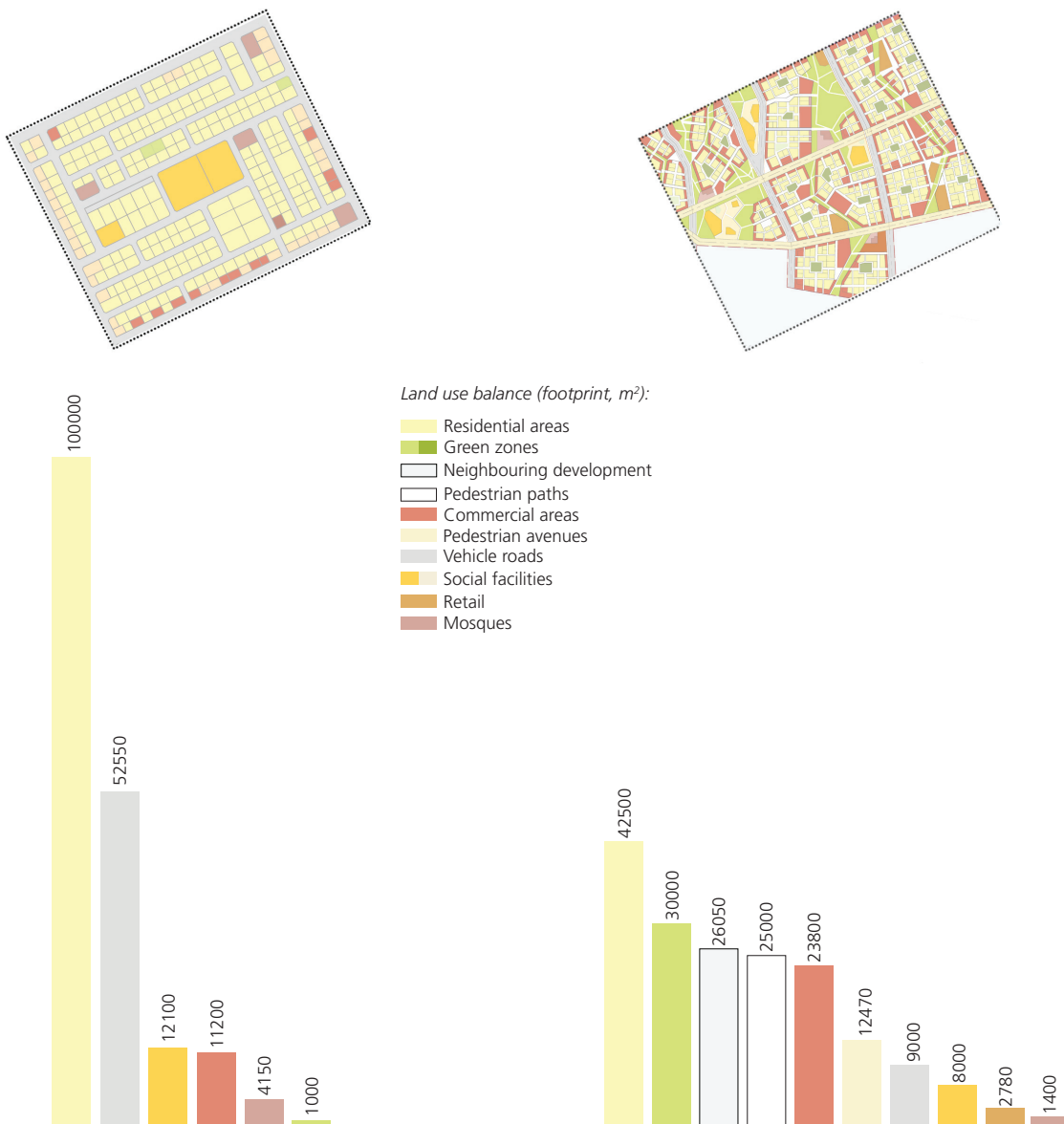


Fig. 46. Benchmark analysis



# 6

## FINANCIAL FEASIBILITY ANALYSIS



## 6.1 Introduction

The demonstration project developed by UN-Habitat proposes new mixed-use land developments in Buraidah based on international planning and design principles for sustainable urbanization. The analysis that follows examines the economic and financial feasibility of UN-Habitat’s proposal. This chapter tests the viability of the demonstration project scenarios by simulating the various scenarios under different sets of assumptions and cost-recovery options that focus on alternative funding sources and private sector engagement through public-private partnerships (PPPs).<sup>1</sup>

PPPs are defined as “long-term contracts between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility”.<sup>2</sup> In order for PPPs to be successful, local government must be able to authorize and enforce such contracts and the proposed project must offer a solid risk-adjusted return.<sup>3</sup> Private sector returns in PPPs may take a number of different forms such as revenue collected through betterment levies and user fees.

The analysis below emphasizes the importance of exploring different financing options suited to the demonstration project’s design specifics and urban context.<sup>4</sup> By integrating and synchronizing the various planning and financial components, Buraidah’s municipal government will be in a better position to maximize the benefits of sustainable urbanization and own-source revenue mobilization.

## 6.2 Methodology

While the cost-recovery target population for the demonstration project is largely comprised of residents, the local demand for commercial and leisure activities are also included. The cost recovery strategy deployed is largely a factor of the target population as shown in Figure 47. Strategies oriented around retail, business, recreation, and services are better suited to the resident population. The private returns to investment calculated in this analysis make use of the aggregate definition of the resident population, which includes both permanent and transient residents. Population estimates, provided by UN-Habitat, are used to estimate the permanent population in order to provide a more detailed disaggregated analysis of the resident population and consumer population.

The first evaluation (Figure 48) provides a market estimate that provides a foundation for the financial analysis and project capacity, specifically revenue generation potential from betterment levies, parking fees, and property taxes. Figure 48 also provides a summary of the

assumptions included in the analysis, focusing on three main points: land, business landscape, and infrastructure capacity.

The feasibility analysis provided below highlights three main land use categories: residential, retail, business. Furthermore, the proposed scenarios follow a timeline based on the various project finance components. Consequently, the project simulations include project phases based on the expected lifetime of each project asset.

	Target markets	Recommendations
<b>RESIDENTIAL</b>	Local market: households, individuals and business corporates  International Markets: short-stay business visitors	Differentiate residential options, services and facilities offered in order to attract different market segments
<b>OFFICE</b>	Primary demand: private companies  Secondary demand: government entities	Offer Grade A buildings along with complementary services and facilities
<b>RETAIL</b>	Primary demand: residents, office tenants, visitors  Secondary demand: neighboring office buildings, visitors in the vicinity	Highly visible and accessible retail area with internationally recognized brands

Source: United Nations Human Settlements Programme, Nairobi (2018).

Fig. 47. Target market and recommendations



<b>Assumptions &amp; Benchmarks</b>	
<b>Total built area (m<sup>2</sup>)</b>	<b>508,404</b>
<i>Residential</i>	
Residential built urban area (m <sup>2</sup> )	249,118
Residential share of total built urban area	49%
Number of residential units (villas, apartments)	1,179
Number of residential parking lots	5,900
<i>Office</i>	
Office built urban area (m <sup>2</sup> )	25,187
Office share of built urban area	5%
Office unit size (m <sup>2</sup> )	90
Number of office units	280
<i>Commercial</i>	
Commercial built urban area (m <sup>2</sup> )	57,490
Retail share of total built urban area	11%
Retail unit size (m <sup>2</sup> )	160
Number of retail units	359
Employee capacity (100%)	4,185
Employee capacity (70%)	2,930
Number of parking lots (transient population)	310
<i>Public infrastructure</i>	
Road network (m <sup>2</sup> )	84,246
Pedestrian corridor	23,569
<i>Social facilities</i>	
Social facilities built urban area (m <sup>2</sup> )	9,538
<i>Religious facilities</i>	
Religious facilities built urban area (m <sup>2</sup> )	2,042
<i>Public green space</i>	
Total area (m <sup>2</sup> )	56,010
<i>Warehouse</i>	
Total Built area (m <sup>2</sup> )	5,100

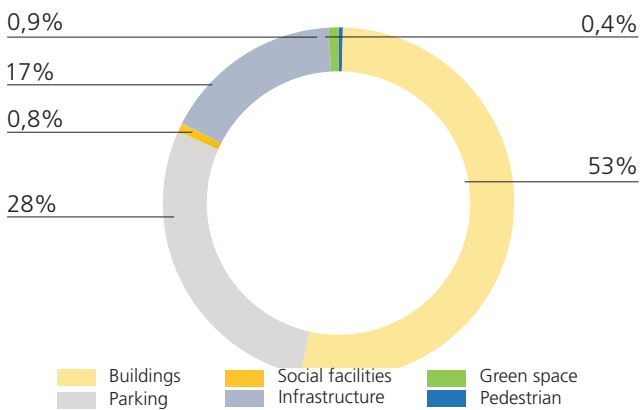
Source: United Nations Human Settlements Programme, Nairobi (2018).

Fig. 48. Demonstration project baseline assumptions

### 6.3 Capital Investment, Maintenance, and Operation Costs

Capital investment, maintenance, and operation costs are provided in the section that follows. The estimations are based on preliminary data, and should, therefore, serve as a rough estimate of the demonstration project's infrastructure costs.<sup>5</sup>

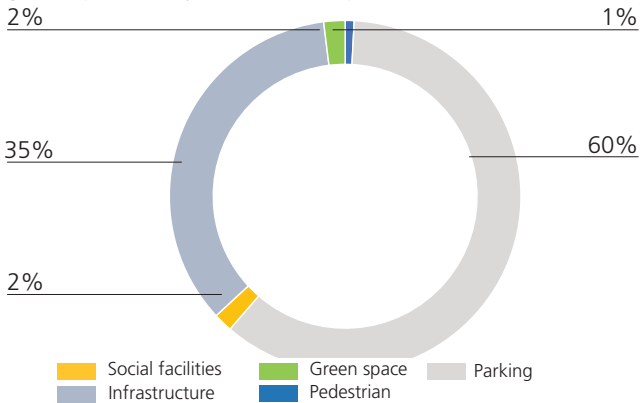
Preliminary analysis estimates total investment at approximately SAR 1.8 billion. This includes (1) construction of buildings (53 percent), (2) parking facilities (28 percent), (3) infrastructure (16 percent), and (4) public green spaces, social facilities, and pedestrian corridors (1 percent) (Figure 49).



Sources: Colliers International. (2015). Saudi Arabia Construction Cost Benchmarking and Forecasting; UNECE. (2014). Estimating and benchmarking transport infrastructure; UNECE. Workshop on good practices and new tools for financing transport infrastructure. 2nd Session benchmarking of transport infrastructure construction costs.

Fig. 49. Capital costs breakdown (percent)

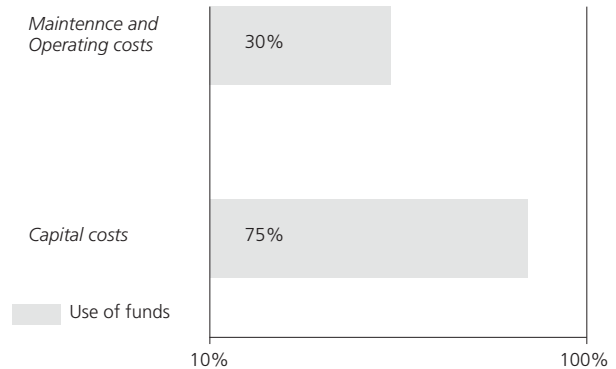
The annual maintenance costs for each type of infrastructure was calculated based on an estimation of the Amanah's current maintenance costs.<sup>6</sup> While maintenance costs are affected by a variety of factors (e.g. type of infrastructure, depreciation, etc.), the evaluation provided in this chapter gives a preliminary estimate of expected maintenance costs.



Sources: Al-Qassim Amanah Budget. (2014 – 2015). ECORYS Transport. (2005). Infrastructure expenditures and costs, practical guidelines to calculate total infrastructure costs for five modes of transport. Client: European Commission – DG TREN. UNECE. (2014). Estimating and benchmarking transport infrastructure. UNECE. Workshop on good practices and new tools for financing transport infrastructure. 2nd Session benchmarking of transport infrastructure construction costs.

Fig. 50. Demonstration project maintenance costs

The annual maintenance cost is approximately SAR 43 million. Buildings comprise approximately 10 percent of the initial infrastructure project costs, while 35 percent is allocated to roads and public utilities, and over 40 percent for parking. Over a fifteen year period, the project's budget would be primarily spent on capital expenditures (70 percent) and, to a lesser degree, maintenance costs (30 percent).<sup>7</sup>



Sources: Al-Qassim Amanah Budget. (2014 – 2015). ECORYS Transport. (2005). Infrastructure expenditures and costs, practical guidelines to calculate total infrastructure costs for five modes of transport. Client: European Commission – DG TREN. UNECE. (2014). Estimating and benchmarking transport infrastructure. UNECE. Workshop on good practices and new tools for financing transport infrastructure. 2nd Session benchmarking of transport infrastructure construction costs.

Fig. 51. Financial planning for 15 years

This preliminary figure stresses the importance of exploring different financial tools and partnerships between the public and private sector in the design, implementation, and management of complex projects in which multiple assets are developed simultaneously.

### 6.4 Private and Public Sector Finance

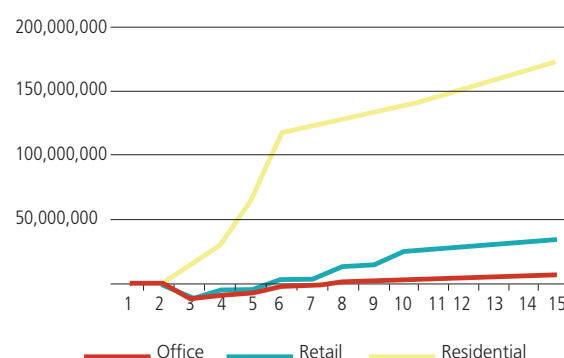
One of the central assumptions of the demonstration project simulation is that the private sector assumes partial responsibility of the project financing, including construction of buildings, public green spaces, and a pedestrian corridor. The public sector, meanwhile, is responsible for providing the land where the developments will occur.

The preliminary evaluation estimates capital costs for the private sector at approximately SAR 1 billion, of which a large share would be allocated to construction of residential areas (1,179 units including villas and apartments), commercial developments (359 units with an average size 160 m<sup>2</sup>), and business developments (280 units, average size 90 m<sup>2</sup>).

The project benefits and long-run financial feasibility are based on revenue generation estimates from residential, commercial, and business properties. The financial feasibility of the demonstration project is calculated based on international and local data (Figure 54) on rent for the three types of land use mentioned.<sup>8</sup> Figure 54 shows the baseline assumptions used to estimate the economic returns for residential, commercial, and business land use. Figure 52 shows an overall positive trend in projected revenue over the project's fifteen year timeline.

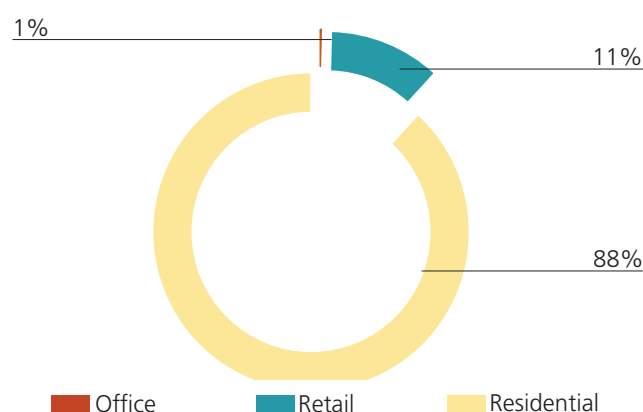
The core business is related to residential activities, followed by commercial and office activities. Each core business generates an internal rate of return between 16 and 18 percent in residential areas, 9 to 11 percent in business zones (office), and 13 to 15 percent in commercial areas, generating a net operating income (private sector) of approximately SAR 100 million per year. While a number of factors can affect actual revenue, UN-Habitat's estimates provide a reliable reference point for expected business turnover and returns to investment. Figure 53 shows the net operating income by land use.

The demonstration project aims to attract investment into real estate, provide guidance on urban development strategies, and show the value of sustainable urbanization through collaboration with the private sector (PPPs).<sup>9</sup> The projected returns to investment estimated in the analysis further supports the viability of financing scenarios that include PPPs. The following section examines additional own-source revenue generation options that should be considered alongside PPPs.



Sources: UN-Habitat, Riyadh Office; UNECE. (2014). Estimating and benchmarking transport infrastructure. UNECE. Workshop on good practices and new tools for financing transport infrastructure. 2nd Session benchmarking of transport infrastructure construction costs. ECORYS Transport. (2005). Infrastructure expenditures and costs, practical guidelines to calculate total infrastructure costs for five modes of transport. Client: European Commission – DG TREN.

Fig. 52. Estimation of net operating incomes



Source: UN-Habitat, Riyadh Office, Colliers International. (2015). Saudi Arabia Construction Cost Benchmarking and Forecasting.; UNECE. (2014). Estimating and benchmarking transport infrastructure.; UNECE. Workshop on good practices and new tools for financing transport infrastructure. 2nd Session benchmarking of transport infrastructure construction costs. ECORYS Transport. (2005). Infrastructure expenditures and costs, practical guidelines to calculate total infrastructure costs for five modes of transport. Client: European Commission – DG TREN.

Fig. 53. Net operating income breakdown (percent)

### Benchmarks & Assumptions

Residential	
Average land value (SAR/m <sup>2</sup> )	600
Total land value (SAR)	55,000,000
Average annual rent (SAR/m <sup>2</sup> )	1,602
Office	
Average annual rent (SAR/sqm)	801
Total lettable land (m <sup>2</sup> )	25,000
Retail	
Average land value (SAR/m <sup>2</sup> )	1,300
Total land value including commercial space (SAR)	1,400,000
Average annual rent (SAR/m <sup>2</sup> )	801
Total lettable land (m <sup>2</sup> )	57,490

Sources: UN-Habitat, Riyadh Office, Colliers International. (2015). Saudi Arabia Construction Cost Benchmarking and Forecasting.; UNECE. (2014). Estimating and benchmarking transport infrastructure.; UNECE Workshop on good practices and new tools for financing transport infrastructure. 2nd Session benchmarking of transport infrastructure construction costs; ECORYS Transport. (2005). Infrastructure expenditures and costs, practical guidelines to calculate total infrastructure costs for five modes of transport. Client: European Commission – DG TREN.

Fig. 54. Benchmarks for estimating private sector returns

## 6.5 Financing Instruments for the Public Sector

### 6.5.1 Public sector financing

As previously mentioned, the feasibility analysis of the demonstration project incorporates the various UN-Habitat planning and economic recommendations oriented around sustainable urbanization.<sup>10</sup> The success of the demonstration project ultimately depends on the ability of the municipal authorities to mobilize own-source revenues through a number of different financial instruments such as PPPs. This section examines the viability of the demonstration project from the public sector side.

In this scenario, the key infrastructure (i.e. roads, parking facilities, buildings, social facilities, public green spaces, and the pedestrian corridor) is financed by the private sector.<sup>11</sup>

While the private sector’s estimated cost recovery is SAR 100 million annually, the public sector does not currently have fiscal instruments capable of collecting sufficient revenue for the development of such a project. As a result, the financial feasibility analysis test different tax instruments that would improve the public sector’s ability to recover capital expenditures in addition to operation and maintenance costs. The tax instruments explored in UN-Habitat’s analysis are (1) betterment levies, (2) parking fees, and (3) property taxes.<sup>12</sup>

### 6.5.2 Revenue generating tax instruments for municipal governments

#### A) Betterment levies

Typically, a government imposes a betterment levy on the owners of certain properties”.<sup>13</sup> It is used to either entirely or partially fund the cost of a specific improvement or service that benefits the public (generally) and confers a special benefit upon the owners of certain properties”.<sup>14</sup>

According to international experiences, the investments in public facilities (schools, health), walkability areas, and commercial areas can increase the land values to 13 percent, 9 percent, and 17 percent respectively.<sup>15</sup>

The analysis ran three simulations (low, medium, high) based on international experiences with betterment levies in order to estimate the potential land value increase in Buraidah as a result of the demonstration project.<sup>16</sup> Our analysis highlights the potential for own-source revenue generation through parking fees and betterment levies.

In order to accurately estimate the impact of the demonstration project on the surrounding properties, additional micro-level data is required. However, the simulations run in UN-Habitat’s analysis provides preliminary land value estimates (Figure 56). In the “high” scenario, an estimated SAR 18 million in revenue was gen-

erated. In this simulation, the betterment levy is imposed once, and the revenue collected is used to cover infrastructure maintenance costs for one year. If betterment levies (SAR 9,900 per unit) on the real estate development properties (1,818 units) proposed in the demonstration project are included in the revenue estimate, the change in estimated revenue collection is minor; the additional revenue would cover less than 5 percent of the total capital costs.

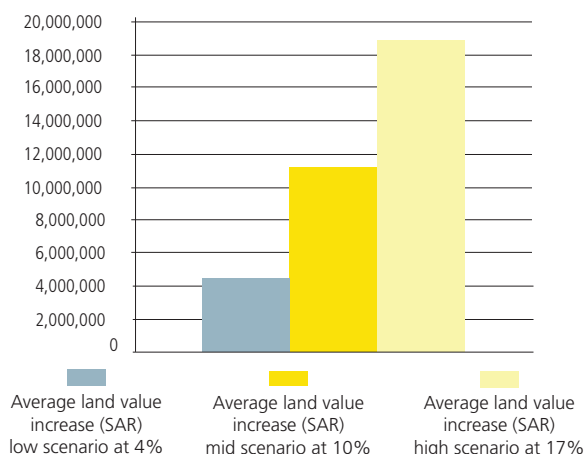
#### Betterment levies scenario assumptions

Residential land (m <sup>2</sup> )	171,965
Residential land value (SAR)	103,178,844
Retail and office land (m <sup>2</sup> )	1,121
Retail and office land value (SAR)	1,457,729
Social facilities (m <sup>2</sup> )	10,744
Social facilities and land value (SAR)	6,446,327
Public utilities infrastructure land value (SAR)	64,689,000

Sources: UN-Habitat, Riyadh Office; UN-Habitat. (2016). *Leveraging land: land-based finance for local governments*. Nairobi, Kenya: UN-Habitat Headquarters.

Fig. 55. Betterment levies scenario assumption

UN-Habitat’s analysis suggests that betterment levies are a viable option for infrastructure cost recovery in Buraidah. However, since betterment levies are not recurrent, they are more appropriate for large capital expenditures as opposed to providing par to the tax base for municipalities. It is important to note that revenue from neighboring properties that could potentially benefit from the proposed infrastructure projects were not included in UN-Habitat’s analysis due to a lack of information and data.<sup>17</sup> As a result, the projections likely represent lower bound estimates.



Sources: Colliers International. (2017). *The Impact of Social Infrastructure on Mixed Use Developments*.; UN-Habitat, Riyadh Office; UN-Habitat. (2016). *Leveraging land: land-based finance for local governments*. Nairobi, Kenya: UN-Habitat Headquarters.

Fig. 56. Land value increase

## B) Parking fees

User fees can provide a long-term source of revenue for municipal governments. In the case of Buraidah, parking fees are well suited to the infrastructure proposed in the demonstration project, which includes 6,210 parking lots for the resident population.<sup>18</sup> Figure 57 shows that 4,316 parking lots would generate SAR 19 million in revenue per year, more than the total own-source revenue collected in Buraidah. Figure 58 provides a breakdown of own-source revenue categories for the Al-Qassim (2015).

Following the preliminary evaluation, parking fees would generate approximately SAR 19 million in revenue and cover an estimated 80 percent of annual maintenance costs for the parking infrastructure included in the demonstration project. Although a more detailed analysis is needed, these findings suggest that parking fees could be a significant source of revenue for the city and highlight the importance of exploring this option further.<sup>19</sup>

## C) Property taxes

Property taxes are the third option for generating own-source revenue. To estimate the effect of property taxes in Saudi Arabia, international case studies (UN-Habitat 2016)<sup>20</sup>, Finance for City Leaders' Handbook (UN-Habitat 2016)<sup>21</sup>, and common property tax regimes in East Africa are used to provide a baseline.<sup>22</sup> Two tax rate options are considered that differentiate between commercial and residential properties.

- Property tax rate estimate for commercial property is 2.5 percent
- Property tax rate estimate for residential property is 1.75 percent

Property taxes are collected annually and based on property rental data collected in Buraidah. Figure 59 shows the forecast for revenue generated in this property tax scenario over a fifteen year timeline. Commercial and residential property taxes at the rates provided above would generate SAR 3 million per year.<sup>23</sup>

### Car Fee Scenario

Residential fees (SAR per vehicle/year)	4,800
Non-resident fees (SAR per vehicle/year)	3,000
Residential gross revenue (SAR/year)	19 mln
Non-resident gross revenue (SAR/year)	558,000
Residential occupancy rate (% of total)	70
Non-resident occupancy rate (% of total)	60

Source: Riyadh parking fees as benchmarks. Available from <https://www.riyadh-airport.com>.

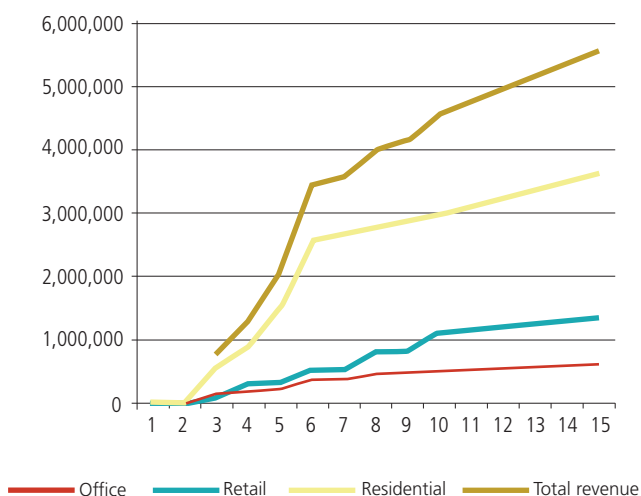
Fig. 57. Car fee scenario assumptions

### Direct Revenue 2015 Actual

Unclassified sales	1,571,401
Land sales	31,016
Fuel sales	3,100
Land development fees	12,000
Business licence fees	547,291
Business sign fees	11,453,154
Construction, renovation and demolition charges	6,813,500
Automobile transfer fees	2,338,875
Detect fees	44,910
Revenue collected from government-owned properties	19,572,788
Penalties and fines	6,965,140
Other	9,540,824
<b>Total</b>	<b>60,399,531</b>

Source: Al-Qassim Amanah, Saudi Arabia (2015).

Fig. 58. Own-Source Revenue, 2015



Sources: International Federation of Surveyors. (2016). *Property Taxation for Developing Economies*. FIG Publication no. 67; UN-Habitat. (2016). *Leveraging land: land-based finance for local governments*. Nairobi, Kenya: UN-Habitat Headquarters.

Fig. 59. Property tax scenario

## 6.6 Analysis of Financing Scenarios

Parking fees and property taxes would generate a total of SAR 23 million annually while betterment levies would provide financing for capital expenditures on public infrastructure. According to UN-Habitat’s analysis, more than 63 percent of parking infrastructure expenditures and more than 90 percent of other infrastructure expenditures included in the demonstration project can be recovered locally using the financing and taxation instruments discussed. In total, over 40 percent of the demonstration project’s capital costs can be recovered using the various financing mechanisms taxation options examined.

It is important to point out that property taxes would be a powerful revenue generating instrument and contribute significantly to the financial sustainability of the project over the long-run. The simulation run in this analysis used the “low” property tax rate<sup>24</sup>, meaning revenue projections likely represent a lower-bound estimate.<sup>25</sup> Additionally, the private sector has an important role in supporting municipal infrastructure development and management. Public-private sector collaboration through PPPs could provide crucial infrastructure financing for capital expenditures.<sup>26</sup> In addition to PPPs, the estimates produced from UN-Habitat’s financial feasibility analysis strongly support the use of betterment levies, parking fees, and property taxes. Additional financial instruments should be explored in order to fill any existing investment gap. UN-Habitat recommends that Buraidah continue exploring mechanisms that will strengthen their own-source revenue base.

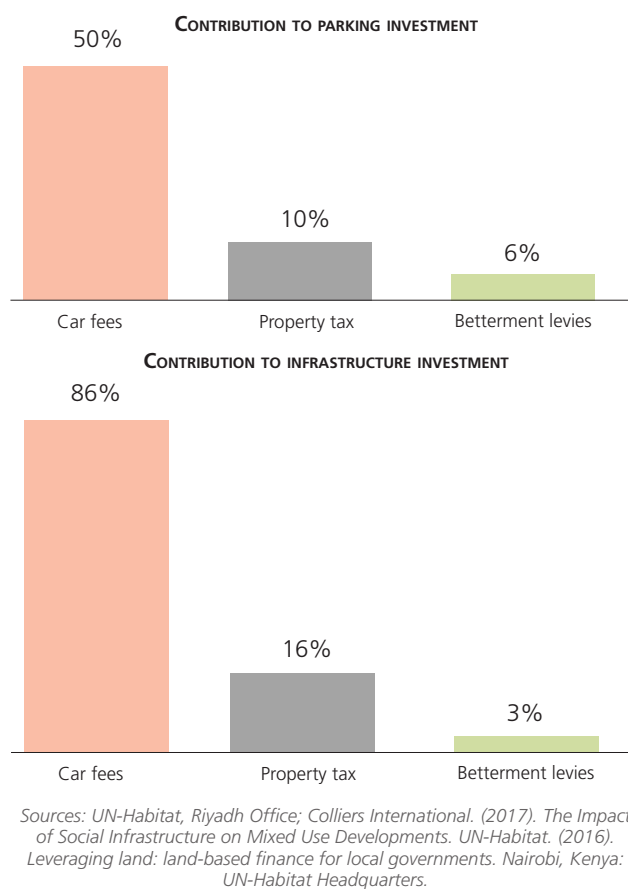


Fig. 60. Contribution to infrastructure investment

## 6.7 Conclusion and Policy Recommendations

The policies recommended by UN-Habitat for implementation of the demonstration project are:

- Identify own-source revenue potential based on an approach that integrates urban planning and municipal finance
- Estimate the impact of the demonstration project on land value in order to estimate revenue from land value capture own-source revenue mechanisms
- Introduce land value capture mechanisms as part of the annual municipal revenue stream. (e.g. Medellin, Colombia)<sup>27</sup>
- Generate a diverse portfolio of income stream, implementing different fiscal instruments.<sup>28</sup>

The preliminary findings provided in this chapter support the use of land taxes and user fees as part of the core municipal budget (XIV) and the Kingdom of Saudi Arabia (XV). The introduction of the tax instruments explored in this chapter would contribute significantly to improving local government capacity and, ultimately, reaching the National Transformation Program 2020 (NTP) goals.<sup>29</sup>

PROJECT YEAR	1	2	3	4	5	6	7	8	9	10	TOTAL
<b>RESIDENTIAL</b>											
Constructed area (m <sup>2</sup> )		83,039	83,039	83,039							<b>249,117</b>
Lettable land (m <sup>2</sup> )		-	24,912	37,368	62,280	99,647	99,647	99,647	99,647	99,647	
Occupancy rate (%)			10%	15%	25%	40%	40%	40%	40%	40%	
<b>OFFICES</b>											
Constructed area (m <sup>2</sup> )		12,594	12,594								<b>25,187</b>
Lettable land (m <sup>2</sup> )			7,556	10,075	12,594	20,150	20,150	22,669	22,669	22,669	
Occupancy rate (%)			30%	40%	50%	80%	80%	90%	90%	90%	
<b>RETAIL</b>											
Constructed area (m <sup>2</sup> )		3,598	3,598								<b>7,196</b>
Lettable land (m <sup>2</sup> )		-	720	2,159	3,598	5,037	5,037	6,477	6,477	6,477	
Occupancy rate (%)			10%	30%	50%	70%	70%	90%	90%	90%	
<b>PARKING</b>											
Constructed area (m <sup>2</sup> )		49,406	49,406	49,406							<b>148,218</b>
<b>SOCIAL FACILITIES</b>											
Constructed area (m <sup>2</sup> )		3,179	3,179	3,179							<b>9,538</b>
<b>PUBLIC UTILITIES INFRASTRUCTURE</b>											
Constructed area (m <sup>2</sup> )	20,002	28,082	28,082								<b>84,246</b>
<b>PUBLIC GREEN SPACES</b>											
Constructed area (m <sup>2</sup> )		28,005	28,005								<b>56,010</b>
<b>PEDESTRIAN CORRIDOR</b>											
Constructed area (m <sup>2</sup> )		11,784	11,784								<b>23,569</b>

Note: This table shows the ten-year construction phase which would be preceded by a five-year planning phase.  
Source: United Nations Human Settlements Programme, Nairobi (2018).

Fig. 61. Project timeline and implementation targets





# 7

## ANNEX



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## 7.3 Notes and References

- 1 Although, Saudi Arabia development policy is oriented to use PPPs for strategic projects at large scale, using Built-Operate-Transfer and other type of agreements (e.g. Prince Mohammad Bin Abdulaziz International Airport, privatization of the operation and maintenance of the King Fahd International Airport of Dammam, Taif international airport), the Demo project gives evidence on the potential returns for urban project at small scale.
- 2 United Nations Human Settlements Programme. (2016). Finance for City Leaders, p. 100, Nairobi, Kenya.
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- 15 Colliers International. (2017). The Impact of Social Infrastructure on Mixed Use Developments.
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- 17 Colliers International. (2017). The Impact of Social Infrastructure on Mixed Use Developments.
- 18 United Nations Human Settlements Programme (2018), Nairobi, Kenya.
- 19 To monitor the land value impact new instrument (e.g. fiscal cadaster) will be highly recommended. In Bogotá, from 2009 to 2010, the city's cadastral office valued all its urban properties by adopting administrative reform. The updating process generated 47 per cent of real increase in the city's cadastral value (Ruiz Francisco, Vallejo Gabriel. (2010). Using land registration as a tool to generate municipal revenue: Lessons from Bogota. The World Bank, Washington, DC).
- 20 United Nations Human Settlements Programme. (2016). Leveraging Land: Land-based Finance for Local Governments. United Nations Human Settlements Programme. Nairobi, Kenya.
- 21 United Nations Human Settlements Programme. (2016). Finance for City Leaders, Nairobi, Kenya.
- 22 United Nations Human Settlements Programme. (2013). Property Tax Regimes in East Africa, Nairobi, Kenya.

- 
- 23 The simulation takes account for low rates in order to give evidence on the potential impacts of this financial sources. International Federation of Surveyors. (2016). Property Taxation for Developing Economies. FIG Publication no. 67
- 24 In Singapore, for example, the effective property tax rate is 5.00 percent for owned property and 11.00 percent rented property in 2015 (UN-Habitat. (2016). Leveraging land: land-based finance for local governments. United Nations Human Settlements Programme. Nairobi, Kenya).
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