وزارة الشـــؤون
البلدية و القروية
Ministry of Municipal & Rural Affairs

TABUK
City Profile

مستقبل المدن السعودية
FUTURE SAUDI CITIES

UN HABITAT
FOR A BETTER URBAN FUTURE

Future Saudi Cities Programme
City Profiles Series: **Tabuk**

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TABUK

تـبـوك

FUTURE SAUDI CITIES PROGRAMME

CITY PROFILE

View of the Wadi Al Disah


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Contents

1 INTRODUCTION

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1.1 About the Future Saudi Cities Programme

The Future Saudi Cities Programme is a joint programme developed by the Saudi Ministry of Municipal and Rural Affairs (MoMRA) and UN-Habitat, implemented in close cooperation with the municipalities of 17 major Saudi cities. The cities have been selected based on their different population sizes, geographic distribution, and a range of criteria based on capacities and economic potential to create a more balanced regional development among the cities of Saudi Arabia. The chosen cities include Riyadh, Makkah, Jeddah, Taif, Madinah, Tabuk, Dammam, Qatif, Al-Ahsa, Abha, Najran, Jazan, Hael, Arar, Al Baha, Buraidah, and Skaka.

After undertaking city-level reviews in the 17 cities, five cities were chosen as a representative cross-section, for in-depth analysis. The city-level reviews considered the linkages between urban and territorial planning by examining the city within the relational context of its sub-region and exploring specific issues at the neighbourhood level. These reviews, when referenced with City Prosperity Index reports and validation processes in the Rapid Planning Studio workshops, were used to extrapolate strong, evidence-based conclusions that relate to the planning system as a whole.

Applied research, with a strong focus on action-oriented conclusions, was used to collect evidence to diagnose the strengths and weaknesses of the planning system and local planning practices in each city. The methodology utilised design tests and demonstration projects as avenues to apply and analyse potential solutions, before concluding on policy recommendations.

UN-Habitat's three-pronged approach considers spatial planning in relation to legal and institutional frameworks, in addition to financial mechanisms. In this way, success criteria for the sustainable implementation of a spatial plan should include flexible but enforceable rules and regulations, in addition to a financing strategy and projections.

As a pragmatic explication of this approach, three local demonstration projects, representing essential elements of a strengthened and improved planning system, have been developed. These were elaborated to include schematic designs and feasibility studies, that can later be transformed into implementation plans. Such implementation plans are projected to be undertaken by MoMRA, in collaboration with other partners in the Kingdom.

In order to facilitate this process, a joint "FSCP Urban Lab" was created as a vehicle to strengthen endogenous capacities and to develop tailored tools, and instruments. The Lab, composed of international expertise from the planning, legal and economy branches of UN-Habitat Nairobi office, has been working with Saudi-based staff in the UN-Habitat Riyadh office (selected by MoMRA), to enhance knowledge exchange and to apply a learning-by-doing method to the programme.

As such, all 17 cities have been simultaneously engaged in a capacity-building strategy that included foundational learning, and 'on the job' training, culminating in Saudi-specific advanced training. This training was based on the planning-system conclusions and recommendations, that the FSCP produced. Thus, the Urban Lab functions as a tool to generate evidence whilst additionally strengthening capacities through a process of learning-by-doing.

1.2 Saudi Initiatives for Sustainable Urban Development

The Saudi Government, along with the respective Ministries, and in line with a larger country-wide transformation process, has made several efforts aimed at the sustainable development of its growing cities. These contributions vary from plans at the national level, like the National Spatial Strategy (NSS), to strategies and plans at the regional level, cutting across various sectors towards realising Vision 2030. The FSCP recognises these efforts as positive, supporting Vision 2030 goals to realise a sustainable urban environment for the Kingdom of Saudi Arabia. The FSCP acknowledges and builds upon the current tools, plans, and strategies as part of a comprehensive assessment and suggests variations and improvements where appropriate.

1.3 Objectives of the City Profile Report

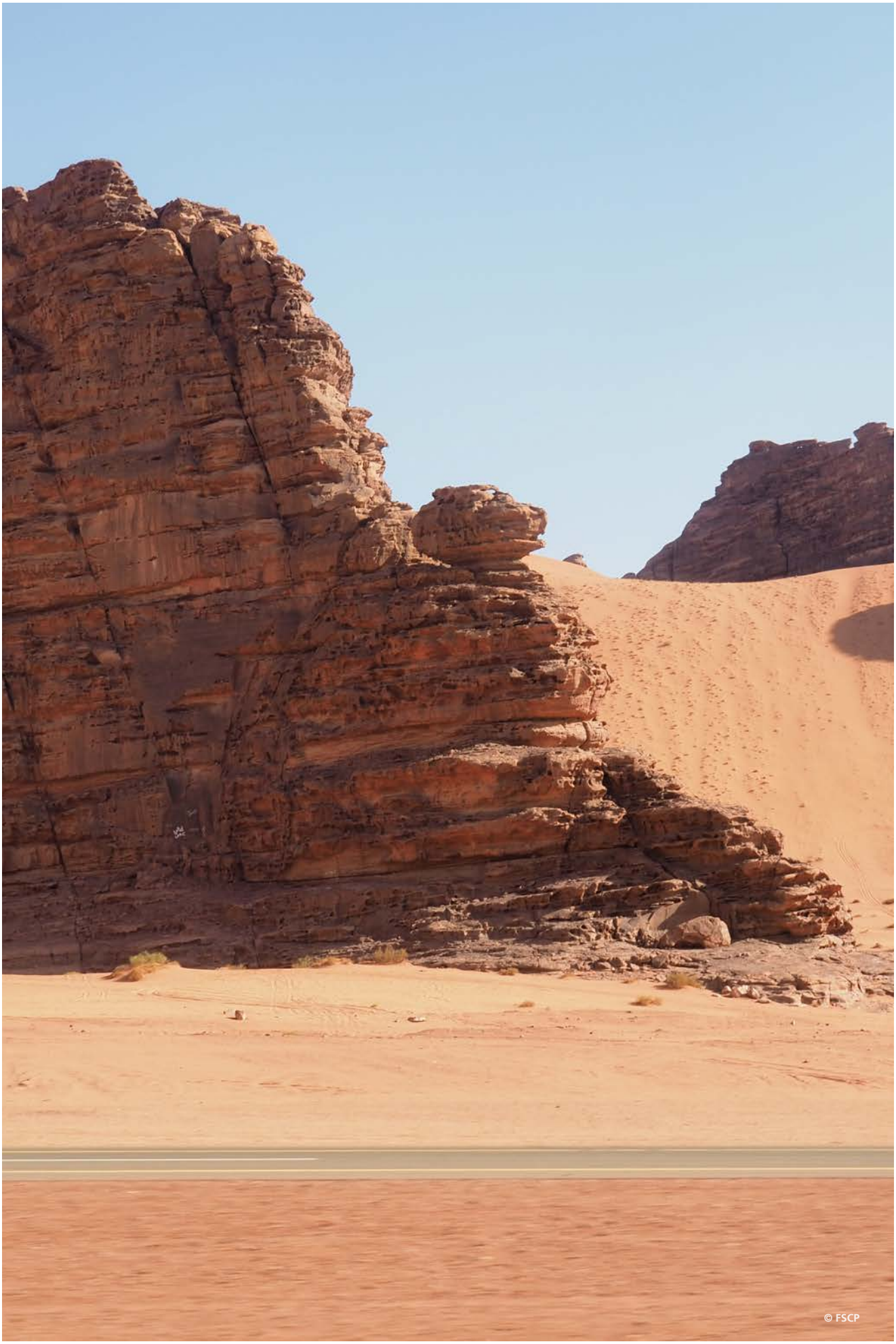
1.3.1 Scope of the city profile

The city-profile combines MoMRA's new strategy, with a review of existing studies, plans, and strategic documents, such as the review of the Kingdom of Saudi Arabia (KSA) National Spatial Strategy (NSS) to identify and address the root causes of problematic conditions outlined in the preliminary findings. The report acknowledged low uptake of the NSS by regions, utilities and ministries, as a key weakness. The issue of horizontal (sectors) and vertical (scales) integration is thus a key challenge that the FSCP aims to address going forward.

Policy recommendations for improving urban planning frameworks and practice shall be structured through a multi-scalar lens, considering the city as a continuum in the urban fabric, that should grow from the neighbourhood to the wider city-region, whilst influenced by dynamics and regulations at the national and supranational levels. This ensures that policy recommendations for these cities do not operate in isolation from the city's envisioned role in the administrative region and the national system of cities.

1.3.2 Objectives of the city profile

The City Profile Report brings together diagnostic urban analysis and aligns that analysis with the UN-Habitat sustainable development framework and the Saudi Vision



Topographic diversity in Tabuk region

2030. It performs as a thinking tool that constitutes together an assessment tool and guidance for the current and future planning of the city, whilst defining a clear strategy for sustainable development.

The definition of an ad-hoc strategy is rooted in an evidence-based approach to the issues, building upon both primary and secondary data collection and analysis. The profile, as well as the Programme as a whole, uses the data collected by the City Prosperity Initiative (CPI), to identify significant trends and challenges at the city level. This evidence is then combined with reviews of existing planning documents, and cross-referenced with multi-scalar GIS spatial analysis, to define the above-mentioned ad-hoc strategy.

1.4 City Profile Methodology

1.4.1 Evidence-based input approach

The evidence-based planning approach creates a deeper understanding of the spatial dynamics of the urban area, by combining and comparing urban datasets such as demographics, density, land use, natural features, and accessibility analysis.

The evidence (data) is reflected in the form of indicators that can be compared with best practice standards and benchmarks for sustainable urban development. Not only does this provide a clear perspective on the main developmental issues, but it also quantifies the projected effect of future development proposals on the indicators applied in the analysis.

The programme recognises that the methodology, on which policy recommendations guiding improvements and adjustments in the planning system are based, needs to be evidence-based. For this purpose, different methods were integrated to first provide the necessary body of evidence on which to build an understanding, and full assessment of issues before making recommendations for the respective cities.

The elements constituting the evidence-based approach are primarily constituted of the following:

- Reviews of existing policy documents and plans;
- CPI index;
- GIS spatial analysis.

All of these elements are utilised in a cross-scalar diagnostic methodology that incorporates quantitative and qualitative evidence. The method used to generate evidence-based policy recommendations, which develops capacities and engages stakeholders in all 17 cities, provides conclusions derived from both top-down and bottom-up approaches, cross-cutting all scales of planning.

Validation process with local authorities and stakeholders

By analysing how the structures of spatial, socio-environmental and economic issues interact at different scales of influence, the diagnostic methodology moves from the national to the neighbourhood scale, tracking the interdependencies within the city's physical development patterns, and seeking to decrypt the reasons behind them.

1.4.2 The reviews

Several reviews of existing policy documents and plans were undertaken with the purpose of a) extracting information useful to the understanding of the context, and the city itself, and b) assessing their contents based on three criteria: content relevance, process integration, and effectiveness. The reviews focused on assessing the:

- National Spatial Strategy;
- Tabuk Regional Plan;
- Tabuk Structural Plan;
- Tabuk Local Plan.

1.4.3 The City Prosperity Index assessment report

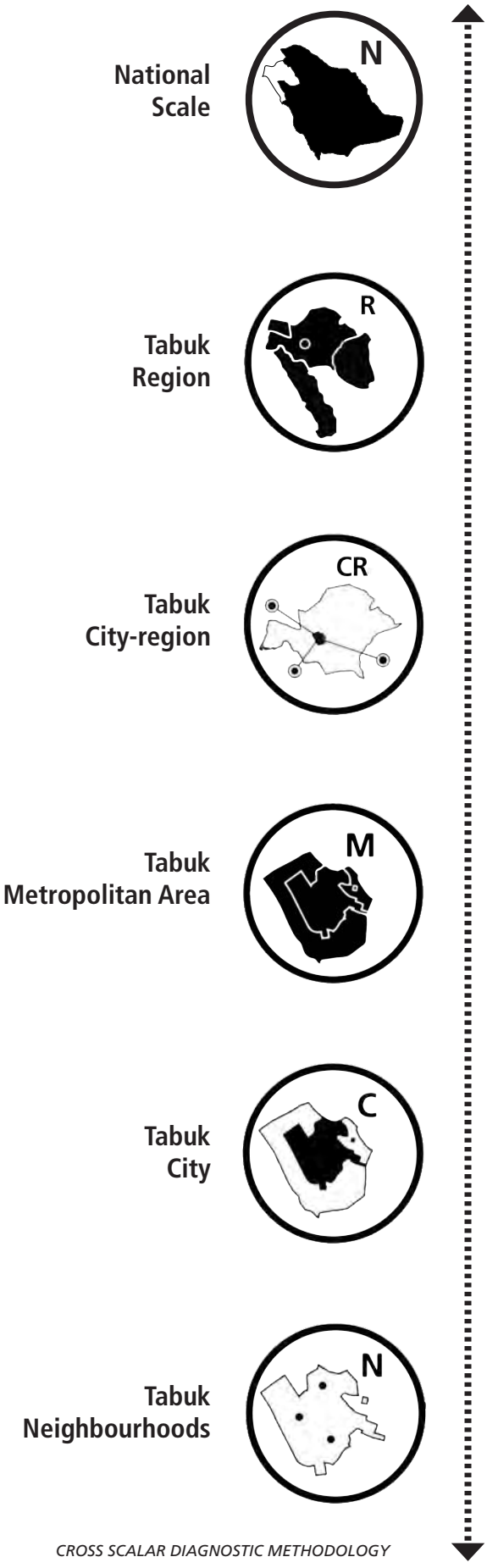
The City Prosperity Index is made up of six dimensions that serve to define targets and goals that can support the formulation of evidence-based policies. These include the definition of city-visions and long-term plans that are both ambitious and measurable. The six dimensions are:

- Productivity;
- Infrastructure;
- Quality of life;
- Equity and inclusion;
- Environmental sustainability;
- Governance and legislation.

These dimensions have been assumed as guiding principles in the spatial assessment of Tabuk. There are ten detailed spatial indicators at the FSCP city profile level that link into the 72 flexible indicators of the CPI assessment.

1.4.4 The GIS spatial analysis

The spatial reflection of the above indicators highlights detailed patterns of development and the interactions and dynamics associated with movement, densities, and land use within the urban system. This process enables a dynamic understanding of the physical expressions of weaknesses and strengths in the urban system and the main issues to be addressed. The effect of proposals for future development can also be assessed by use of the same indicators.



CROSS SCALAR DIAGNOSTIC METHODOLOGY

2

NATIONAL AND REGIONAL SPATIAL CONTEXT

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2.1 The Region's Role in the KSA

2.1.1 Historical background

Historically, the Tabuk Region falls within the Hejaz Region, specifically in the state of The Hashemite Kingdom of Hejaz, which is ruled by the Hashemite Dynasty. It achieved national independence after the destruction of the Ottoman Empire by the British Empire, during World War I. The new kingdom had a brief life and was conquered in 1925 by the neighbouring Sultanate of Nejd, under a resurgent House of Saud, creating the Kingdom of Hejaz and Nejd. In 1932, the Kingdom of Hejaz and Nejd joined the Saudi dominions of Al-Ahsa and Qatif, as the unified Kingdom of Saudi Arabia.

The history of the Tabuk Region dates back 5,000 years ago. The region hosts the land of Madyan, a historical population that is mentioned extensively in the Holy Quran. Crossing the entire region is the Hejaz Railway, which during the Arab Revolt between 1916 to 1918, was under constant attack.

2.1.2 Geography and location

The Tabuk Region sits in the extreme Northwest of Saudi Arabia, with Jordan bordering it to the North and to the West of it is the Gulf of Aqaba and the Red Sea. Surrounding it are three other administrative regions; Al Jouf, Hael, and Madinah. Evidently, the region's strategic location is considered to be one of the most important elements of economic development due to its long maritime front on the Red Sea. In addition, being a border area allows a large proportion of trade access to Egypt, Jordan, Syria, Lebanon, and Turkey; as well as the movement of passengers and pilgrims from those countries and other countries in North Africa. The area of the Tabuk Region is 139,000 square kilometres or about 6.2% of the total area of the Kingdom. The Tabuk Region stretches from North to South covering over 580 kilometres and extends over 480 kilometres from East to West.

2.1.3 Demographic background

According to the estimations of the Central Department of Statistics and Information, the total population of the region was projected at 887,000 people, representing about 2.88% of the total population of the Kingdom, in 2014. The Saudi population in the region is estimated to be 732,000 and 155,000 are made up of non-Saudis. The Tabuk Governorate has 72% of the total population of the region, followed by Amlaj with 7.7%, Diba with 6.6%, Wajeh with 5.6%, Taima with 4.6%, and finally Haql Governorate with 3.5% of the total population. In 2004, the urbanisation rate for the region was 85%, (this rate differs from one governorate to another)

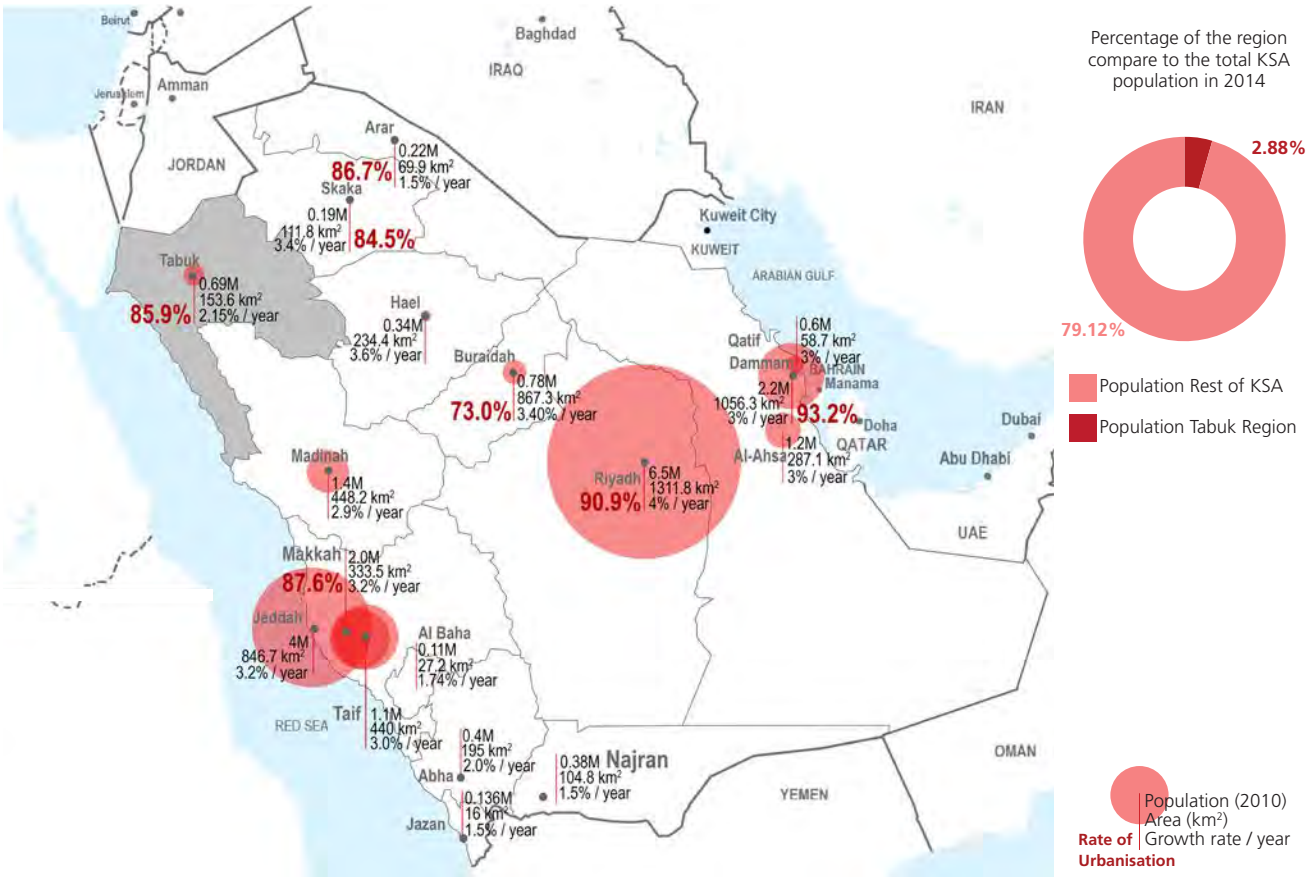


Fig. 1. Population distribution, growth rate and urban areas within the Kingdom of Saudi Arabia

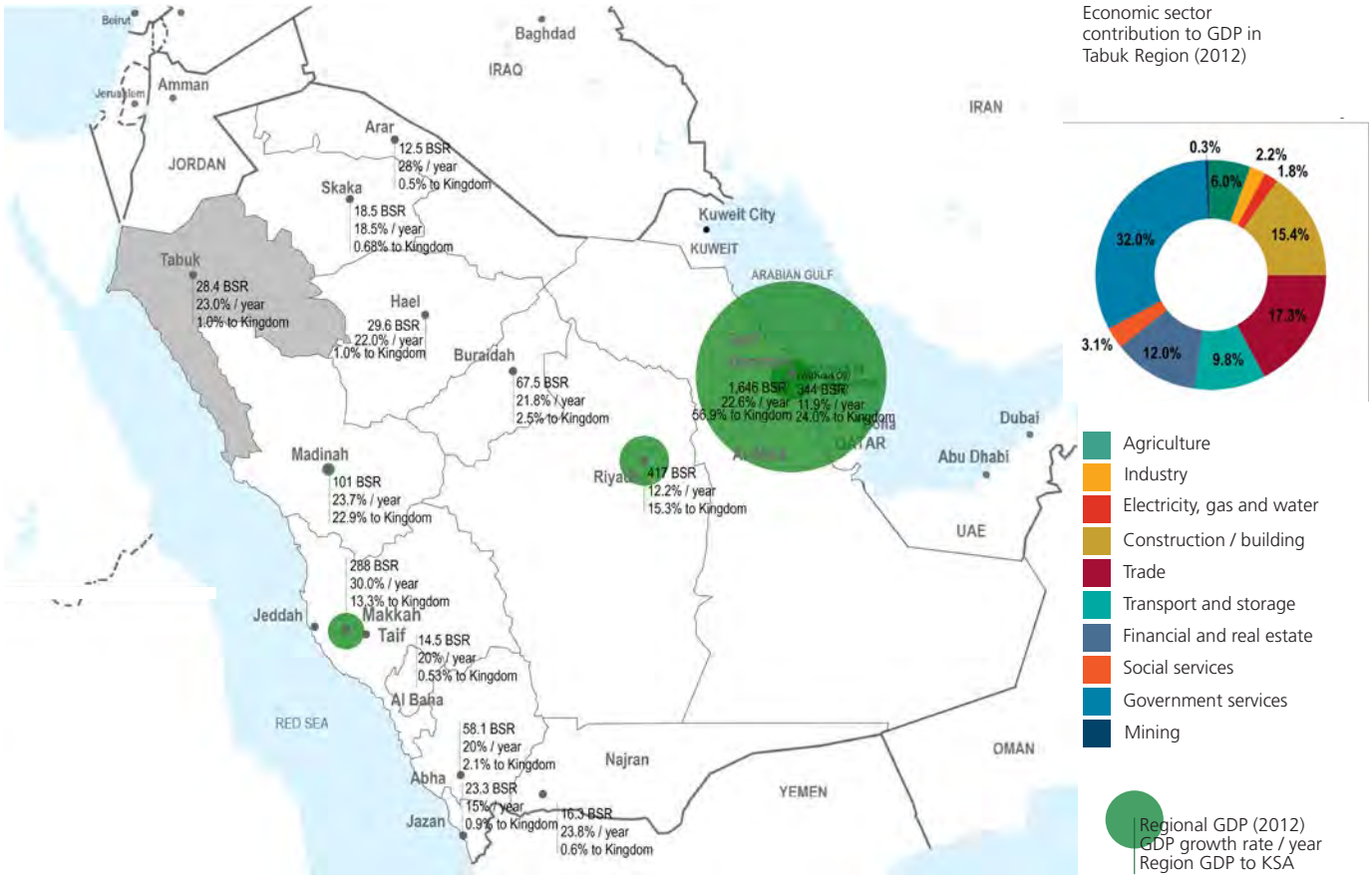


Fig. 2. Regional Gross Domestic Product and economic sector contribution

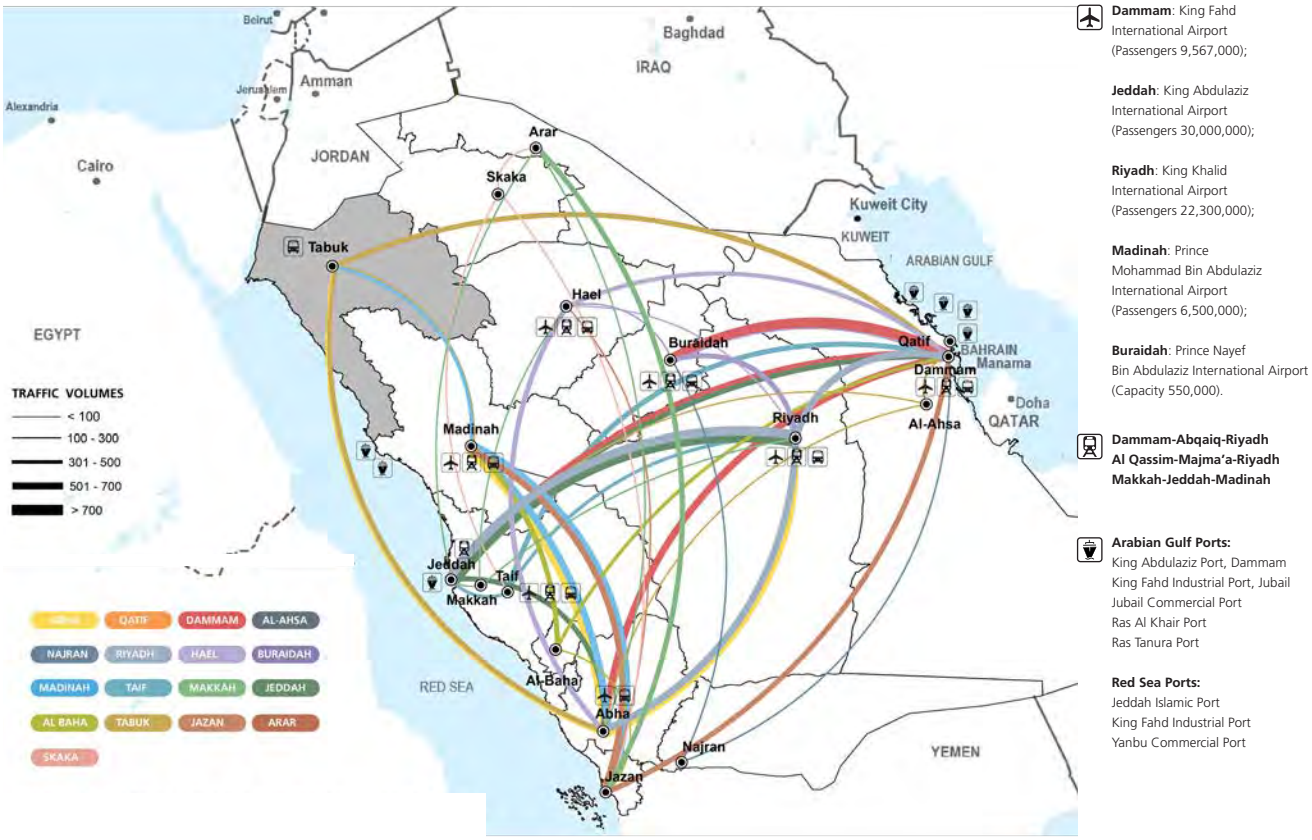


Fig. 3. Transport connectivity between Saudi cities

and the highest rate was in Tabuk Governorate with 92.7%, and the lowest in Diba Governorate with only 47.2% of the population living in urban areas.

2.1.4 Socio-economic background

The Gross Domestic Product (GDP) of the Tabuk Region, in 2012 was 28.4 billion riyals, representing 1.03% of the GDP of the Kingdom, and 1.99% of the GDP of the Kingdom without crude oil and gas. The region's average annual growth rate of GDP wast 23% during the period from 2009 to 2012. The trade sector ranks first in terms of contribution to the GDP with 17.3%, followed by the construction and building sector with 15.4%, financial and real estate services sector with 12%, transport and communications sector with 9.8%, agriculture with 6%, and industry with 2.2%.

2.1.5 National connectivity

There are two regional airports, Prince Sultan Bin Abdulaziz Airport in the city of Tabuk, and the other is Al-Wajh Airport. The number of passengers using them was 938,000 passengers, representing 2.44% of the total air traffic of passengers in the Kingdom. Tabuk Regional Airport has one terminal serving both international and domestic destinations including Cairo, Dubai, Bahrain, Sharjah, in addition to Riyadh, Jeddah, Dammam, Madinah, Jazan, and Abha. Duba Port is 210 kilometres away from the city of Tabuk. The contribution of this port is still limited to the total shipping movement of the Kingdom, where quantities of goods handled by the port represent 0.9% of the total goods handled by all of the Kingdom's ports. Diba Port ranks first in the Kingdom regarding the movement of passengers (arrivals and departures), representing about 41.2% of the total movement of passengers by maritime transport in the Kingdom. Duba Port is one of the oldest ports on the Red Sea, the nearest Saudi Arabian port to the Suez Canal.

The Hejaz Railway was a narrow-gauge railway that ran from Damascus to Madinah. It was a part of the Ottoman railway network when it was opened in 1908, with a length of 1320 kilometres. Two connected sections of the Hejaz Railway are in service. Before the war in Syria, the railway ran from Amman to Damascus and from phosphate mines South of Jordan to the Gulf of Aqaba. Small non-operating sections of the railway track, buildings, and rolling stock are still preserved as tourist-attractions in Saudi Arabia.

2.2 Regional Development Patterns and Dynamics

2.2.1 Regional organisation

Administrative Boundaries

The Tabuk Region and the city of Tabuk are part of the historic Hejaz Region, located in Western Saudi Arabia. The Hejaz

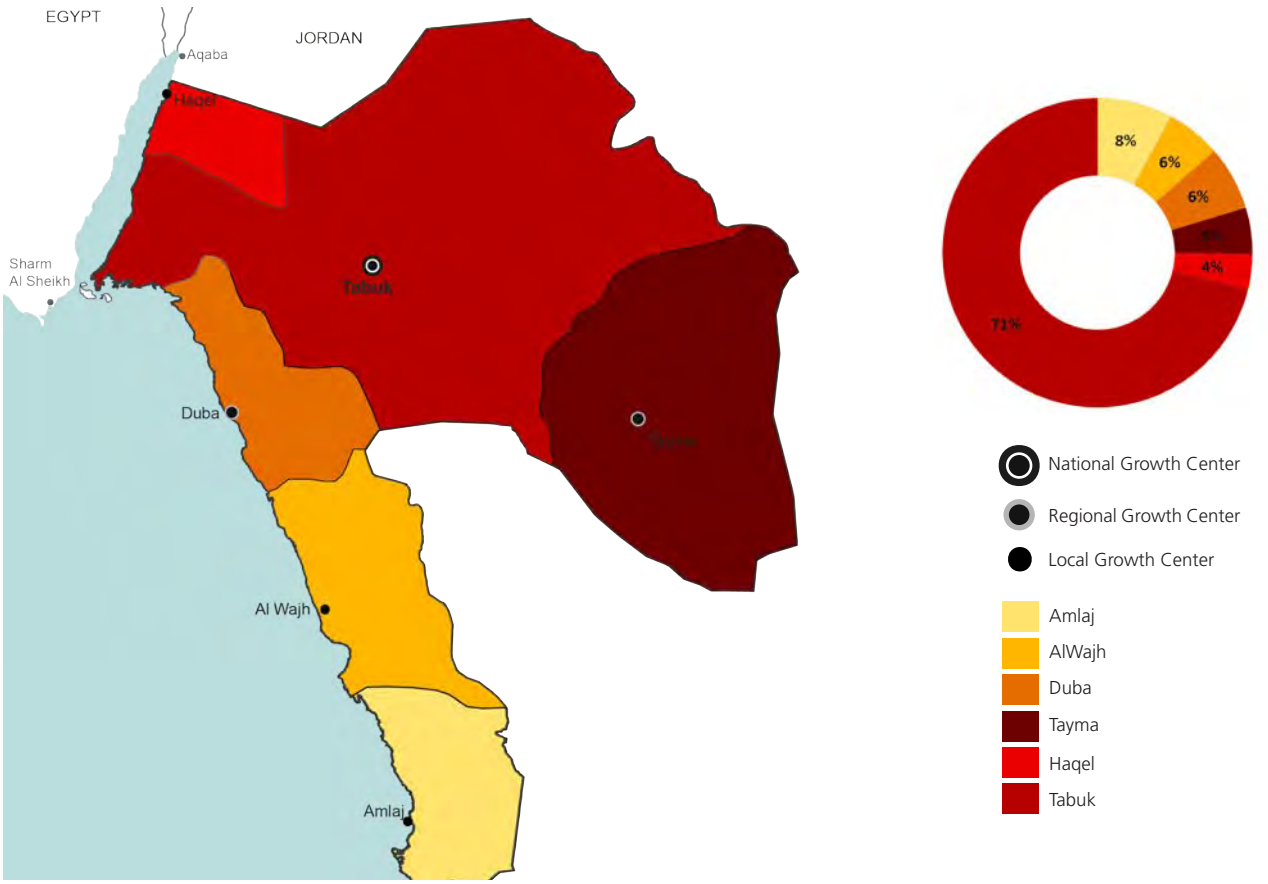


Fig. 4. Administrative boundaries and population distribution in the governorates according to 2010 Census

Geographical view from Tabuk Region

is the most populated area of the Kingdom, as 35% of the Kingdom's population resides here. The Tabuk Region extends over an area of 117,000 square kilometres, or 11.7 million hectares, corresponding to 5% of the total land area of the Kingdom. The region's population is approximately 910,030 inhabitants or 2.7% of the Kingdom's population. The region is administratively divided into the Principality of Tabuk, its capital, and five governorates, namely: Al-Wajh, Diba, Taimaa, Amlaj, and Haql. Similar to the other 12 regions of KSA, Tabuk is governed by a "municipality" (Arabic: Amanah) and is headed by a mayor (Arabic: Amin).

The Regional Plan for the Tabuk Region

The city of Tabuk plays a very key role in the Kingdom as it's a focal for many of the new mega projects scaled for the Kingdoms' Vision 2030; the Neom City and the Red Sea Project among other expansion projects. The regional plan of Tabuk and the NSS have placed a lot of importance on the hierarchical development of most of the centres in the region as a way to balance the foreseen growth.

The Regional Plan of Tabuk Region for the year 1450H proposes a unique set of functions for the different governorates that draws on the existing strengths and potentials for each governorate, with Tabuk City as a National Services Centre, while the cities along the coastline shall capitalise on tourism, fishing activities, and mining.

The central idea is to emphasise the role of Tabuk as a National Growth Centre and focus on its development while spreading development to other growth centres, especially along the coastal corridor. Additionally, it will distribute and spread development in a balanced manner to the Regional and Local Growth Centres, and rural communities. Emphasising the linkage between the Tabuk Region and the neighbouring areas through the corridor of Duba/Tabuk/Skaka/Arar and the internal corridor of Tabuk/Tayma/Madinah, in addition to the corridor of Wajh/Ula/Hael, and the coastal corridor of Madinah/Yanbu/Tabuk, will draw focus to economic activities along these axes.

2.2.2 Regional structure and resources

Movement Infrastructure

The total length of paved roads, affiliated to the municipalities in the region, is approximately 3,068 linear kilometres. This accounts for 3.4% of the total roads of the Ministry of Municipal and Rural Affairs in the Kingdom. The length of expressways, two-way and one-way roads in the region, under the supervision of the Ministry of Transport, amounts to 886 kilometres, representing 5.6% of the total roads of the Ministry of Transport. The total length of agricultural and earth roads in the region was 10,133 kilometres at the end of 2012. According to our regional drivability analysis to main urban centres, 83.4% of the region's population lives within a 15-minute drive of a major urban centre.

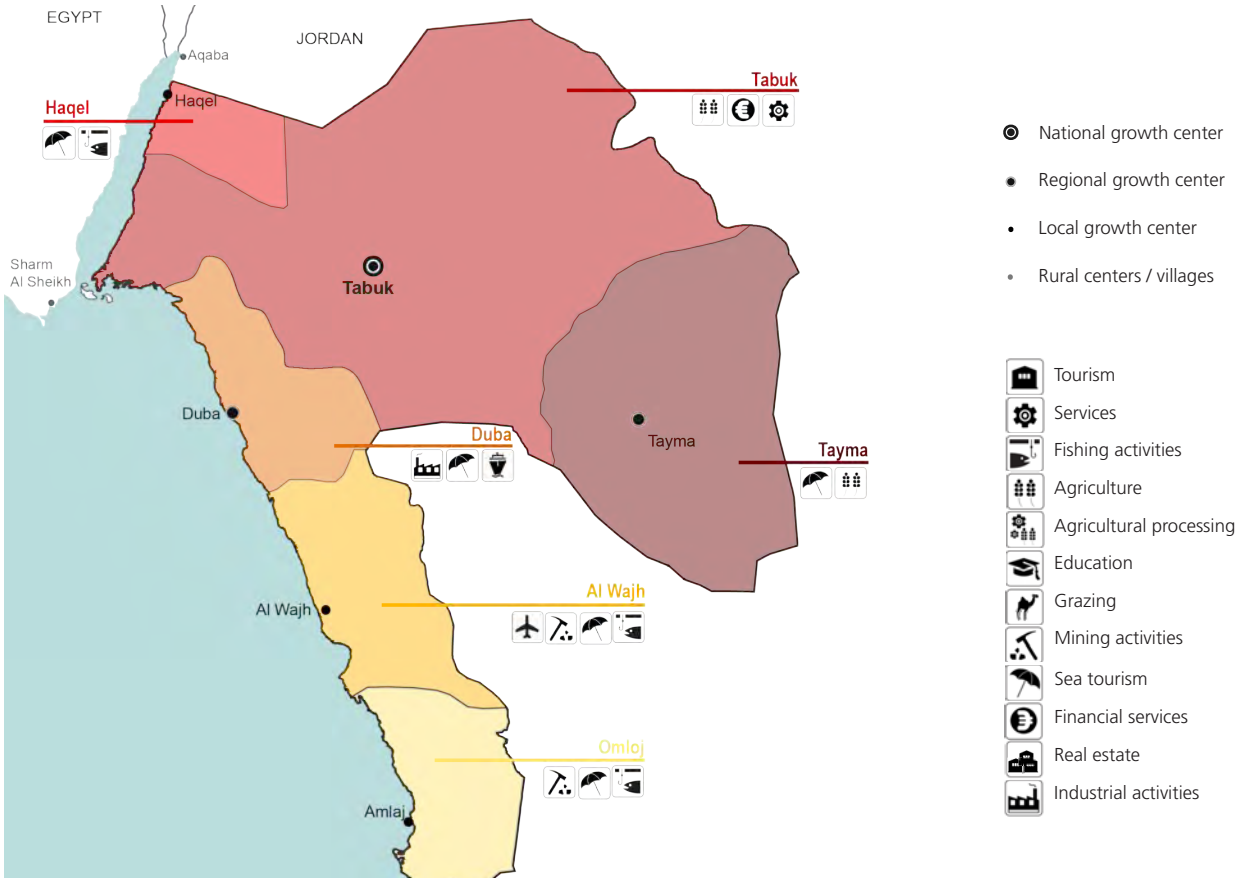


Fig. 5. Development sectors according to the Regional Plan for the Tabuk Region

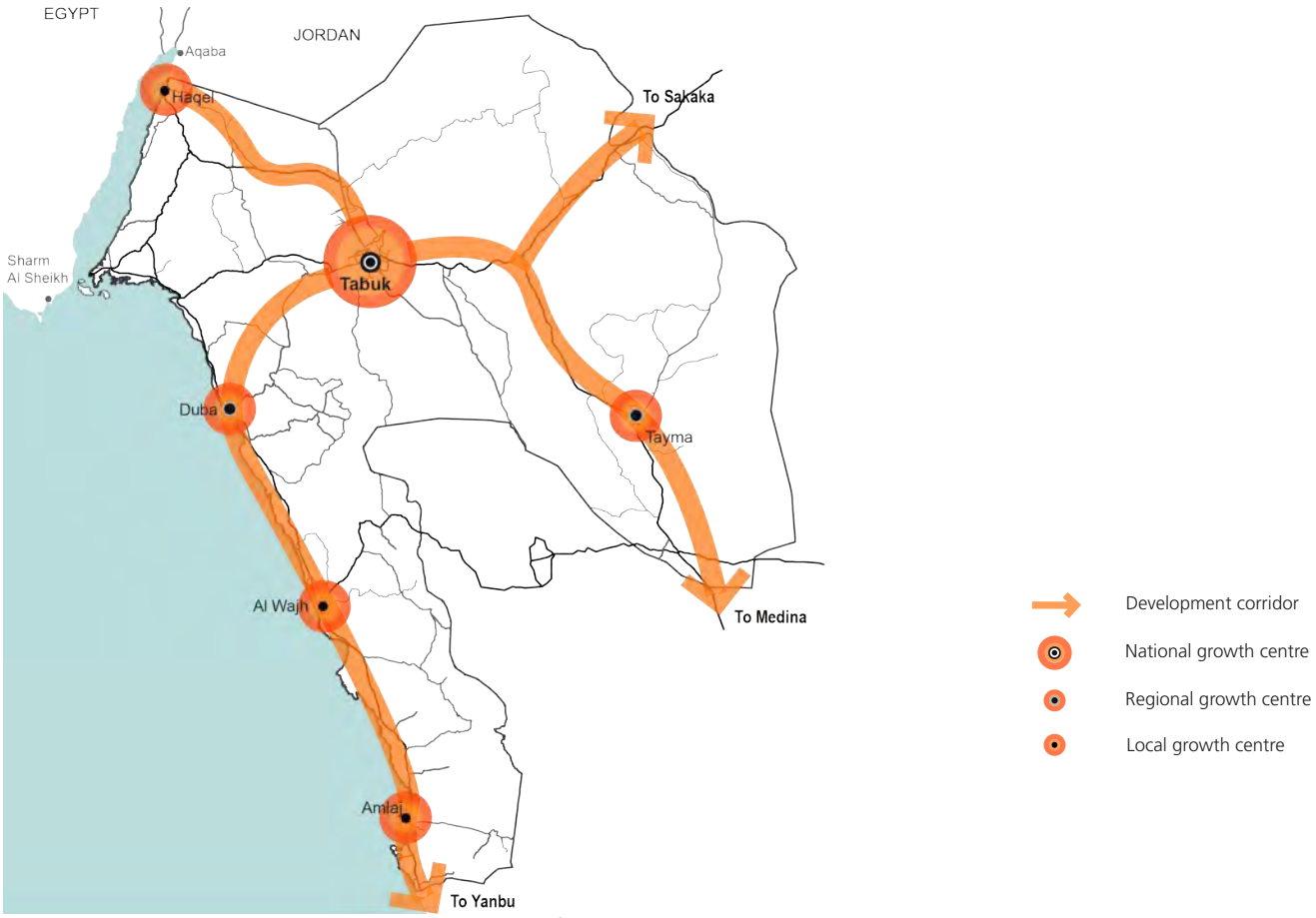


Fig. 6. Development corridors according to the Regional Plan for the Tabuk Region

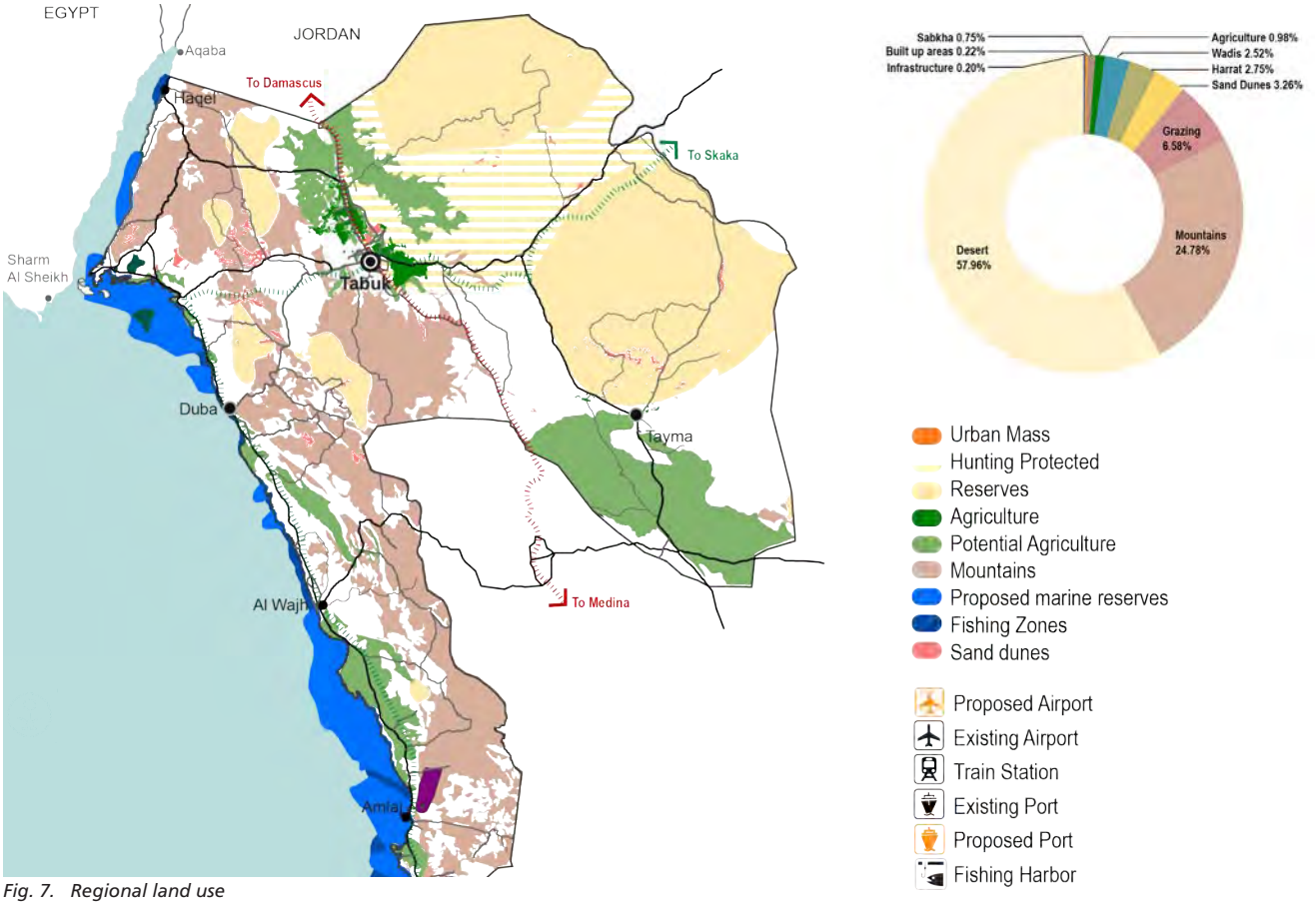


Fig. 7. Regional land use

Land use

Land use plans were proposed based on the Regional Development Plan selected until the target year 1450H, which was the basis on which detailed studies of the Regional Sectoral Plans for services, infrastructure, and the economic base of the Tabuk Region were developed. The general framework of land use for the Regional Plan for the Tabuk Region in 1450H noted that agricultural areas would increase to 156% of the current area of agricultural areas. For urban agglomerations, it will increase to 90% of the current status. For industrial zones, there are two industrial cities in Duba and Tabuk as well as the industrial areas in each of the cities of Tabuk, Wajh, Dabaa, Tayma, and Amlaj. As for the tourist areas, it is spread in Tabuk and the five governorates of the region. The plan was supported by a regional road network and a head to serve the main development axes, linking the National Growth Centre with Regional Growth Centres and Local Growth Centres while supporting sub-development hubs to link Regional and Local Growth Centres with Rural Growth Centres.

Mega-projects

The presence of a mega-project at a national scale would bring considerable transformation in different scales to the urban environment and the life of citizens in surrounding urban settlements. This would mostly be economical, for example, on the price of land and housing, but also on the social aspect, especially due to tensions with local populations and social conflicts, and infrastructure suitability. Two of the biggest mega-projects in the Kingdom and the Middle East sit in Tabuk, and below is a brief introduction to those projects, their envisioned purpose, and scale.

The Red Sea Project

The Red Sea project will be a luxury resort destination for nature and culture established across a series of islands in a lagoon. It will set new standards for sustainable development and bring about the next-generation of luxury travel to put Saudi Arabia on the international tourism map.

The Red Sea project is located along the Northwestern coast of the Kingdom of Saudi Arabia, between the cities of Amlaj and Al Wajh. It is being developed on one of the most pristine sites in the world. Along with residents of Saudi Arabia and the GCC countries, the Red Sea project will provide an opportunity for the whole world to experience and enjoy an eco-friendly destination scattered across a breath-taking archipelago that is home to exquisite beaches and 200 kilometres of untouched coastline. The initial ground-breaking of the Red Sea project is expected in the third quarter of 2019. Completion of phase one of the project is anticipated by the last quarter of 2022, which will include the development of hotels and luxury residential units, as well as all logistical infrastructure, including air, land, and sea transport hubs.

Neom City

Neom is a planned 26,500 square kilometres transnational city and economic zone, to be constructed close to the border region of Saudi Arabia and Egypt, (via a proposed bridge across

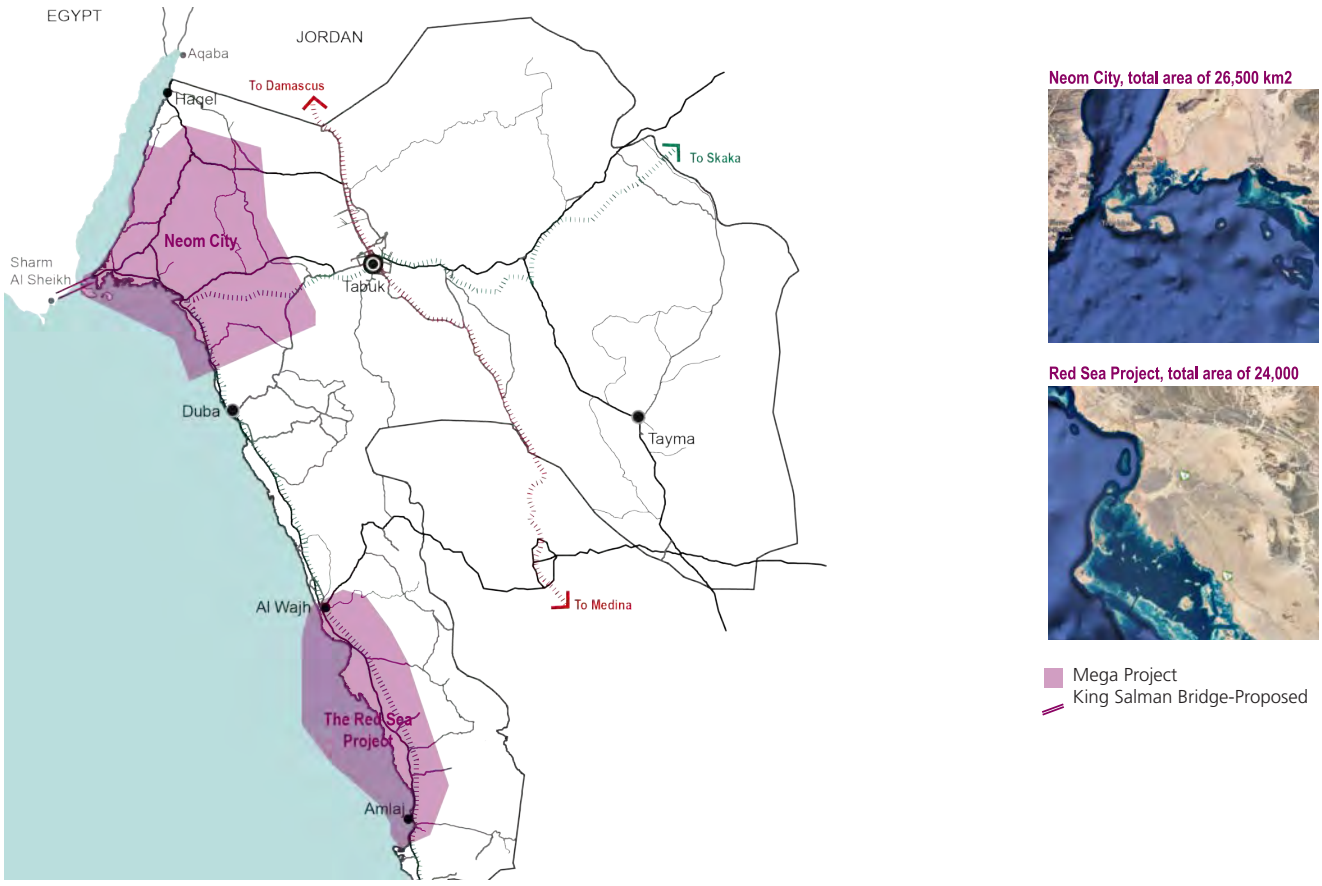


Fig. 8. Mega-projects near Tabuk

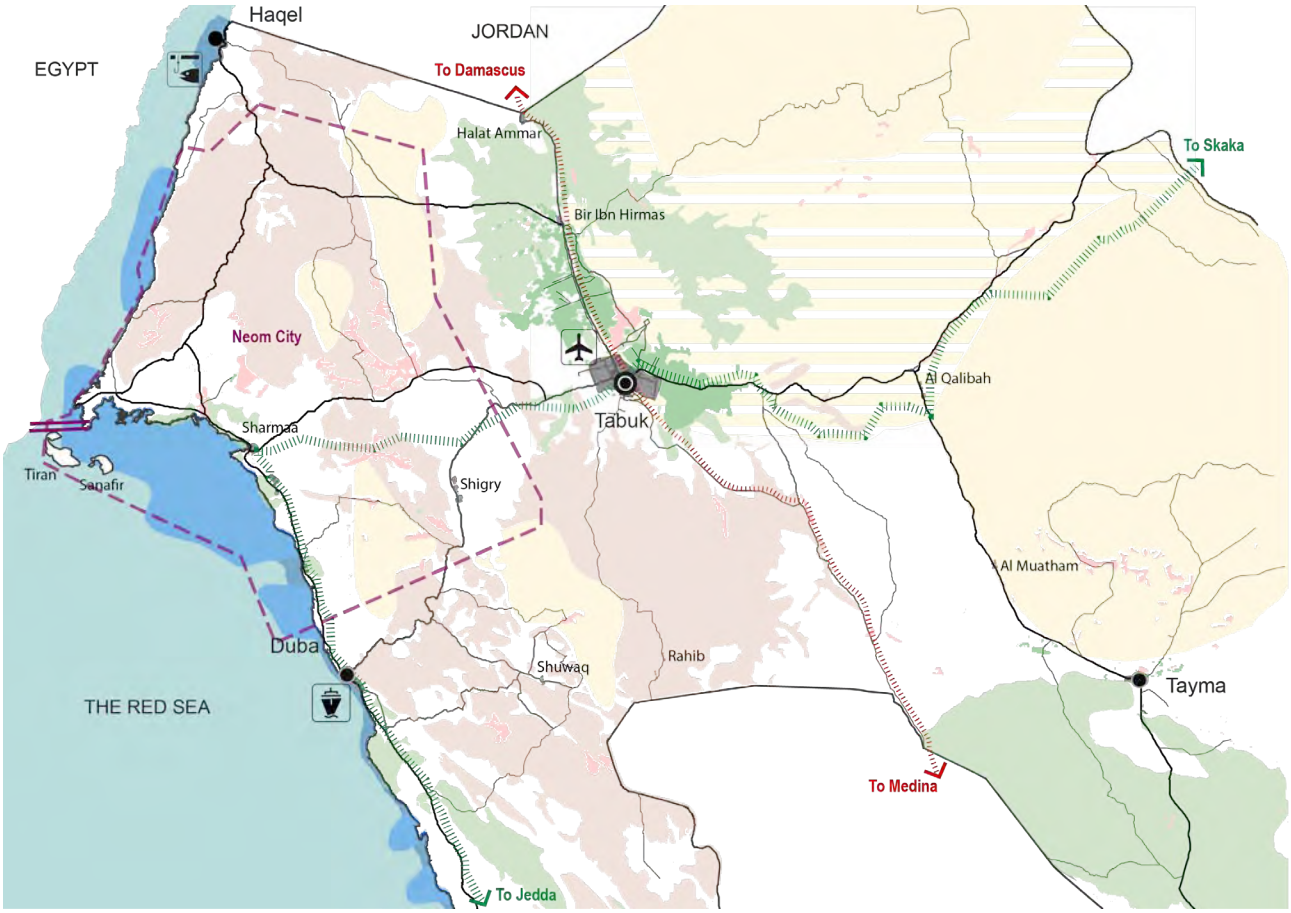
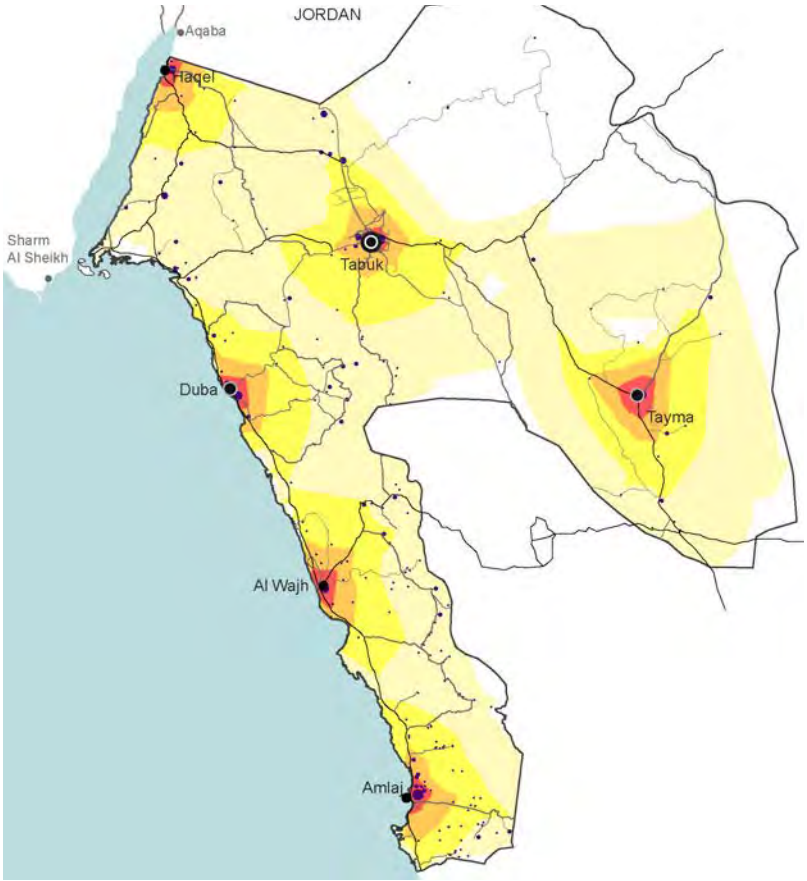


Fig. 9. Neom City as national scale mega-project



Drive Time	Population	% of Total
15 Min	581,503	83.4%
30 Min	601,122	86.6%
60 Min	624,159	89.9%
120 Min	693,699	99.9%
Inaccessable	605	0.1%

Drive Time
15min
30min
60min
120min

Highway
Main Road
Secondary Road

Urban/Rural center population
0-850
851-2850
2851-11070
11071-33150
33151-441351

Fig. 10. Access and connectivity in Tabuk Region

the Straits of Tiran via Tiran Island, that will be called the King Salman Bin Abdulaziz Bridge). Neom's area extends along the Aqaba Gulf and 468 kilometres of coastline with beaches and coral reefs, as well as mountains up to 2,500 metres high, which will provide many development opportunities. The Neom project comes as part of the ambitious plans to transform Saudi Arabia's economy as part of Vision 2030 and to boost foreign direct investment into the country as it embarks on a post-oil era. The bridge is expected to cost about 4 billion US dollars and will be financed by KSA. The causeway would link Tabuk to the Red Sea resort of Sharm El-Sheikh on the Sinai Peninsula and would pass through Tiran Island at the entrance of the Gulf of Aqaba. The proposed construction projects aim to create closer links between Egypt and Saudi Arabia and have the potential to create plenty of jobs on both sides. It will also provide an alternative Hajj route and is expected to serve a million passengers and pilgrims annually.

Concerns have been raised about possible adverse environmental effects, and the neighbouring states have raised others concerns regarding security. The extra traffic and additional development could cause a further decline of the threatened Red Sea Dugong population and damage to coral reefs and fisheries.

2.3 City-region Structure and Dynamics

Tabuk, together with the coastal cities of Haql and Duba, and the agricultural city of Tayma create a simple system of cities that is wholly reliant on the national services present in Tabuk as a national growth center. Amongst these cities, Duba has the potential to take on the industrial role, while Haql could play an influential role in cross-border economic exchange, being a border town. However, this system of cities, currently configuring Tabuk City-region, will be entirely restructured once Neom City is up and functional, as the entire dynamic of the system will change. It is foreseeable that the small towns and the city of Tabuk will see faster growth rates and development, influenced by the new transnational city and economic centre in Neom, so that the city-region will have the opportunity to capitalise on establishing a strong relationship with the new city. In their evolution, these cities can become interdependent because of the many relational networks that they already have, and that interconnect them to a greater extent than other cities located in the wider region.

2.3.1 City-region connectivity

Urban transport infrastructure and services are the backbone for an efficient urban system. Currently, very few public transport lines operate between Tabuk and the cities along the coastal axis and are operated by SAPTCO (Saudi Arabia Transport Company). With Neom City on the horizon, a much more comprehensive and efficient urban transport system needs to be set in place, to give these cities the chance of capitalising on this regional development opportunity.

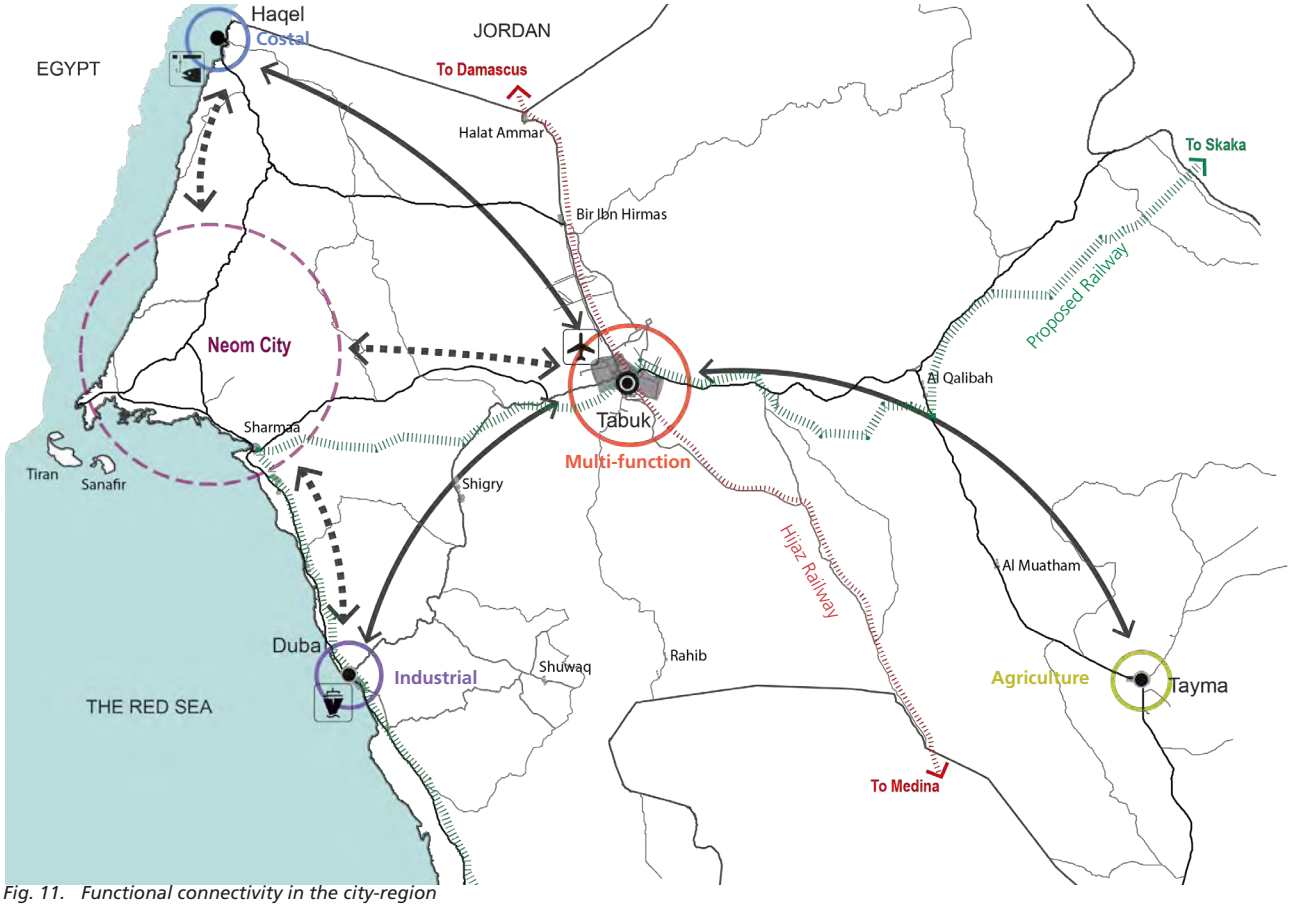
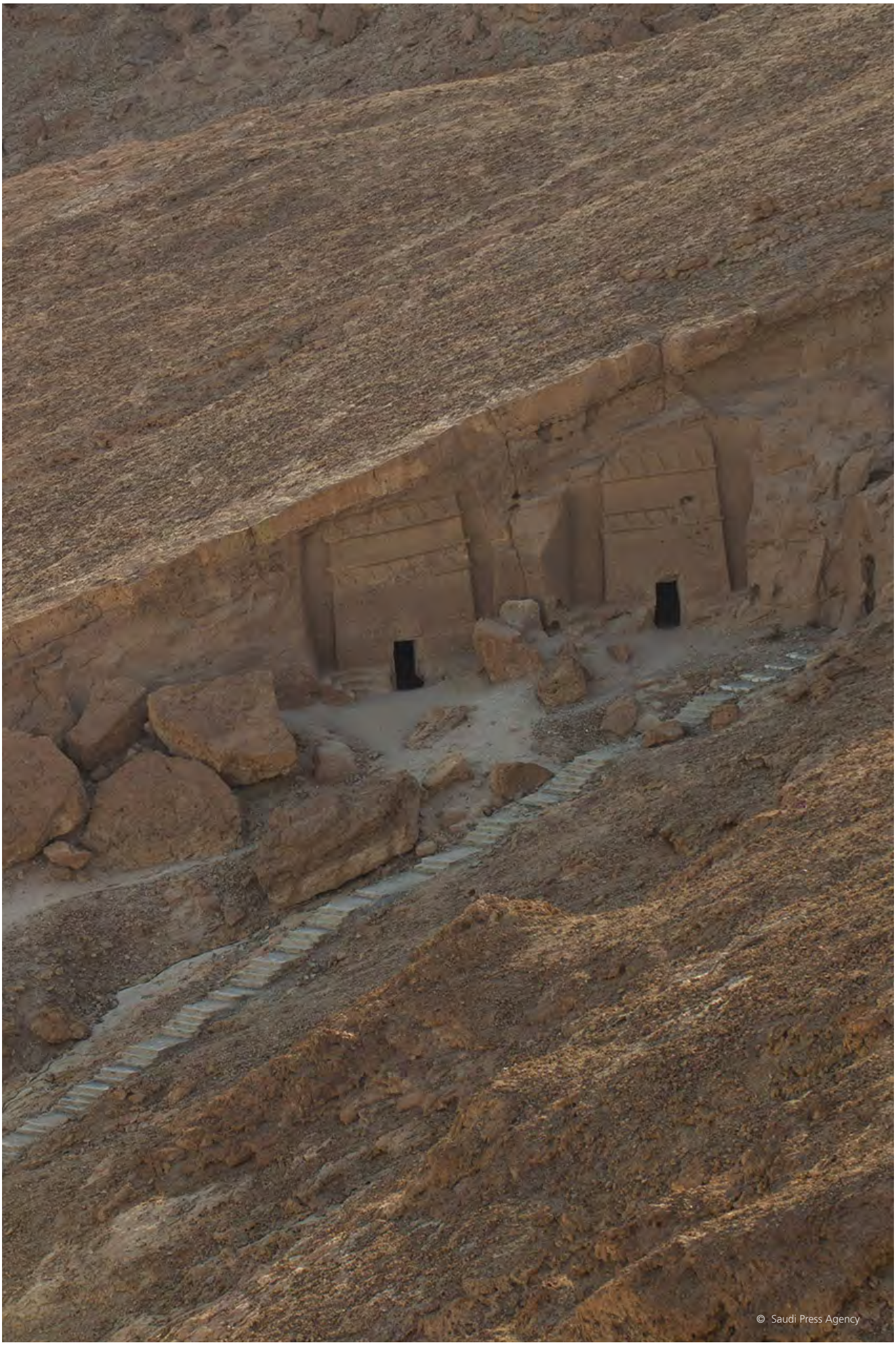


Fig. 11. Functional connectivity in the city-region



View from unique historical assets in Tabuk Region

2.3.2 City-region economy

Agriculture

Agriculture is one of the most important economic sectors in Tabuk, where the total crop area in 2012 was 489,00 hectares, representing about 6.2% of the total crop area in the Kingdom. Tabuk is well known for flower plantations as it exports flowers to Europe such as gladiolas, lilies, and statices. The Tabuk Region has remarkable floristic diversity; however, this natural biodiversity hotspot is affected by several human activities, such as woodcutting and development.[1] Therefore, a conservation programme should be launched to protect the natural diversity in such important vegetated areas.

Tourism

The Tabuk Region holds strong potential for a lot of marine tourism with many beaches and coasts. Given its desert-like nature, unique locations, and cultural heritage landmarks, it provides a mix of different kinds of tourism for visitors, that can provide a strong backbone for introducing the concept of slow tourism. The Regional Plan for the Tabuk Region reviewed the types of tourism possible in the region and found that they included desert tourism, diving tourism, sailing tourism, beach tourism, and cruise tourism, and distributed these potential tourism nodes to Tabuk and other governorates according to their potential tourism development. The plan concluded with a number of recommendations and identified some implementation mechanisms which should be adopted, including:

- Participation between the public and private sectors;
- Determining the importance of the role of the Supreme Commission for Tourism;
- Improving the level of performance in the tourism sector, and providing the workforce necessary to work in tourism activity; and
- Ways to provide the necessary funding and facilitate access to credit for individuals, and provide incentives and advantages that encourage tourism investment.

2.3.3 Climate and topography

The Kingdom of Saudi Arabia represents 80% of the Arabian Peninsula. Environmentally, the country is mainly formed by large sandy and rocky deserts with big mountainous systems. It also has many structural features such as 2,410 kilometres of sea coasts, 2.7 million hectares of forest land, over 171 million hectares of rangelands, 35 square kilometres of mangroves, and 1,480 square kilometres of coral reefs. These ecosystems have an incalculable value; not only do they structure the territory but they are also key elements for the national economy and welfare of the population. Saudi Arabia has a mid to high rate of population growth, one of the few in the world, standing at 2.52% by the year 2017. If not well managed, this growth can impact and deteriorate natural systems, affecting biodiversity and ecosystems' dynamics. In the case of both the Tabuk Region and

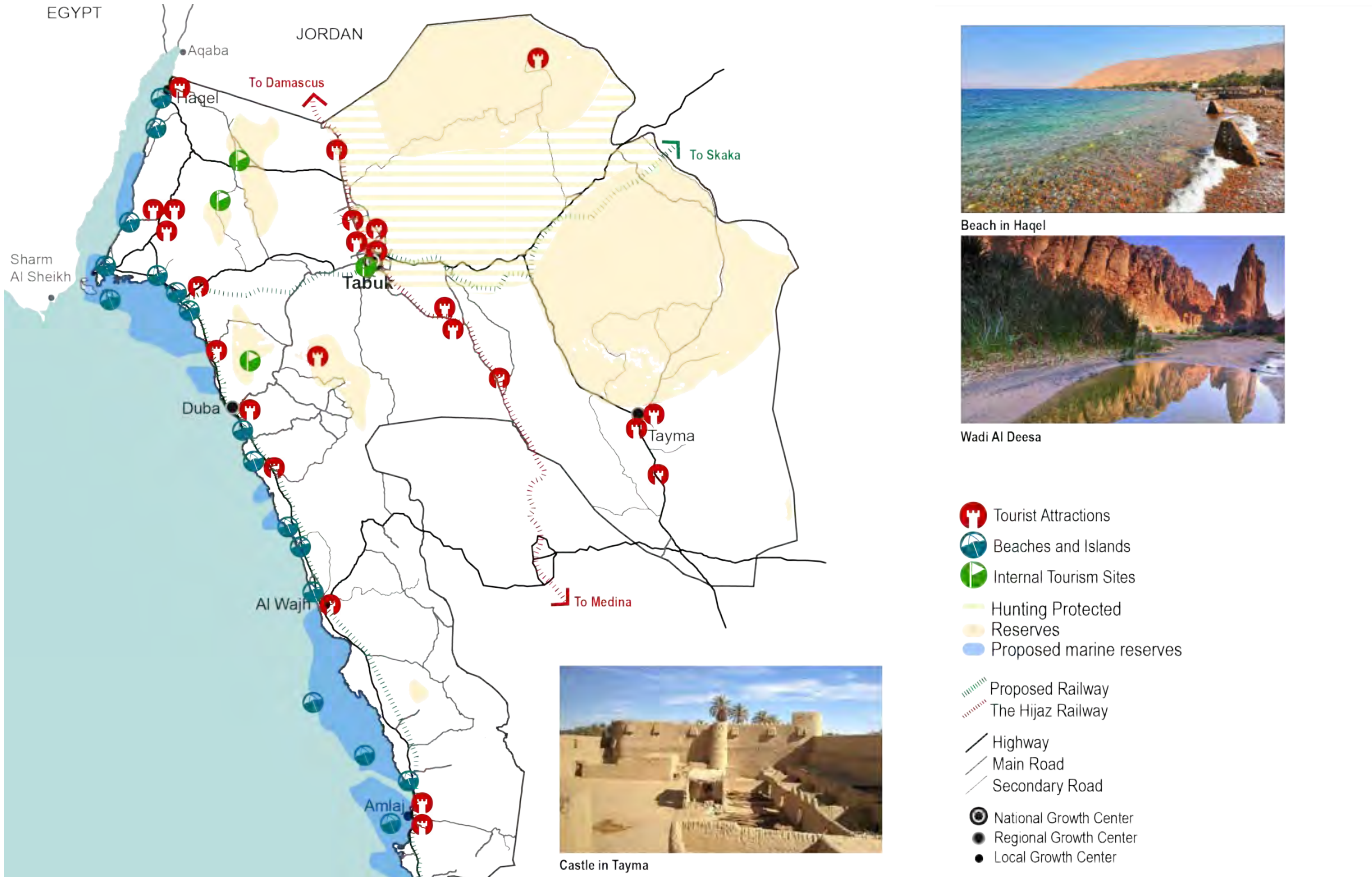


Fig. 12. Tourist attractions

the city of Tabuk, different drivers of environmental degradation have been identified. On the one hand, unsustainable growth patterns and inadequate infrastructure are challenging future economic development and compromising existing natural resources. On the other hand, the burden on the environment is exacerbated by **climate change**, which is currently driving the already severe climate to more extreme conditions.

Environmental Aspects

Tabuk City lies at the junction of the Hejaz Mountains and the plains in the North. It is settled at an altitude of 778 metres bordered by large mountainous systems to the South as well as large areas of agriculture to the South, East, and North, and protected areas and hunting reserves further East. All of these elements make Tabuk´s immediate natural surroundings a varied and characteristic environment. The region, as well as the rest of the country, has a semiarid to hyper-arid climate, characterised by high temperatures, deficient rainfall, and extremely high evapotranspiration. Tabuk region is also characterised by its northerly cooling influences and by having the lowest winter temperature average in the country. Winter temperatures usually range between 6°C and 18°C, occasionally dropping below zero at night, and summer temperatures vary from 28°C to 40°C. Prevailing winds coming from the West also influence these temperatures. Recent studies indicate that these temperatures have been increasing due to climate change. It has been monitored that change in annual mean temperature has gone higher from 0.024°C between 1978-2003 to 0.072 between 2004-2013. In addition, heat wave events have risen from 11 between 1978-1995 to 33 between 1996-2013, as well as sandstorm events which slightly increased by 0.05%.

Regarding water sources, mean annual rainfall in Tabuk is very low at 30mm. However, current trends indicate an increase from -1.03mm between 1978-2003 to 5.85mm between 2004-2013. This means that projected rainfall will rise to 37.1 or 42.0 depending on the model. Equally, air humidity has been increasing from 33% between 1978-2013, and it is projected to keep increasing up to 38% between 2030-2079. Another important element is the number of torrential rain events in the city, which have decreased according to studies from five between 1978-1995 to three between 1996-2013.

In spite of its low rainfall, there is plenty of underground water in Tabuk coming from Tabuk aquifer, which is one of the main aquifers in the country. The city is also surrounded by hills and wadis, of which Wadi Al-Akhdar (the green valley), Wadi Damm and Wadi Asafir are the most important. This has been conducive for agricultural production in the city to be a key economic activity, as it currently accounts for approximately 13% of the land use in the 1450 Urban Growth Boundary. Agriculture land is not limited to this boundary, but it extends to large areas surrounding the city.

Georgios shipwreck in Tabuk coast

GOVERNANCE AND FINANCIAL FRAMEWORK

3

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3.1 Legal and Institutional Framework

The planning legal framework of Tabuk is shaped by the Kingdom's legislative environment, which is based on Islamic Sharia Law. The law-making authority is vested in four entities; the King, the Shura Council, the Council of Ministers and the Ministerial departments. Consequently, there are five legislative instruments (Royal Order, Royal Decree, Supreme Order, Council of Ministers Resolution, and Ministerial Decree) that function in a hierarchical order, underpinning their authority and validity.

Given this non-centralised law-making process, the city of Tabuk is guided by over 500 existing urban planning related instruments with most of these having been promulgated at the lowest administrative level (Circulars),[2] that lack authoritative legal force.

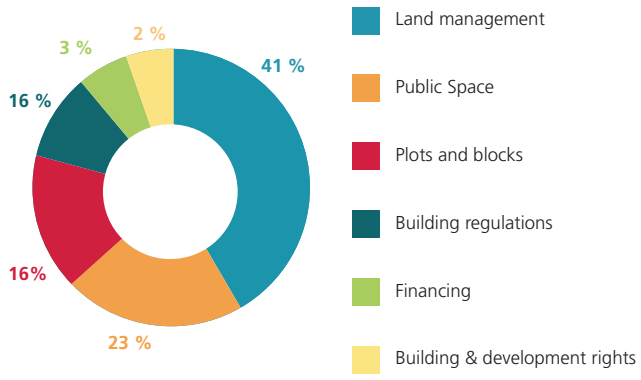


Fig. 13. Number of urban laws in KSA based on the Main Themes of Urban Planning Legislation (UN-Habitat)

The Ministry of Municipal and Rural Affairs (MoMRA) plays a significant role in Tabuk's growth and development patterns because it is legally entrusted with the task of conducting urban planning of the Kingdom's cities, including the permitting of all types of construction activity. Consequently, the Municipality of the Tabuk Region (Amanah), as the local level actor for Tabuk, merely acts as an implementing arm for MoMRA. The institutional budgetary system is also centralised, meaning that Tabuk's development intervention is reliant on funds allocation from MoMRA through an annual line item budgeting, which is the sole fiscal means available.

The Kingdom's planning system, which follows a hierarchy of spatial level and is predominantly top-down, influences the spatial system of Tabuk. The National Spatial Strategy (NSS) of 2001 is the guiding plan for the Kingdom. Three plans have been approved and are operational in Tabuk. These include a) the Regional Plan for Tabuk Region, 2005; b) the Structural Plan, 1996; and c) Local Plan, 2013. The three phases of the Urban Growth Boundary, (2014, 2019, and 2030) aim to prevent urban sprawl in the outskirts of cities without adequate urban infrastructure. The Land Subdivision Plans are the basic building blocks that guide Tabuk's development.

Apart from NSS, these planning instruments are defined by procedural manuals within MoMRA, rather than by Law, and thus they lack legitimacy. By their nature, these instruments cannot construct a system of legal accountability and transparency of the relevant actors. Moreover, land use and building control regulations have facilitated urban sprawl within Tabuk. For example, the total built-up area for the city is 15,360 hectares, which has a population density of 45.2 p/ha. In addition, within the same area, residential districts are not only scattered but also have a low-density typology. This is evidenced by the fact that 94% of the buildings, within the city, have a maximum height limit of two floors. Therefore, it appears that the in-force building regulations have instigated urban sprawl within Tabuk, despite the call from residents, specialists, municipality council, and the private sector to regularise high-density residential housing within the city.[3] Additionally, the land owned by the government and the military, as well as the agricultural land, which exists within the urban core poses a great challenge to Tabuk's territorial planning.

In terms of reform, Tabuk would benefit from both fiscal and jurisdictional decentralisation to facilitate independent and innovative solutions to urban social problems at the Amanah level. This should entail:

- The transfer of local planning power, authority and function from MoMRA to the Amanah with provision for independent action without recourse to effectively address community needs. This is supported by the New Urban Agenda, which specifies that territorial urban design and planning processes should be led by sub-national and local governments, but their implementation will require coordination with all spheres of governments as well as participation of the civil society, the public sector and other relevant stakeholders.
- Fiscal decentralisation, which gives autonomy to the Amanah to source funds to finance development activities. Revenue generation activities in cities may also include taxes and levies. Urban areas, such as Tabuk should be allowed to collect some form of property taxes to fund development activities. The recent White Lands Act that imposes fees on undeveloped plots in urban areas to tackle land speculation, housing shortage and indiscriminate land development shows that regulatory mechanisms can be leveraged to generate revenue while fostering an efficient development framework.
- Opening of avenues for actors, including the private and voluntary sector and the general community, to participate in decisions regarding projects that affect them.

Consolidation of the legal planning instruments would also support development intervention in Tabuk and add legitimacy to the plans that Tabuk relies on. Additionally, the city of Tabuk could benefit from a functional, effective legal instrument that:

- Manages scattered settlements located on agricultural land, preserves this land use and factors these areas in the urban boundary;
- Safeguards the city's urban identity, particularly the surrounding cultural areas;
- Transfers development rights outside the city's urban core, particularly the significant pockets of land of the Eid Mosque and the Ministry of Defense.

The law-making process could also be revised to limit the number of actors. The legal framework needs to enshrine an acceptable level of public participation in decision making, to foster equality and inclusion.

Revising the Urban Growth Boundary (UGB) Law to include clear criteria on how it is set would enhance technical and vertical accountability. The law also needs to place more emphasis on establishing the Development Protection Boundary as a no-development zone to prevent not only haphazard development but also avert private interests from taking advantage of the laxity in the legal text. These initiatives will strengthen policy formulation designed to make the city more sustainable, compact and dense. Primarily, post-legislative scrutiny of the UGB Law should be done to assess if it has met its policy objectives. This could, in turn, inform the legal reform process as well as the planning policy options.

3.2 Planning Instruments and Procedures

3.2.1 Hierarchy of plans

The planning system of Tabuk is derived from the de facto planning hierarchy of the Kingdom. In this framework, there are four different levels of spatial plans: national, regional, local and district. Figure 14 highlights the planning instruments in force in Tabuk.

3.2.2 The Tabuk Regional Plan

Regional planning represents the second-tier of spatial planning in the KSA, which aims to address the natural, urban, social and economic regional development aspects. The regional plan for the Tabuk Region was developed by MoMRA and approved in 2005. This plan covers Tabuk City and the following five cities: Al-Wajh, Duba, Haql, Tayma, and Umlaj.

The Tabuk Region, which is located along the Northwest coast of the Kingdom, enjoys a strategic geographical advantage. It serves as a centre for trade and economic exchange with neighbouring countries, thereby enhancing the opportunities for international trade, free zones, special economic zones, and attracting global investment into the region. The Tabuk Regional Plan enhances axial development which has significantly advanced Tabuk's status as an economic hub. The plan considers Tabuk as a centre for national growth and focusses development within the city while simultaneously spreading

Natural land features around Tabuk

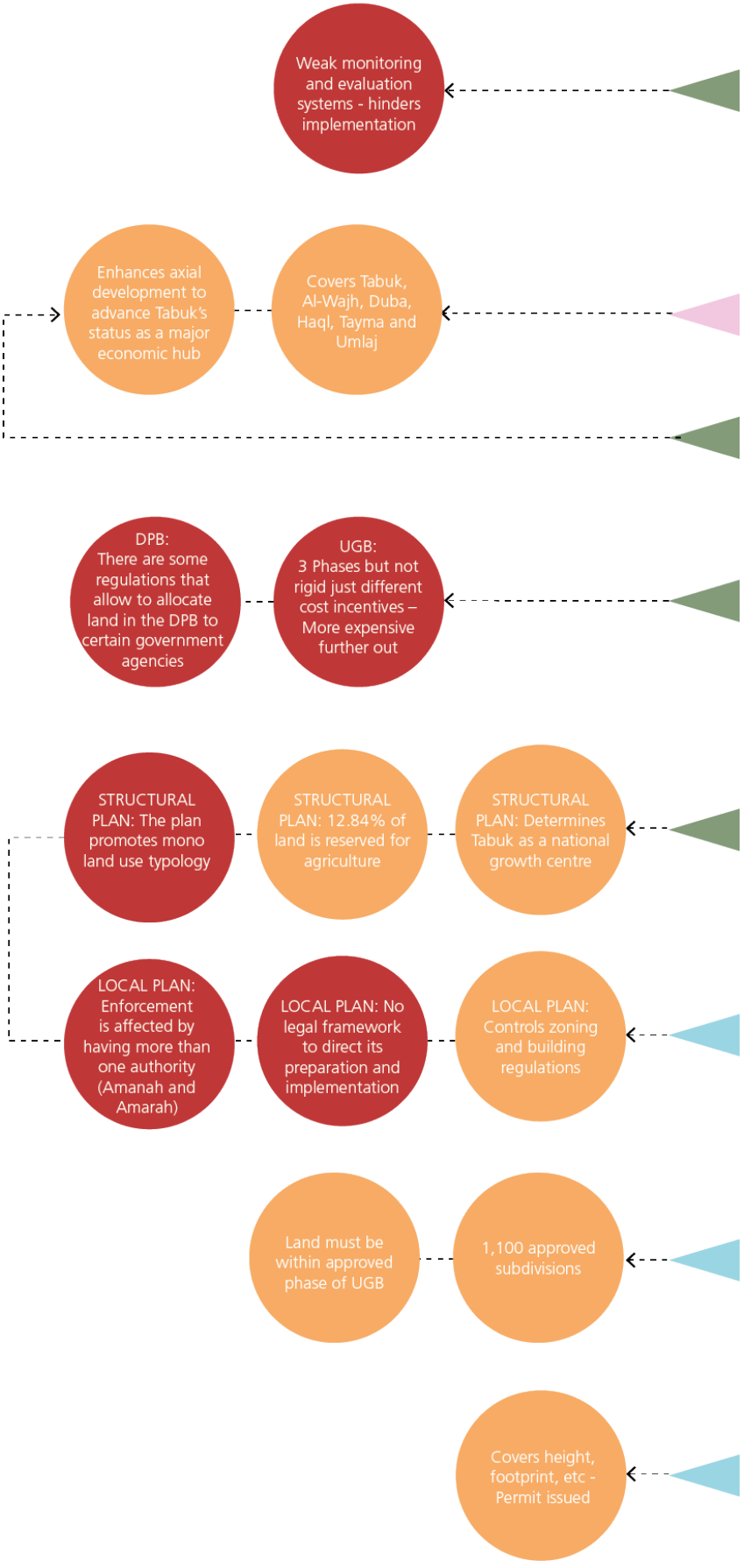
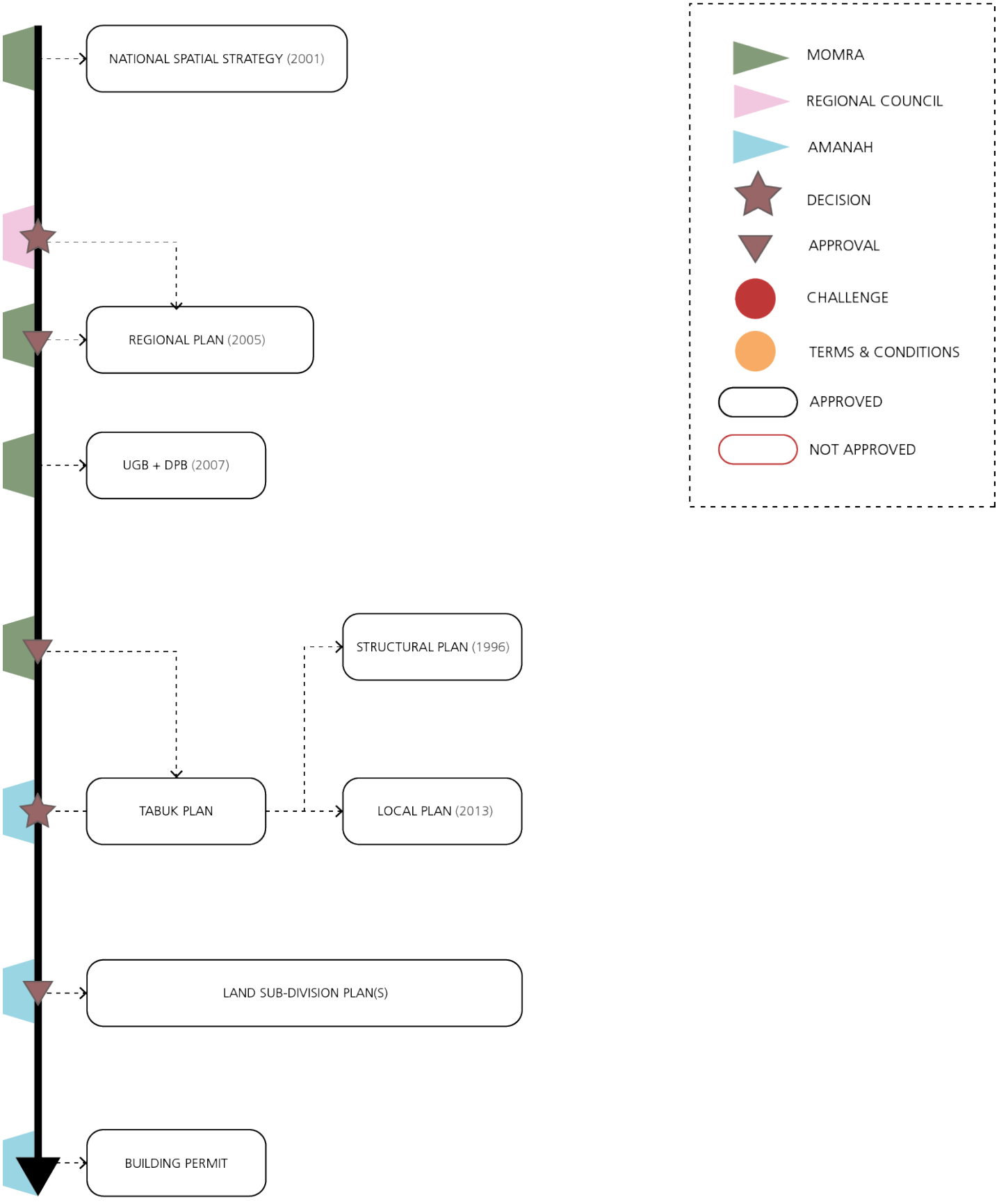


Fig. 14. FSCP simplified representation of hierarchy of plans and the planning instruments for the city of Tabuk


NATIONAL SPATIAL STRATEGY (2001)
REGIONAL PLAN (2005)
UGB + DPB (2007)
STRUCTURAL PLAN (1996)
TABUK PLAN
LOCAL PLAN (2013)
LAND SUB-DIVISION PLAN(S)
BUILDING PERMIT
MOMRA
REGIONAL COUNCIL
AMANAH
DECISION
APPROVAL
CHALLENGE
TERMS & CONDITIONS
APPROVED
NOT APPROVED

development to other growth centres, especially those located on the coastal corridor. In addition, the plan seeks to distribute development for the rest of the region in a balanced manner to achieve the trends of the National Spatial Strategy (NSS). The NSS directs balanced regional development by:

- Spreading and focusing economic development at the National Growth Centre (Tabuk), regional and local growth centres as well as rural clusters and communities;
- Applying the recommendation of the National Spatial Strategy to make the city of Duba a Regional Growth Centre and to support its tourism development. This has been implemented by the presence of a port and the proposed establishment of both an airport as well as an industrial area;
- Raising the level of the city of Taima to a Regional Growth Centre to support its active agricultural development as well as the development of touristic sites to achieve the developmental balance between the coastal corridor and the internal corridor of the Region;
- Sustaining the level of the cities of Al-Wajh, Omloj, Haql, and Al Beir as Local Development Centres to support the tourism development of these cities, in addition to the existence of fishing and mining activities;
- Excluding Al-Assafiyah from being designed into a Local Growth Centre pursuant to the recommendation of Tabuk Urban Development Strategy because it is in a protected reserved area (Al-Khanifah Reserve);
- Establishing a Local Growth Centre in the city of Bida to support tourism services in this coastal sector;
- Developing rural clusters (Rural Growth Centers) in the villages of Shakra, Kulaiba, Ashawaq, Sharma, New Al-Jahra, Al-Shabhah, Al-Mungor, Maqhna, and Zaytah, as well as the development of a rural cluster for a new village called Al-Hawj located on Tabuk/Skaka corridor. This village will not only act as a hub for agricultural activities and an extension of Basaita agricultural plains in Al-Jouf Region but also serves the international, regional corridor of Tabuk/Skaka/Arar;
- Linking Tabuk Region with neighbouring areas with the following development corridors: Dhiba/Tabuk/Sakaka/Arar (the northernmost international corridor of the Kingdom); Internal corridor of Tabuk-Taima -Madinah; Corridor of Wajih - Ola – Hael; and The coastal corridor of Madinah - Yanbu -Tabuk;
- Linking the National Growth Centre (Tabuk) with various growth centres in addition to linking rural clusters with other sub-development corridors including Regional and Local Growth Centres and strengthening the road network and infrastructure; and
- Focussing on economic and industrial development, by enhancing agricultural, mining and tourist activities as well as work on using the mining within the various growth centres.

3.2.3 The Tabuk Plan

The Tabuk Plan[4] is a planning tool constituted by a strategic component (the Structural Plan), and of a regulatory document, the Local Plan, supporting the technical implementation for selected areas within the city. The scope of these plans includes:

- Long-term strategy for the city;
- Identification of relevant development areas;
- Identification of urban/non urban land;
- Main mobility system;
- Environmental protection;
- Infrastructure provision;
- Detailed land use;
- Urban regulations; and
- Detailed proposals for selected areas.

Structural Plan of Tabuk

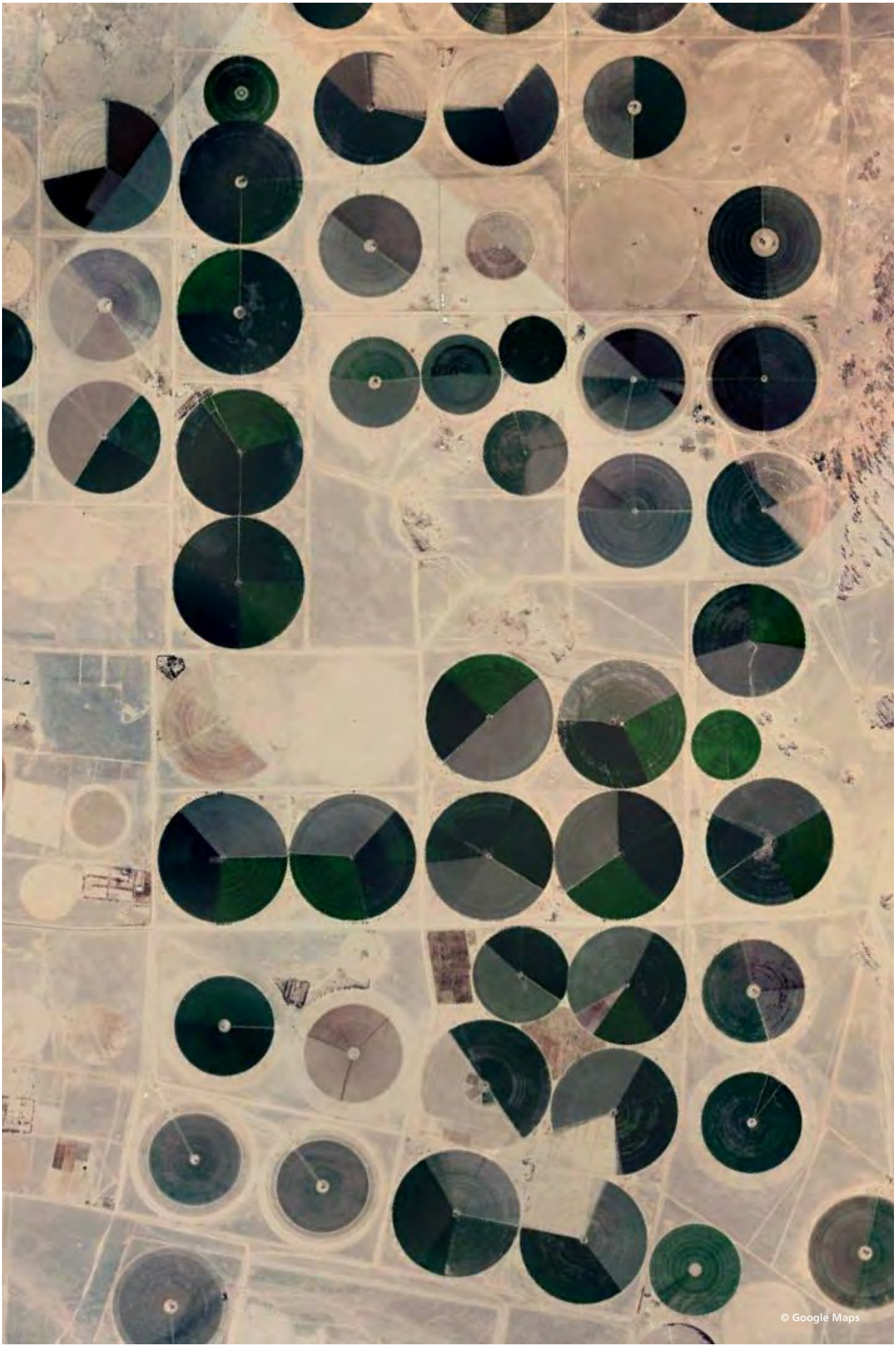
The Structural Plan aims to identify key spatial structures as those provided for in the Regional Spatial Strategy. The Tabuk Structural Plan (1996-2043) was prepared by the Amanah and approved by MoMRA. This plan, in line with the Regional Plan, highlights different objectives for the different cities that are located within the metropolitan area.

Within the context of the National Urban Strategy and the suggestions from the development strategy of the Tabuk Region, it has been determined within the City's Structural Plan that Tabuk City should be a National Growth Centre. This would help in achieving a more balanced regional development and it would require the city to have the following facilities to serve the surrounding local communities and clusters, as well as the numerous villages and hamlets:

- Universities, technical colleges, and technical institutes;
- International airport and multimodal transport systems;
- Sports fields and cultural centre;
- Agricultural and animal activities;
- Industrial city and craft workshops;
- Money, trading and bank activities, and market;
- Tourism, leisure, and recreational activities;
- Transport and export;
- Health Services; and
- Security and administrative services.

However, several important urban projects are included in the Structural Plan, the most important of which are the following:

- The supply of infrastructure networks for development action areas according to the five-year plans and stages of implementation of the Structural Plan;
- Initiation of study programs for the road networks leading to the industrial zone towards the North-Eastern part of the city;
- Initiation of study programs for the industrial zone;
- Activate the Western and Northern Ring Road to serve



Crop circles in Tabuk

the university and sports city; and
- Authorise the use of land located along the Madinah Road on both sides for residential, commercial purposes with a depth of 400 metres for 20 kilometres starting from the yard of Tabuk Sahari Hotel.

In terms of land-use, the Structural Plan identifies strategic land uses and infrastructure networks within the metropolitan area of the 2030 Urban Growth Boundary. Within this growth boundary, 30.95% of the land is reserved for governmental uses whereas 18.59% of the urban area is reserved for residential use. Within the city' geographical extent, 12.84% of the land is kept for agricultural use, which means that the definition and separation of buildable vis-a-vis non-buildable areas is strong in Tabuk.

This plan does not promote a clear mixed land use strategy as it encourages a mono land use typology instead. Mixed land uses, (3.86% Commercial and Residential) are only proposed along the major corridors. Other uses, such as industrial have a land allocation of 5.25%, while more than 11% of the city's urban land is earmarked for public facilities.

Local Plan

The Local Plan represents the third level of the urban planning system in KSA and is largely focused on those areas of a municipality, which are contained within the UGB with a special focus on housing. The Local Plan contains the Urban Atlas which details the allowed land uses for every part of the city. It is complemented by a regulations report which contains specifications on the permissible development rights such as floor area ratio, street dynamics, building heights, areas of special building regulations, etc.

The aim of the Local Plan is to a) apply urban controls to urban land use and building regulations; b) to provide public services and infrastructure in a cost-effective and integrated manner; c) set basic requirements for proposed road networks; and d) help facilitate the development of public and private sector housing.

There is no legal framework to direct the preparation and implementation of local plans. Rather, it is prepared by various consultants following the "Booklet of the Terms of Reference for the Preparation of the Local Plan," which is formulated by MoMRA. This Booklet was updated in 2015, and one key technical change is the requirement that the lifespan of new plans should be 14 years (2015-2029).

The development of the Local Plan is complicated by the fact that there are parallel structures set up by MoMRA and the Ministry of the Interior. While the legal mandate for planning lies in the Municipalities (under MoMRA), there are jurisdictional overlaps with the Mohafazat (Governorates, sub-regional) and Markaz (Districts), which are set up under the Ministry of Interior. In other words, the Ministry of Interior is the oversight entity for regional project implementation[5] while MoMRA is the central spatial planning institution but there is no clear coordination mechanism. This frequently leads to decision-making impasse which affects the delivery of technical standards within municipalities such as Tabuk. The Tabuk Local Plan was approved in 2013, and it was prepared by MoMRA in coordination with the Amanah.

3.2.4 Tabuk Urban Growth and Development Protection Boundaries

Legal Framework

In 2008, the Prime Minister issued decree No. 157, which sets the overall regulations for both the Urban Growth Boundary (until 2030) and the Development Protection Boundary. The executive regulations were issued in 2010 by the MoMRA Ministerial Decree No. 11769 followed by the current revision (MoMRA Ministerial Decree No. 66000) which was enacted in 2014. The growth boundary is intended to control urban expansion and prevent sprawl in the outskirts of cities without adequate urban infrastructure, whereas the development protection boundary sets a long-term plan for future development of cities beyond the 2030 urban growth boundary. The 2014 Decree stipulates several general development principles including:

- Strategic development projects that are part of the spatial strategies, including major road and railway networks passing through private lands, should be prioritised over any other development projects;
- Development projects outside of the boundary are only permitted with the approval of MoMRA; and
- Large-scale development projects should follow specified detailed standards.

The Law also defines development standards that a developer is obliged to comply with based on strategic categories of national, regional, and local centres and the size of the lot. Tabuk is categorised as a National Growth Centre (See figure 15).

Legally, the area between the Development Protection Boundary and the 1450 (2030) Urban Growth Boundary is protected and not earmarked for development, but the law also outlines mechanisms for building mega or national-regional economic projects therein.

Moreover, given law, certain agencies have rights to land situated in such areas, where approval of development projects is routinely controllede by set of regulations in this regard. MoMRA's powers of assessing compliance. Additionally, given the legal flexibility around the definition of "mega" or "strategic" projects, private residential developments exist outside the 1450 (2030) Urban Growth Boundary. These factors have undermined the functional effectiveness of the regulations, the rule of law, as well as compact development of urban areas.

URBAN BOUNDARY CLASSIFICATION OF LAND SUBDIVISION APPROVALS AND THE URBAN BOUNDARY PHASES EXECUTIVE REGULATION ISSUED BY THE MINISTERIAL DECREE NO 66,000 IN 20/12/2014		
1ST PHASE (2014-2018)	2ND PHASE (2019-2024)	3RD PHASE (2025-2030)
NATIONAL GROWTH CENTERS (HAEL, TABUK, BURAIDAH, ONAIZA, ARAR, NAJRAN, JAZAN, AL BAHA, SAKAKA, ABHA, TAIF AND AL AHSA)		
MORE THAN 500,000 SQM		
- Tarmacking of internal roads - Sanitation and electricity - Water if available - Storm water infrastructure	- Tarmacking of internal roads - Sanitation and electricity - Water if available - Storm water infrastructure - Connect to closest main road - Percentage of residential area completed not less than 50% - Provide land for social services (schools, kindergartens, hospitals, etc.)	- Tarmacking of internal roads - Sanitation and electricity - Water if available - Storm water infrastructure - Connect to closest main road - Percentage of residential area completed not less than 50% - Provide land for social services (schools, kindergartens, hospitals, etc.)
- Tarmacking of internal roads - Sanitation and electricity - Provide land for social services (schools, kindergartens, hospitals)	-	-

Fig. 15. Matrix Showing the development options within the phases of the Urban Boundary in the National Growth Centres (including Tabuk)

Setting the Boundary

The Urban Growth Boundary for Tabuk was set simultaneously, along with other cities, by MoMRA, through a Committee under the Unit of Coordination and Projects. The composition of the committee is not yet clear, for instance, it did not involve the municipality of Tabuk Region, which is responsible for planning at the city level. There is an understanding that the calculations were based on selective factors, such as historical growth and expected population growth in the city; however, there is no accurate published criteria on how the size of the boundary was calculated.

Challenges

Although Tabuk is considered an ideal city for the implementation of the phased stages of the UGB, there is segregated development and disconnection between the different development phases because of white lands owned by both the government and military, as well as agricultural land, which is allocated within the different phases of the UGB.

Permitting

Development within the UGB is closely linked to permitting and development control. The process in Tabuk is as follows:

- A developer submits a land subdivision plan, including detailed implementation plans for the instalment of the requisite infrastructure to the Amanah of the Tabuk Region;
- The Amanah will then assess the application in accordance with the provisions of the Law on the Urban Growth Boundary; except those cases defined by MoMRA Ministerial Decree No 17777. This Decree delegates certain roles to the mayors in regards to approving land subdivision, solely in relation to the size of residential projects. The Mayor of the Tabuk Region is an approval authority under this Law;
- The application is then sent to MoMRA for review in accordance with development standards and applicable building codes, and building permits are either refused or granted by MoMRA;
- A developer whose permit has been refused has two options of appeal: a) recourse to the Amanah and MoMRA calling a re-study of the application; or b) file the case in the relevant jurisdictional administrative court;
- The decision in the above appeal processes is final and binding to all the parties.

White Lands Act

The percentage of undeveloped land ("white lands"), in Tabuk is not high; there are 1,388 hectares which represents more than 7% of the land inside the 1450 (2030) UGB. The

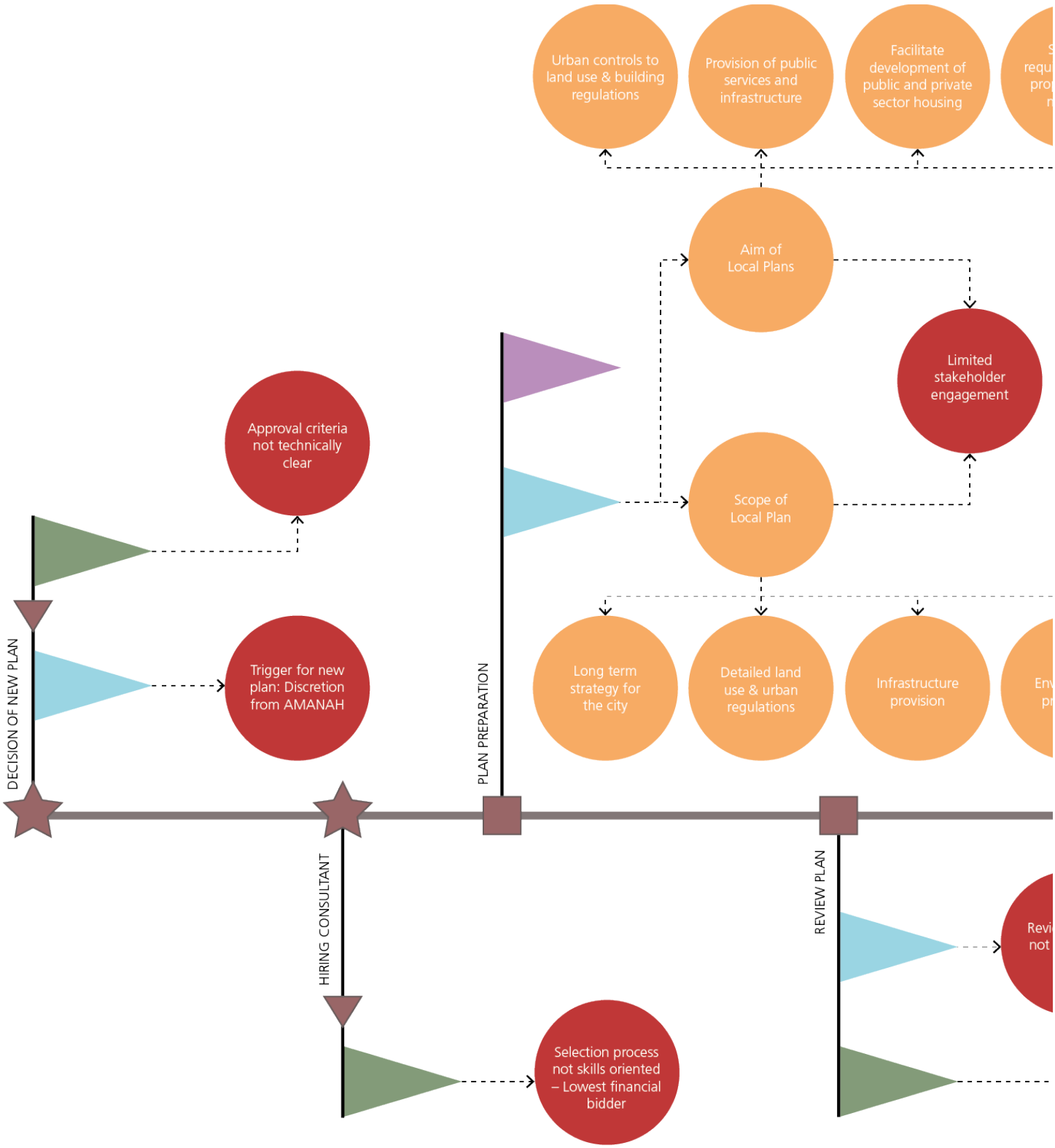
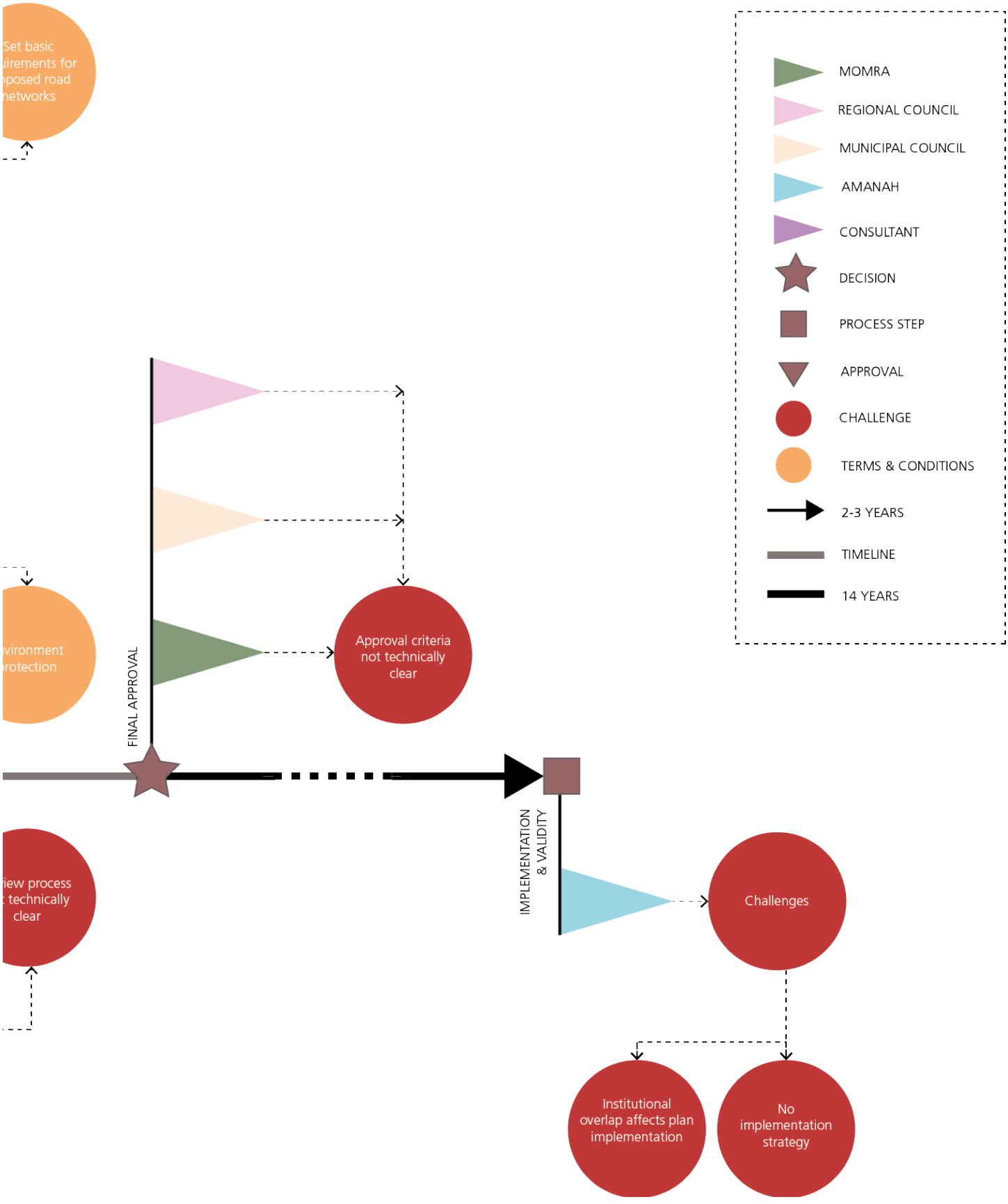


Fig. 16. FSCP simplified representation of Planning Process and Actors involved in the preparation of the Tabuk local Plan


Set basic
uirements for
pposed road
networks
MOMRA
REGIONAL COUNCIL
MUNICIPAL COUNCIL
AMANAH
CONSULTANT
DECISION
PROCESS STEP
APPROVAL
CHALLENGE
TERMS & CONDITIONS
2-3 YEARS
TIMELINE
14 YEARS
vironment
rotection
FINAL APPROVAL
Approval criteria
not technically
clear
iew process
t technically
clear
IMPLEMENTATION
& VALIDITY
Challenges
Institutional
overlap affects plan
implementation
No
implementation
strategy

government recently issued the White Lands Tax Law[6] that imposes an annual land tax of 2.5% of its value on "white land," which is defined as vacant land located in 'populated areas'; zoned for residential or for dual residential and commercial use. This Law aims to: a) increase the supply of developed land to better address housing shortages; b) make residential land available at reasonable prices, and c) combat monopolistic practices. The Ministry of Housing, which is the implementing authority, will enforce the Law in phases. At the moment, the Act is operational only in Makkah, Riyadh, Dammam and Jeddah (See figure 17).

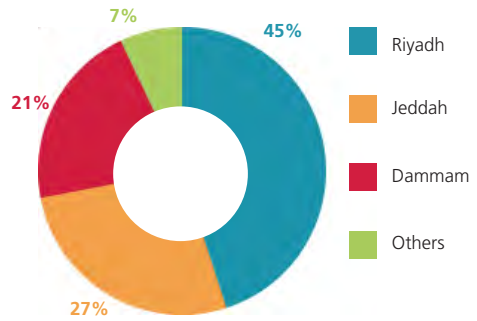


Fig. 17. Percentage of white lands after implementation of the first phase of the White Lands Law

3.2.5 Land Subdivision Plans

The Land Subdivision Plans are the basic building blocks for KSA cities' growth and development. The Mayor of the Tabuk Region has the power to approve the land subdivision in accordance with the following criteria (Ministerial Decree No. 17777 of 2010):

- The land must be within the approved urban boundaries;
- The land use specified for the land is consistent with the instructions and regulations governing it;
- The subdivision will not result in cancellation or modification of an approved regulation, planning or authorised land use;
- All necessary planning procedures have been completed and the Deputy Ministry for Town Planning (DMTP) has been issued with a certified copy of the plan after its approval.

There are more than 1,100 land subdivision plans, which have been approved by the Amanah within the UGB.[7]

3.3 The Institutional Context

3.3.1 Urban institutions in KSA

Tabuk's growth and development pattern is impacted by the centralised planning institutional framework of the KSA, under MoMRA. MoMRA is entrusted with the task of conducting urban planning of the Kingdom's cities, including providing the necessary roads and fixtures, maintenance and cleanliness of the environment, as well as of licensing all types of construction activity. The Deputy Ministry of Town Planning under MoMRA and its departments, such as Local Planning, Studies & Research, Projects Coordination and Urban Planning & Design, is mandated to coordinate with "concerned bodies" in charge of planning, to achieve comprehensive urban development.[8] In practice, there is little coordination between these departments and the Amanah, and this affects service delivery and project implementation.

3.3.2 Regional context: Tabuk Region

According to the Ministry of Interior administrative classification, the Tabuk Region is divided into six governorates (3 are class A while 3 are class B), and 66 centres (18 are class A while 48 are class B). Tabuk, being the regional capital, is not included in this classification but is instead governed through a "municipality" (Amanah), and headed by a Mayor. This delineation is provided for by MoMRA with Tabuk's actual status being a 2nd class Amanah. Given this structure, the Amanah is allocated funds by MoMRA for development action and municipal services through an annual line-item budgeting, which is the sole fiscal means available to Tabuk.

There are additional institutions in the Tabuk Region that manage and regulate the development process. The Amarah of the region, headed by the Regional Prince who, pursuant to the Regional Law,[9] reports to the Ministry of Interior.

The Regional Council is based in the Amarah and is required to :

- Identify the needs of the region and propose their inclusion in the National Development Plan;
- Identify beneficial projects for the region and submit these as activities requiring funding. These requests are vetted, and viable projects selected for funding. Funding is provided as part of the National Development Plans and annual budget of the country, which is the sole means available to municipalities;
- Study the organisational arrangement of the regional administrative centres, follow up implementation of any modifications; and
- Implement the provisions of the development and budget plan, and carry out the needed coordination.

The Municipal Council, also located in the Amanah, with two-thirds of its members appointed by citizen's votes while MoMRA appoints the rest, supervises the activities of the Amanah and municipalities to make sure that they conform to the Local Plan, as well as meet the current needs of the region. It approves:

- The municipal budget sourced from the cash allocation from the national government. This is constantly subject

to revision as it is based on the agreed priorities between the Council and the Mayor;
- Examines the residential plans focusing on whether any procedural violation occurred;
- The scope of municipal services; and
- Expropriation projects based on the priorities of the Mayor.

The Council has no executive powers as this is vested in MoMRA, the Regional Prince and the Regional Council, and therefore, it does not have the capacity to directly follow up its recommendations.

3.3.3 Local context: Tabuk

The Tabuk Region is composed of several cities including Tabuk, which is the capital and largest city. As earlier mentioned, the city is managed by the Amanah which is headed by a mayor. The mayor is appointed by the Minister of MoMRA and the rest of the Amanah's executive members are appointed by the Civil Service Bureau based on their professional qualifications.

The organisational structure of the Tabuk Amanah was updated three times since the establishment of the Amanah of Tabuk. However, within the administrative structure and under the Mayor's office, there are four important main deputies/ agencies concerned with the administrative, organisational, and planning aspects of the Amanah of Tabuk as follows:

- Deputy of Urban Development;
- Deputy of Construction;
- Deputy of Services (Environment); and
- Deputy of Development and Municipal Resources Development.

There are various challenges facing the Amanah in relation to the administration of Tabuk, such as:

- The lands owned by the governmental and military authorities are located within the urban core, which hinders the planning initiatives of the Amanah;
- The role of the Amanah is merely to apply the regulations and legislation, especially those issued by the higher authorities. It has a limited role mainly providing developmental suggestions as per the Council of Ministers Real Estate Disposal Regulation, 2003 and its implementing regulations, 2005. The Amanah also has a direct role in the preparation of building regulations/systems of the city of Tabuk, especially within the approved Local Plan;
- Many governmental agencies, and especially their departments operating within Tabuk city, overlap with the Amanah of Tabuk region, which are the Tabuk Region Council, Tabuk Municipal Council, and the Municipalities of the Governorates, (13) (Transportation, Electricity Company, Water, Agriculture, Civil Defence, Traffic, Civil Service, and Notary public.);
- There is limited vertical coordination between the Amanah and the Ministerial departments, except for the Ministry

Presentation of the Future Saudi Cities Programme

of Finance, where there are continuous and direct coordination and communication, especially with respect to budgets, financial claims, and preparation of budgets;
- Only a few employees are specialised in urban planning, and in addition the recruitment and selection process is bureaucratic and time-consuming;
- An insufficient budget which does not compliment the magnitude of work to be undertaken within the Amanah. This affects, among others, the hiring of qualified consultants to prepare the plans; and
- The procedures to monitor violations of planning regulations and enforcing administrative actions, such as penalties is cumbersome, hence ineffective as a deterrent mechanism.
- More effective mechanisms are needed to tackle the emergence of unplanned settlements within farmlands as well as the air pollution from the landfill on the fringes of the city that is affecting residents.

3.3.4 Legal and institutional implications for Tabuk

Most of the technical decisions and approvals in the local governance (Amanah), including planning decisions, are made on a discretionary basis based on the priorities set for the city. Therefore, the system lacks technical accountability, predictability, and practical clarity.

3.4 Financial Context

3.4.1 Financial system

Sound fiscal management is key to supporting local development. They are fundamental when establishing a solid financial base that strengthens the public sector's role in endorsing economic development. This chapter examines the financial system in Saudi Arabia, particularly regarding Tabuk.

The financial system reflects the degree of centralisation of the governance system in the KSA. MoMRA, via Amanahs, is responsible for financing municipal service activities, such as city planning, building licensing, and road maintenance. In addition to MoMRA, other specialised agencies, (e.g., emir, regional councils, national level ministries), fund and implement projects at the city level. For instance, the Ministry of Education funds city schools directly, instead of funding them through the Amanahs.

3.4.2 Municipal revenue

Currently, the Amanah only has a few sources of revenue and limited authority to collect fees. MoMRA has recently introduced municipal fees, which expanded their own-source revenue base, but local revenues continue to be insufficient. Consequently, the Amanah continues to be reliant on support from the central budget. Therefore, the central government finances most of the public services and infrastructures at the local level. Baladiyahs[10] submit project proposals to the municipal government, who sends them to MoMRA and the Ministry of Finance (MoF) for approval. The MoF allocates fund to ministries and government agencies, (e.g., emir and regional councils) taking into account additional factors, such as population.

In the fiscal year of 2017, Tabuk generated 5% of its budget with own-source revenue. Land sales, signboard fees, detect fees, and land rentals are the main contributors to own-source revenue, representing 89% of the Amanah's local income, . The gap between own-source revenue and the municipal budgets is usually filled by intergovernmental transfers, resulting in heavy reliance of municipal governments on financial resources from the central government.

Although between 2014 and 2017 own-source revenue increased from SAR 39 million to SAR 42 million in the Tabuk Amanah, it remains below the National Transformation Programme (NTP) budget target of 40%. To help bolster the own-source income, UN-Habitat recommends introducing new tax tools and financing strategies.

Every year the MoF solicits each ministry for budget proposals. Thus, ministries are responsible for drafting budgets that are compliant with budgetary guidelines. Even though the final decision is usually a top-down process, within MoMRA the procedure tends to be bottom-up, therefore, lower levels of government submit projects for the next budgetary cycle. For example, the Amanahs gather project proposals from Baladiyahs, which are then submitted to MoMRA. Following budget evaluations and revisions, the approved projects are included for review by the MOF. After review and approval, MoF allocates funding accordingly.

3.4.3 Financing municipal operating cost

Despite minor setbacks between 2014 and 2017, own-source revenue increased by 9%, corresponding to an increase from SAR 39 million in 2014 to SAR 42 million in 2017.[11] However, Tabuk remains dependent on intergovernmental transfers and other financial resources provided by the central government. Figure 22 shows a breakdown of Tabuk's 2017 budget by expenditure category. The category of other expenses

Key Accounts	SAR (thousands)
Sales	3,866
Service fees and Charges	9,885
Leasing	26,617
Other Revenue	2,409
Total Budget	42,771

Source: Tabuk Amanah, Kingdom of Saudi Arabia 2017

Fig. 18. Tabuk Amanah own-source revenue

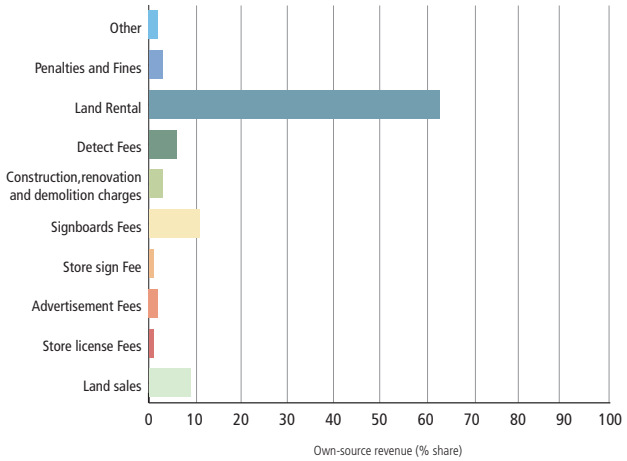
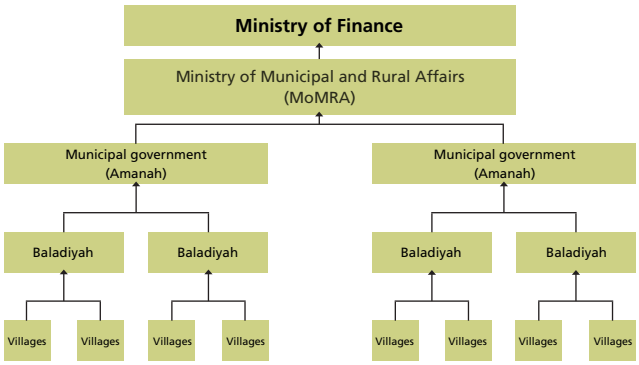


Fig. 19. Tabuk Amanah own-souce revenue breakdown, 2017

constitutes the largest portion of the budget, followed by operation, maintenance/programs, and contracts. Other expenses during the Financial Year 2017 accounted for 67% and were primarily focused on public infrastructures and facilities.



Source: Ministry of Finance, Kingdom of Saudi Arabia

Fig. 20. Municipal budgeting process

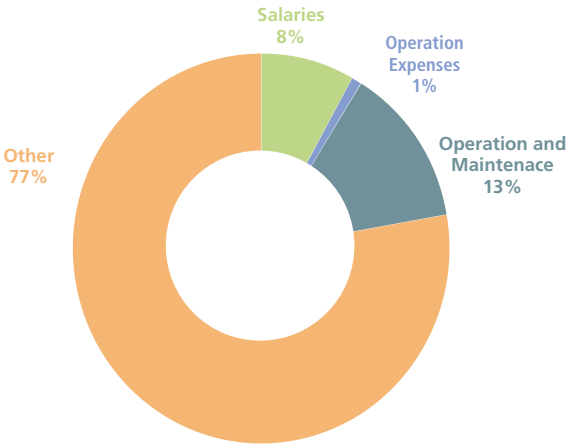
As shown in figure 22, the Amanah's budget is highly dependent on the national economic trend; hence its expenditure performance can be unstable. This bias is particularly evident during the oil crisis in 2014. It is, therefore, clear that policy incentives and new financial instruments are of strategic importance to increase efficiency and performance of public finance by local government in the KSA.

3.4.4 Capital financing for municipal development

The demand for capital to finance local infrastructures in emerging economies is becoming a priority, especially in cities like Tabuk. Recent reforms are aiming at improve the Saudi capital market through increased market capitalisation. For example, the Capital Market Law, the Security and Exchange Commission, and a privately owned Stock Exchange have recently been launched in Saudi Arabia with the goal of improving the domestic capital market. Between 2011 and 2016, Saudi equities increased in value from just over 50% of GDP to almost 70% of GDP. Today, Tadawul is the sole Saudi stock exchange market and the largest equities exchange market in the Arab world. In addition to Tadawul, Saudi Arabia introduced Nomu, an equity market for small and medium-sized enterprises (SMEs). With fewer listing requirements, Nomu is a good option for SMEs that are interested in going public. In addition to providing traditional banking services, Saudi Arabia's domestic banks went through a series of mergers and acquisitions, diversified their assets, and began to offer both conventional and Islamic investment products to a diversified investor base. The Saudi Arabian capital market is becoming an example of efficient capital allocation driven

Budget Category	SAR (thousands)
Salaries	70,178
Operation Expenses	11,590
Operation and Maintenance Programmes and Contracts	111,763
Other	654,097
Own-Source Revenue	47,571
Total Budget	890,202

Source: Ministry of Finance, Saudi Arabia (2017)



Source: Tabuk Amanah, Kingdom of Saudi Arabia (2017)

Fig. 21. Budget breakdown for Tabuk, 2017

by strategic reforms and increased market capitalisation.[12]

Regarding Saudi Arabia's debt market, the government began issuing bonds for debt financing in 1988. In the last 15 years, the debt market underwent a series of reforms, which changed the process for issuing bonds, pricing bonds, and setting bond maturity terms. One major buyer of government bonds is the group, Investors in Government

Development Bonds (GDBs), which is made up of domestic financial institutions, banks, and foreign investors. GDBs are Zakat deductible for domestic investors and exempt from withholding tax on income for foreign investors.

This approach creates competitive and attractive conditions for capital and equity investors and is expected to have wide-ranging impacts on the local economies of cities like Tabuk. Therefore, in the future it will increase the availability of capital to fund urban development.

Housing Finance

The Saudi Arabian real estate market is ten times larger than any real estate market in the Gulf region. Nevertheless, it remains underdeveloped with approximately 30% of Saudi's citizens owning their own home. Home ownership is currently legally confined to Saudi nationals only, although foreigners can buy leasehold property in designated developments. Prior to the mortgage law and mortgage financing, either the Real Estate Development Fund or commercial banks financed the housing credit market.

The Real Estate Development Fund is one of the main sources for soft loans to Saudi nationals to finance home building. Commercial banks, in general, provide mortgages to those who can provide large down payments. In order to fill the resulting financing gap in the housing market, a series of finance laws were approved consisting of (1) the Enforcement Law, (2) the Real Estate Finance Law, (3) the Registered Real Estate Mortgage Law, (4) the Finance Lease Law, and (5) the Finance Companies Control Law.[13] Initially, the loan-to-value rate for mortgages was fixed at a rate of 70%.

Compared to other countries, such as the United Kingdom and India, where the rate is 90-95% and 80% respectively, the loan-to-value ratio offered in Saudi Arabia was considerably lower. Recently, Saudi Arabia's central bank lifted the maximum loan-to-value rate on mortgages from 85% to 90% in an effort to stimulate the supply of mortgage loans.[14] Thanks to the recent legislation, international finance companies are now able to extend credit lines in housing.

Financing Utilities

In 2016, the Ministry of Environment, Water and Agriculture, and the Ministry of Energy, Industry and Mineral Resources managed national utilities. The Electricity and Cogeneration Regulatory Authority (ECRA) was established in 2001, and it is responsible for licensing all entities operating in either the electricity or water desalination spheres, in addition to regulating providers. ECRA ensures that the Saudi Arabia's supply of electricity and water is in pace with demand, that quality standards are met, and that water and electricity are priced fairly. The largest electricity provider is the Saudi Electricity Company (SEC). In 2015, the SEC was solely responsible for distributing electricity to consumers, with the exception of two areas (Jubail and Yanbu), which were operated by Marafiq, the country's first private integrated power and water utility company. Residential customers held the largest share of the SEC client base (6.7 million) in 2015 and consumed 48.4% of its energy output. The second largest consumer group was commercial users (1.5 million consumers, 16.3% of energy sales), followed by government (261,111 consumers, 13% of energy sales) and industry (10,044 consumers, 18.1% energy sales).[15]

The primary water provider is the Saline Water Conversion Corporation (SWCC), and it is responsible for approximately 60% of the Kingdom's production of desalinated water. In 2015, 54% of all desalination plant units were owned and operated by the SWCC, with the largest of the SWCC's plants located in Jubail. In 2016, Jubail's production reached 358 million cubic meters, equivalent to 26% of SWCC's total annual production. SWCC also has desalination plants located in Khobar, Jeddah, and Shuaibah. SWCC is also responsible for the transportation of desalinated water from the production plants to the country's main potable water reservoirs. The National Water Company (NWC) manages Saudi Arabia's freshwater reservoirs, which is responsible for the water distribution. The NWC oversees water supply and sanitation in the largest cities, Riyadh, Jeddah, Makkah, and Taif. Outside of these metropolitan areas, the Ministry of Environment Water and Agriculture, and the Ministry of Energy Industry and Mineral Resources manage water supply and sanitation through regional directorates and branches, (i.e., the General Directorate of Water in the Tabuk Region). Although the SEC and the SWCC are largely government-owned agencies, Saudi Arabia is exploring restructuring options that will allow private sector participation.

Financing Health and Social Services

In accordance with the Saudi constitution, the government provides all citizens and expatriates working within the public sector with full and free access to all public healthcare services[16]. The Ministry of Health is the primary government provider of healthcare services in Saudi Arabia,[17] with a total of 249 hospitals and 2,094 primary health care facilities. Government healthcare comprises 60% of all health services in Saudi Arabia. The private sector also contributes to the delivery of healthcare services, especially in more populated cities and towns. There are 125 private hospitals (11,833 beds) and 2,218 private dispensaries and clinics, comprising 21% of hospital services in the region.[18]

The Ministry of Health supervises 20 regional directorates of healthcare affairs in various parts of the country, (e.g., Health Affairs General Directorate of Tabuk). The role of the 20 directorates includes (1) implementing healthcare policies, plans and programs, (2) managing and supporting the Ministry of Health's healthcare services, (3) supervising and organising private sector healthcare services, (4) coordinating with other government agencies and (5) coordinating with partner institutions. In Tabuk there are 11 Ministries of Health hospitals (47 in Riyadh and 14 in Jeddah) holding 1,220 beds. In order to meet the increasing demand for healthcare services, the Ministry of Health has given regional directorates

wider autonomy in terms of planning, recruitment, power to establish agreements with healthcare service providers and financial discretion in budgetary and expenditure matters. Nevertheless, for most activities, regional directorates must receive authorisation from the Ministry of Health and, therefore, have limited autonomy.[19]

3.4.5 Financial sustainability

Under the current system, the central government funds the majority of infrastructure and public services while municipal governments play a minor role. Despite the concerted effort to improve fiscal health envisioned in NTP, fiscal self-sustainability at the municipal level remains a challenge in the context of rising urban populations and unplanned urban growth.

Land-Based Finance

Land is widely recognised as one of the most effective revenue generating instruments for subnational governments. Land-based finance provides both a stable revenue source and incentives that support local economic and urban development. In the Tabuk Amanah, land is already a major contributor to municipal own-source revenue. In 2017, 30% of the municipal revenue derived from land sales and rental.[20]

The introduction of 2.5% White Lands Tax (WLT) is further proof that the Kingdom's recognition of land-based finance as a powerful revenue source. In Tabuk, where approximately 41% of land is vacant,[21] the WLT is expected to provide a significant source of revenue for the Ministry of Housing, curb land speculation, and protect agricultural land. However, neither of these is a silver bullet to own-source revenue diversification in KSA.

A wide spectrum of land-based financing instruments exists beyond its current focus on leasing and WLT. In the age of decreasing oil income, Tabuk will require greater revenue stability and self-sustainability to meet its ever-growing expenditure needs. To this end, Tabuk must explore a variety of financing instruments and improve the capacity of the existing land management system.

Urban Value Generation

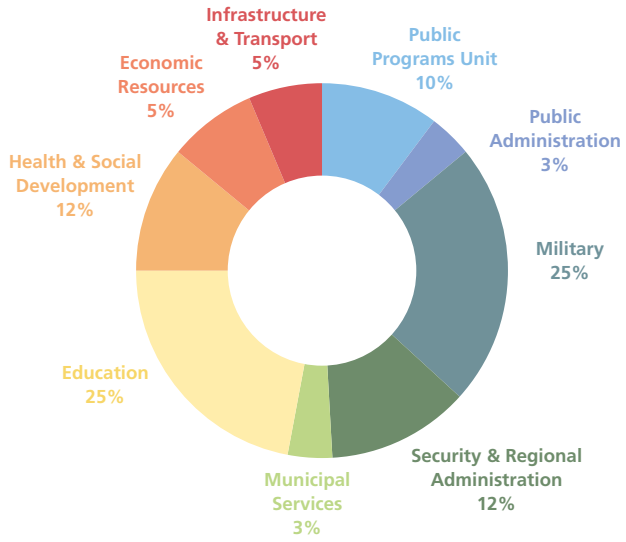
Public finance and sound fiscal management support local development by establishing a solid financial base and strengthening the public sector's role. While these principles are echoed in the National Development Plan guiding both national and subnational public finance, in practice, Tabuk operates under a highly centralised system of public finance and continues to be heavily dependent on intergovernmental transfers to fund local development activities and projects. In 2017, the central government allocated 5% of the total budget to municipal services, which also covered projects and programs managed by the Ministry of Municipal and Rural Affairs (MoMRA), (see figure 22 and figure 23).

To reduce reliance on intergovernmental transfers and increase the performance of municipal services and activities,

Landscape in Tabuk Region

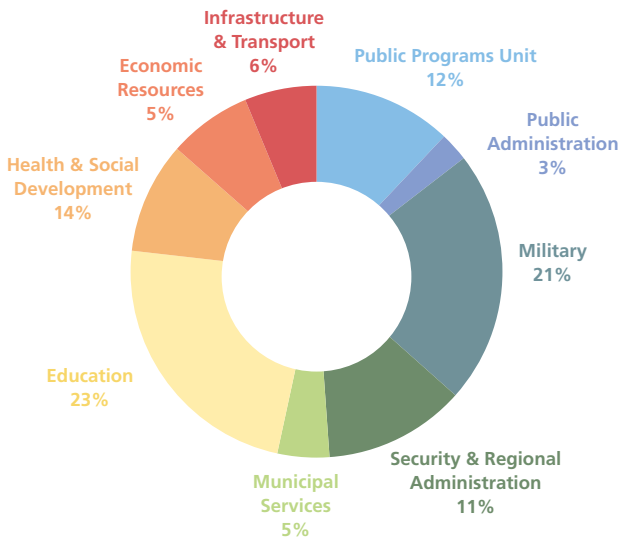
the government is exploring alternative means to generate revenue.

Tabuk's economic growth and urban development trajectory are strongly correlated to planning and design, municipal finance, and governance. Land management and urban planning can support the transformation of municipal finance by improving local ability to generate revenue. For example, Tabuk could explore a number of revenue generating instruments, such as partnering with the private sector through Public-Private Partnerships (PPPs) in the operation and maintenance of public transportation infrastructure, tax administration and collection, waste management services, and municipal property management. In order for this to work, the foundational principles of sustainable urbanisation mentioned above must be either present or actively pursued by governments. Consequently, local governance structures that adopt a three-pronged comprehensive approach will be better positioned to maximise urban value.[22]



Source: Bhatia, R. (2017). Saudi Arabia Budget 2017. The Gulf's International Bank.

Fig. 22. Saudi Arabia national expenditure by sector, 2016



Source: Bhatia, R. (2017). Saudi Arabia Budget 2017. The Gulf's International Bank.

Fig. 23. Saudi Arabia national expenditure by sector, 2017

Major roads infrastructure in the city of Tabuk

4

THE CURRENT CITY

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4.1 Urbanisation Patterns

4.1.1 The city's development patterns

The City of Tabuk is the capital of the Tabuk Region in North-Western Saudi Arabia, and the Northern gateway to the Kingdom, located about 100 kilometres South of the Jordanian border, 130 kilometres East of the Gulf of Aqaba. Its location along the ancient pilgrim and trade route from Jordan and Syria not only elevated its significance and importance in the past but also embeds development possibilities for its future.

With an approximate population of 694,300 inhabitants, Tabuk is the largest city in Northwest Saudi Arabia. Of the 694,384 current residents of the city, 83% are Saudi national while 17% are Non-Saudis. Furthermore, 28.7% of the total population is below the age of 15 years old while 54.6% or 333,300 of all inhabitants are below the age of 30. This is an indication that Tabuk has a large youthful population resulting in the necessity for the provision of adequate housing, education, parks, services, public infrastructure, and employment opportunities.

The city's physical layout is anchored to its old built-up area core which is centered around the historic Tawba Mosque, (Prophet Muhammad's Mosque) growing concentrically outwards to a radius of approximately 3.5 kilometres. The overall development of the city is currently contained within the King Faisal Ring Road. Current built-up area of the city lays on the South and East quadrants of the Ring Road, while recently built-up area occupies the Northeastern quadrant. Future developments and unplanned settlements are dispersed on the Western side of the Ring Road. Beyond the Ring Road are farmlands towards the North and South. Tabuk Airport lays just beyond the Ring Road, approximately four kilometres from the old city centre. Large blocks of military lands cover the Southern and Western sides of the city, outside of the Ring Road.

Geographically, the city lies at the intersection of the Hejaz mountain range and the plains of the Northern Region. There is a significant presence of underground water surrounded by hills and wadis, and the three important regional wadis are Wadi Al-Akhdar (Green Valley), Wadi Damm, and Wadi Asafir. Additionally, wadis Abu Nishfah, Dabaan, and Albaar are located within the urban built-up area.

Both natural and manmade elements influence the city's development pattern. Natural elements such as the wadis and mountain range previously mentioned have steered the city's development pattern. The current and future built-up urban area of the city conforms to the wadi system resulting in associated land uses distributed accordingly across the city fabric. The location of farming activities is directly linked to the underground water table. Man-made elements such as the King Faisal Ring Road which measures approximately 42 kilometres in circumference and covers a land area of approximately 14,000 hectares shapes the development of the city, and have an impact on its development. Additionally, the location of the airport and military lands are major

POPULATION

694,384

POPULATION DENSITY on built-up area

45.2 p/ha

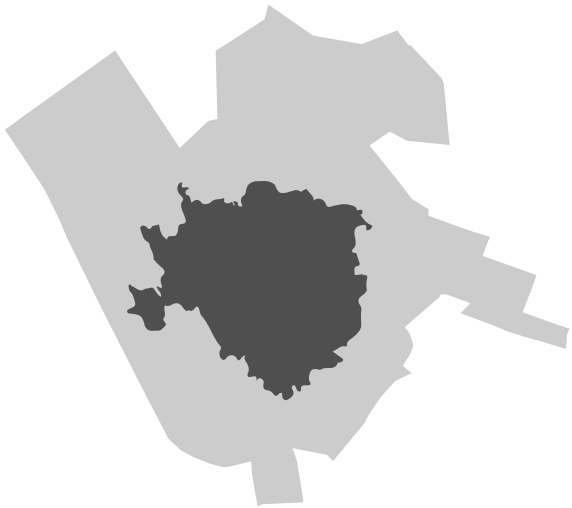
AGE PROFILE

54.6% < 30

POPULATION GROWTH RATE

2.5%

950,000 Expected population by 2030



TABUK CITY COMPARED TO **MILAN MUNICIPALITY**

Population: 5,270,000
Area: 181.8 km^2
Density: 291 p/ha

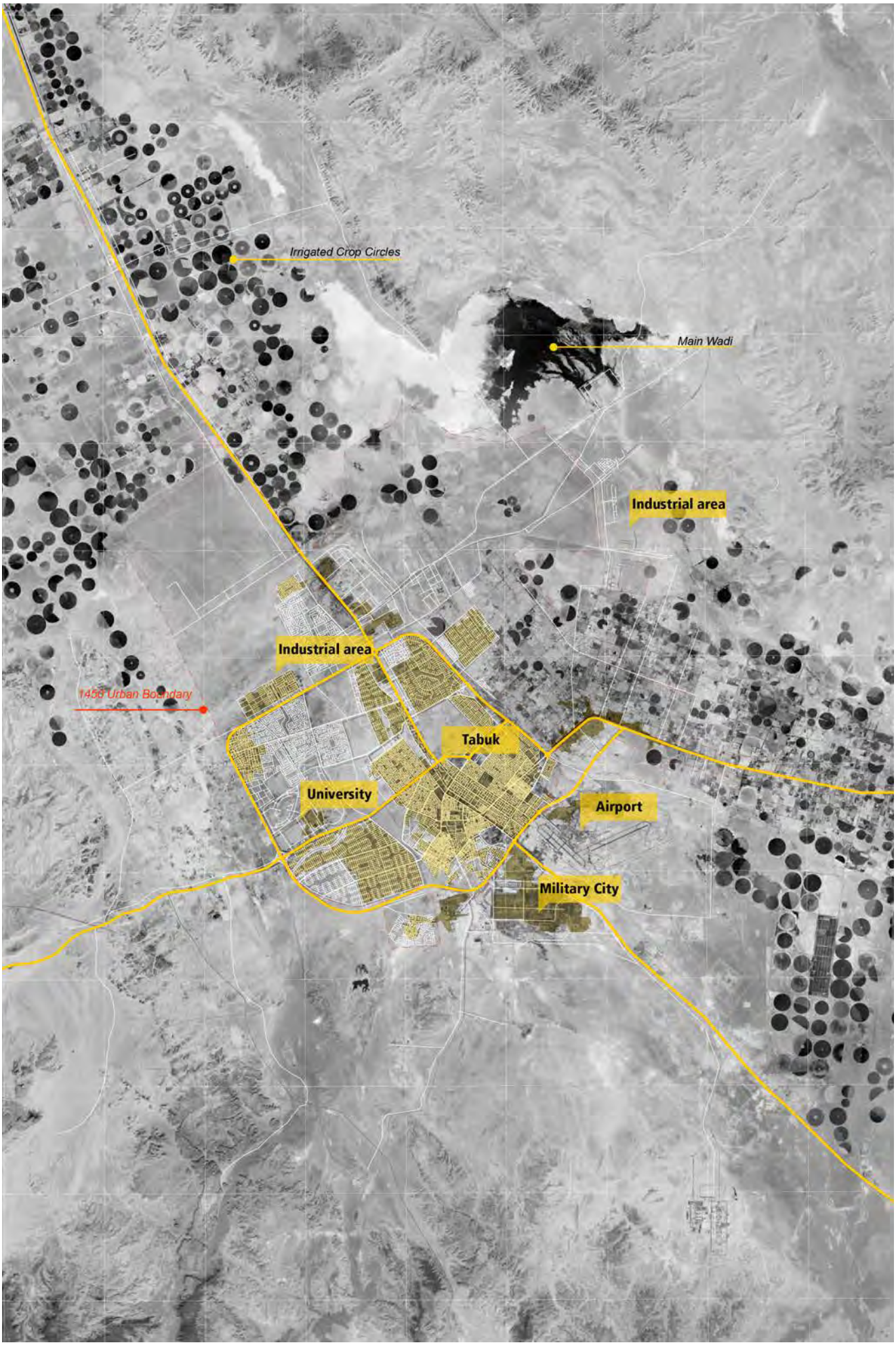


Fig. 24. Boundaries, neighbourhoods and key infrastructure

1980

Area:2,626 ha
Population: 116,000

1990

Area:4,031 ha
Population: 246,961

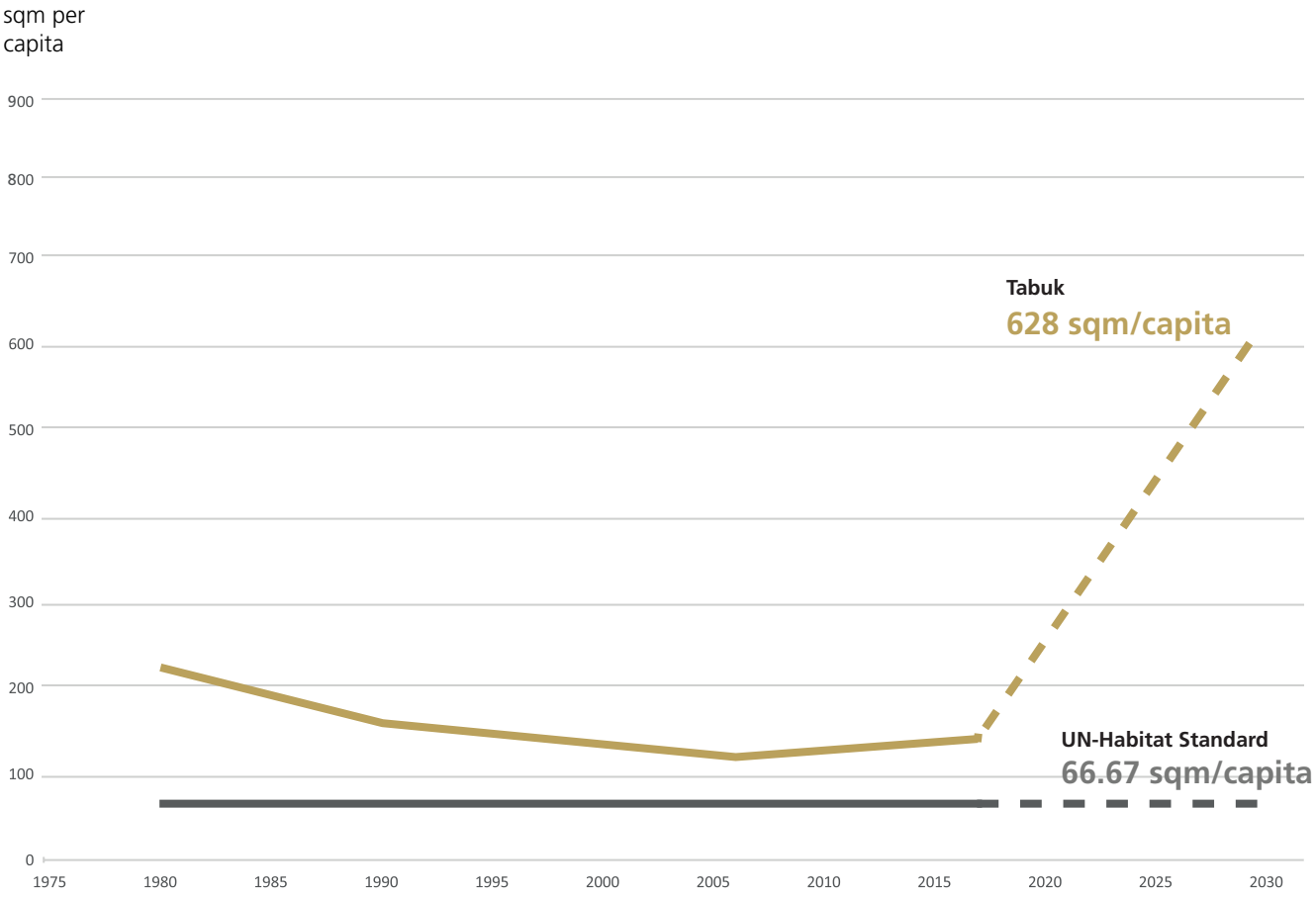


Fig. 25. Land allocated per capita

2006

Area:5,365 ha
Population: 451,757

2017

Area:9,903 ha
Population: 694,384

Fig. 26. Urban growth stages

man-made influencers and the city is currently the largest military base in the Kingdom. Tabuk's urban development has experienced rapid growth and transformation in the past 40 years. Based on the data provided by the Amanah, it appears that the city's population doubled between 1980 and 1990, growing by 113% and going from 116,000 to 246,961. The city continued to grow over the following 16 years recording a population of 451,757 inhabitants in 2006, demonstrating an increase of 83% from 1990. Over the past 12 years, from 2006 to 2018, the population growth continued on a steady and stable upward trajectory, increasing by 54%, or 242,627, reaching what is Tabuk's current population of 694,384 inhabitants. The population of Tabuk has doubled six times in the last 37 years, from 1980 to 2017. Future projections show, according to the current annual growth rate of 2.5%, that the population will grow to 950,000 by 2030. This means a projected increase of 36.8% or 255,000 inhabitants in the next twelve years.

4.1.2 Administrative boundaries

Three administrative boundaries define the city, and these are the Development Protection Boundary, the 1450 Urban Growth Boundary, and 1435 Urban Growth Boundary. MoMRA set these boundaries to control urban expansion and prevent urban sprawl in the outskirts of the city without adequate urban infrastructure. The Development Protection Boundary, Tabuk's outermost boundary, covers an area of approximately 107,100 hectares. This boundary, delimiting the territory under the direct authority of the Amanah, includes a variety of natural landscapes, farms, desert, and wadis. The 1450 Urban Growth Boundary defines the extent of the foreseen growth area for the city expansion, up to the year 1450 (2030). However, it's spatial extension is growing faster than the city's population, resulting in sprawling and low-density development. In 2006, only 5,365 out of 33,546 hectares of the UGB (15.9%) was developed, leaving 28,181 hectares of vacant land, with a density of 84.2 p/ha.

To counteract this recurring tendency, UN-Habitat proposes a redefinition of the current DPB limits in order to amend the Tabuk Boundary, which reduces the area for urban expansion from 417 to 200 square kilometres. This area would be less than half of the current land area of the existing urban footprint. The area between the existing Development Protection Boundary and the proposed amended Tabuk boundary should, therefore, be considered a no-development buffer zone for at least the next 50 to 60 years.

The regulatory laws and initiatives enforced by the Municipality fall short in comparison to how fast private companies are developing, as well as dividing large pieces of land in the peripheries of the city, promoting urban sprawl. This indiscriminate land development is a threat to sustainable urban development and places pressure on the Municipal economy, undermining its ability and efficiency to supply/grant accessibility to water, electricity, sewage, education, hospitals, and public spaces.

Another relevant issue impacting urban sprawl is underdeveloped land. The underdeveloped land is defined as land that is not compact or dense enough due to the recent development pattern

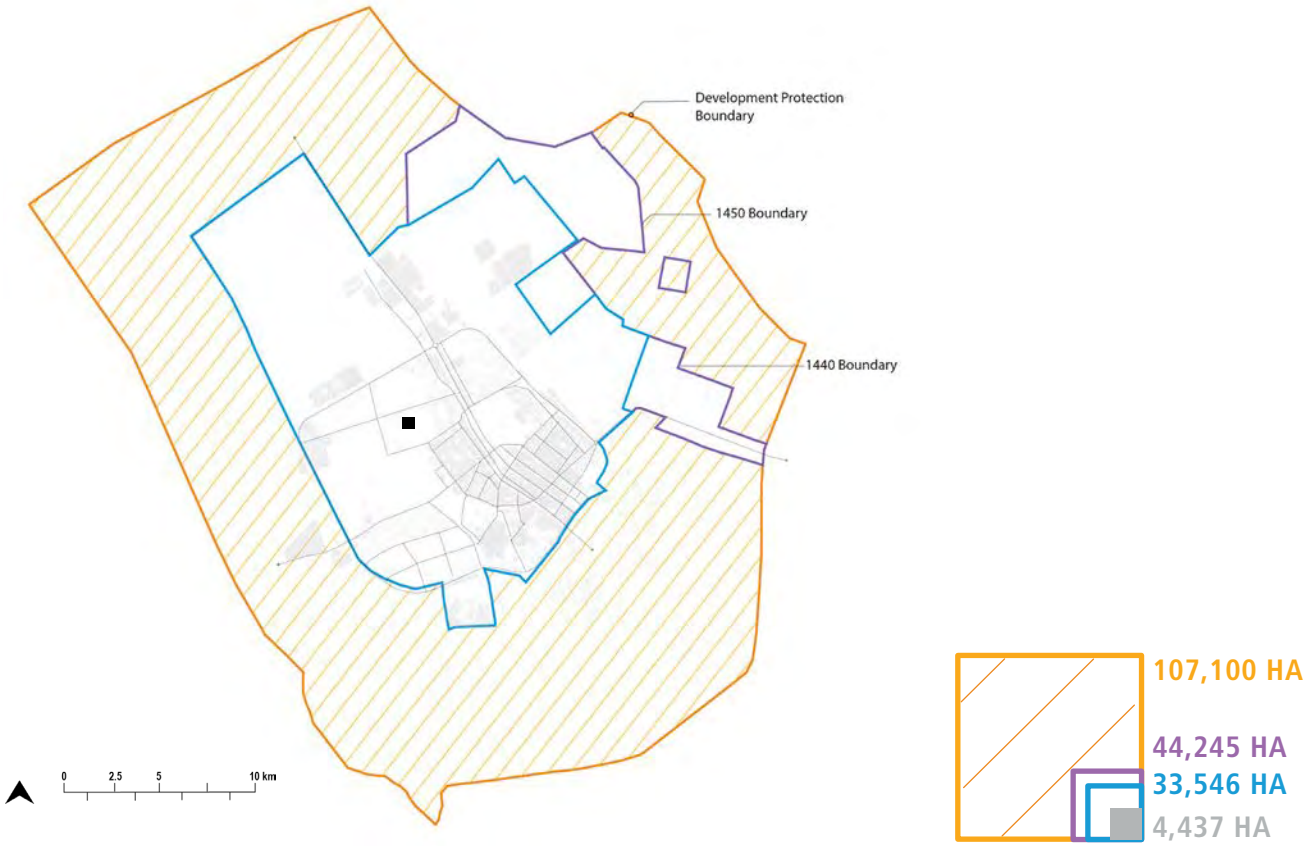


Fig. 27. Administrative boundaries

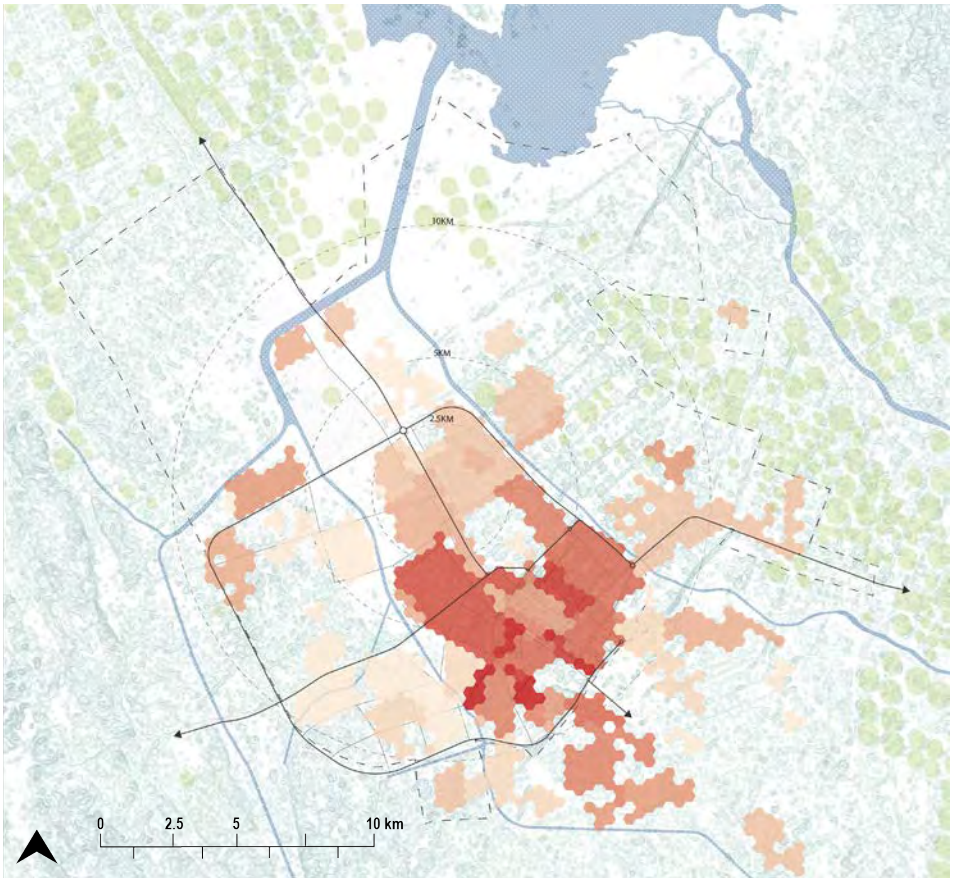
outside the consolidated city, referring to subdivisions located away from the city centre. On the other hand, a high percentage of available land within the city boundary is still vacant. For example, in 2017, approximately 83% of the land within the 1450 UGB was still vacant. Developing this land at the UN-Habitat recommended density of 150 p/ha would take 87 years given the current growth rate. Additionally, far-scattered developments create consistent pockets of urban voids, that undermine the continuity and integration of the urban fabric. If these approved subdivisions are not redeveloped and redesigned according to an integrated and comprehensive vision of the metropolitan territory, and its system of cities, a major development constraint in formulating efficient future urban development plans will develop.

4.1.3 Urban density

Considering Tabuk total population of 694,300, and calculating the average population density of the built-up area (15,360 hectares), Tabuk has an average density of 45.2 inhabitants per hectare, which is considered to be relatively high, if compared to other urban contexts in the KSA. The highest density is in the core of the city, where the old city centre is located, and is estimated to be around 170-310 p/ha, in line with the UN-Habitat recommended density for a compact and sustainable city. The urban fabric in this area is compact, with buildings that are generally three to five stories high, sited with mostly zero lot setbacks and some mixed-use. The advantages of such a development pattern are numerous, for example, the compactness in the distribution of the building offers shade to pedestrians on the streets, as well as façade shading. Another example is that it is more affordable for the city to provide and maintain infrastructure and services as the cost is shared amongst many people per hectare, not to mention, a public realm that is vibrant and lively, therefore, supporting the various commercial activities. One of the few disadvantages of Tabuk's dense development pattern is the overall lack of green open spaces in the urban core. To capitalise on all the benefits compactness brings, the city will have to strategically implement this important element in the urban core and across the city, promoting interventions such as parks, green streets, small green public spaces, and parklets.

The population density in transitional areas located between the old city centre and the most recently developed areas continue to register a high-density population, in comparison to other cities in the KSA. The density in these areas ranges from 40 to 90 p/ha. Moving further outward from the high-density zones, density is registered at an average of 30-40 p/ha, which, compared to other Saudi cities, is considered to be medium-density. Medium-density development patterns provide similar advantages to the high-density ones. Both patterns, if upgraded with strategic improvement initiatives can enhance the vibrancy of the city.

On the outer edges of the urban fabric and beyond, the density drops to 10-20 p/ha, and this is considered to be low-density. Low-density patterns do not present the same advantages as high and medium-densities, as these areas are considered to be underdeveloped, however, this density level can be considered acceptable for Tabuk. It should be noted that underdeveloped



Population:
694,384

Average population density:
45.20 p/ha

0 - 49 p/ha
50 - 99 p/ha
100 - 149 p/ha
150 < p/ha

Fig. 28. Current distribution of population density

areas suggest urban sprawl and present a risk of promoting a polarised and inefficient urban fabric. Low-density and underdeveloped areas tend not to be walkable and pedestrian-friendly environments, promoting dependency on private car ownership. The cost of providing basic services and infrastructure is much higher in these areas; thus, citizens do not have adequate access to public facilities, as well as efficient infrastructure such as water, sewage, and roads. In 2006, Tabuk's average density was 84.2 p/ha and has since decreased by 16.8%, to70 p/ha. This trend is expected to continue, and based on future land use plans and the projected population, the density of Tabuk is expected to precipitate to 22.7 p/ha by the year 2030. Looking at the city's evolution, it appears that in Tabuk the annual population growth rate (2.5%) does not align with the parallel expansion of the city's land area. Tabuk's land area has grown by 250% since 1980, mainly due to land speculation resulting in unnecessary city expansion, causing more of the population to disperse and sprawl and unbalanced growth patterns to occur. This phenomenon affects the functioning of a city in a correct manner and its sustainability. This is manifested in the many monofunctional areas that arise, as developers continue creating new, monofunctional, and gated residential enclaves. Overall, it appears that low-density and urban sprawl are two issues affecting Tabuk's urban development.

4.2 Structuring Elements

4.2.1 Natural and topographic elements

The city of Tabuk lies at the intersection of the Hejaz mountain range and the plains of the Northern region, at an altitude of 760 metres above sea level. The summer temperature ranges between 26 to 46°C, while the winter temperature ranges between -4 to 18°C. There are recorded snow days as well as rainy days during the winter months, from November to March, adding up to approximately 50mm to 150mm yearly precipitation.

From the centre of Tabuk, within a radius of 100 kilometres, the terrain and geographic formations vary, and the ground plane is mostly rocky with gentle undulations. Towards the South and Northwest of the city, the Hejaz Mountain Range defines the territory, while towards the North and Northeast there are desert lands with patches of agricultural land, and large sand dunes formation located at approximately 300 kilometres East of the city.

There is a significant presence of underground water in the area of the city, as it is surrounded by hills and wadis, acting as the receiving end of the stormwater flows running down the hills and mountains surrounding Tabuk. The three most important regional wadis are Wadi Al-Akhdar (green valley), Wadi Damm and Wadi Asafir, while the secondary Wadi Abu Nishfah, Wadi Dabaan, and Albaar, are crossing Tabuk built-

The city of Tabuk

up area. As a result, agriculture developed widely in the city, and at one point in time made Tabuk the breadbasket of the region. Currently, the natural ecosystem within the city and on its edges are affected by urban sprawl, where the continuous development encroaching on agricultural land and sensitive ecosystems, poses a threat to Tabuk biodiversity and environmental resilience. If this trend continues, the loss of agricultural land will also have an adverse influence on the city's food supply, its economic sustainability, and, to some extent, to its identity.

4.2.2 Major movement infrastructure

Tabuk currently has a functioning network of roads that serve the city well at this time. However, as the city grows and expands, the network of roads will need to be reviewed and upgraded accordingly. The hierarchy of roads begins with the regional highways that feed into the King Faisal Ring Road, which measures approximately 42 kilometres in circumference and covers a land area of approximately 14,000 hectares. Localised major and minor roads connect the Ring Road to various neighbourhoods and districts to complete a vehicular movement network across the city. There is currently no public transportation network available. Considering the size of the city and its current number of inhabitants, implementing a variety of public transportation options should be a priority as the city develops. A public transportation system is advantageous to a varying socio-economic population as it is environmentally-friendly, efficient, encourages healthier habits, and is cost effective for both residents and city managers. There is a future transportation plan that will develop a public transportation system to include two inner-city light rail lines and three bus lines, all linking back to the national rail network. This will re-establish part of the Hejaz Railways network.

The Spatial Capital of Saudi Arabian Cities Report (Street Connectivity Study for the City Prosperity Initiative, 2015) calculates street accessibility based on three variables:

- The proportion of land allocated to streets;
- Street density; and
- Intersection density.

A high accessibility assessment value translates to better connectivity, penetration, mobility, and coverage of the city. Tabuk has a good intersection density value of 84 points and good value of 90 land allocated to streets, but poor street density at 43 points.

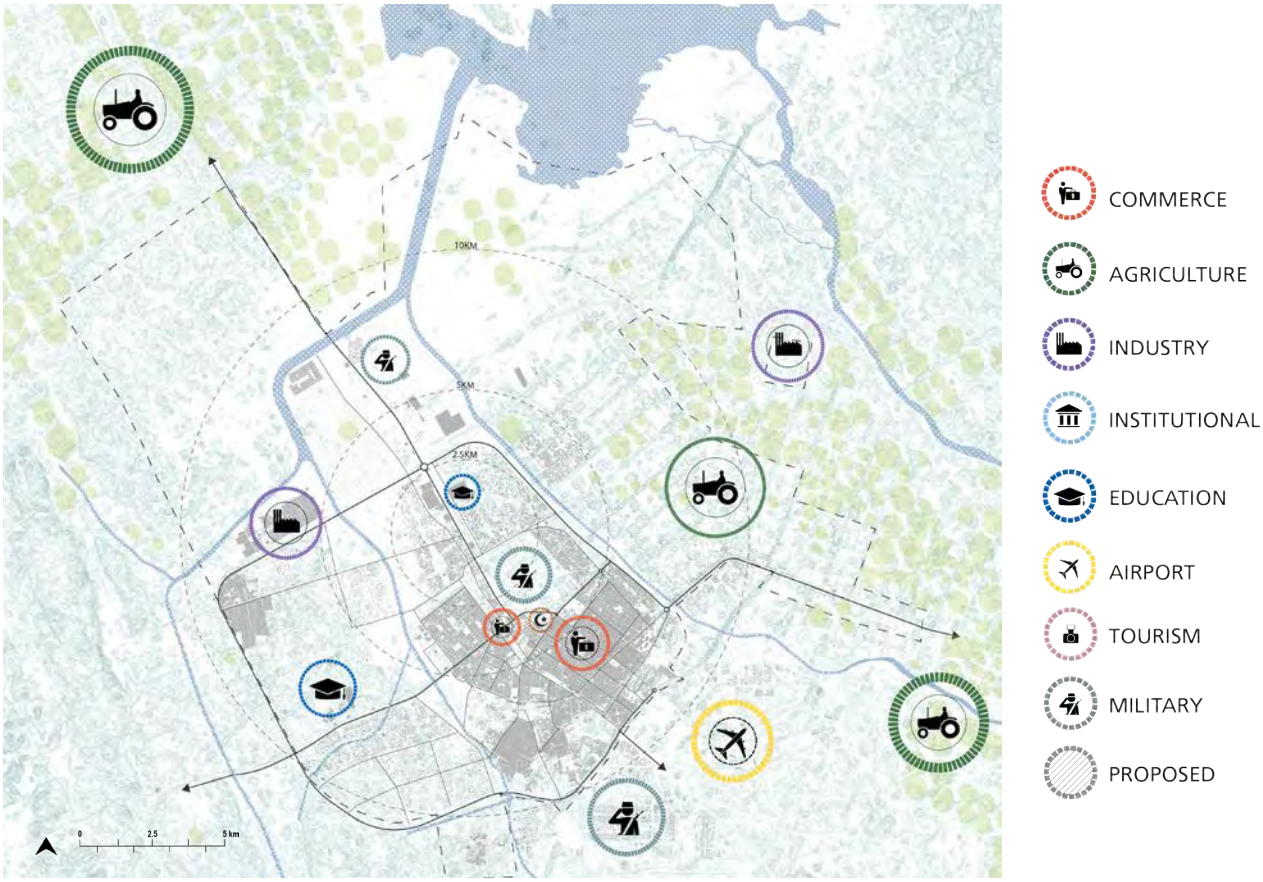


Fig. 29. Major infrastructure and economic nodes

Intersection density is a fair indicator of compactness and walkability and shows how conducive a city is to non-motorised transport. Overall, Saudi cities average 136 intersections per square kilometre, which is above the optimal level estimated by UN-Habitat of 100 intersections per square kilometre. While intersection density is one of the measures of accessibility, it does not take into account the pattern of the streets, and if they optimise circulation for the uses surrounding them. Tabuk achieved the optimal level number of intersections (101.67), and lies in the mid-range, (between 60 and 80 points) with 75 points in land allocated to streets. Tabuk allocates 28.59% of its land to streets, which is close to the average of 27.8% for Saudi cities. While the average street width for Saudi Arabia is 15.5 metres, Tabuk has the widest streets in the Kingdom at 18.7 metres, which is indicative of the widespread existence of large boulevards, highways, and avenues, mostly designed for private vehicles.

Currently, no rail services are connecting Tabuk; however, there is a proposed network foreseen to link the city to Al Jouf, (Skaka), 430 kilometres towards the East, and to Jeddah, about 1,000 kilometres South. The historic Hejaz Railway infrastructure is still present and visible, both within the city and beyond; however, the remaining infrastructure is not currently being utilised, and as a tourist attraction, only a few parts and a recently restored historic station are open. The Hejaz rail network connected Damascus, Syria, and Madinah through Tabuk, and it was last operated in the early 20th century.

The City Prosperity Index (CPI) report on Tabuk (2016) ranks Urban Mobility as 'Weak'; (at 55.8%) and suggests addressing the issue through a public mass transport system, and a well structured and attractive pedestrian realm, in order to reduce over-dependence on private cars even for short distances. While there is also no public transportation network available at present, there is a plan to develop a future public transport network formed by a Bus Rapid Transit (BRT) and a feeder-bus system.

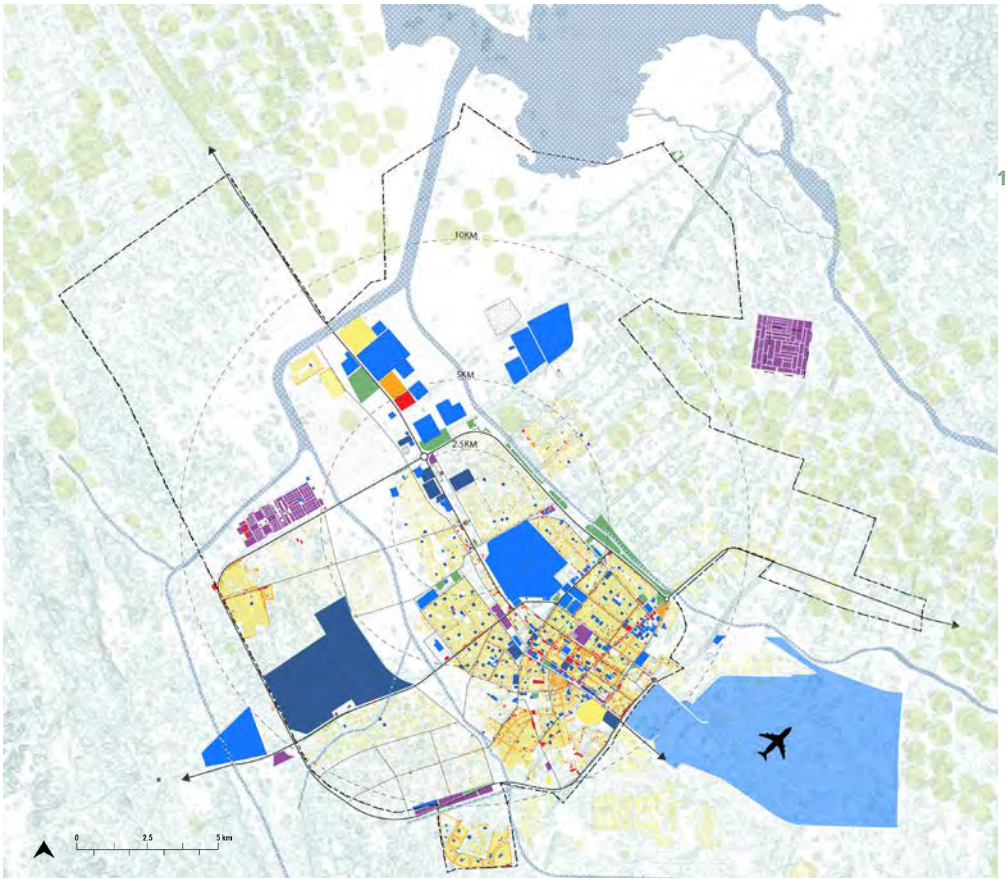
4.2.3 Existing and proposed land use patterns

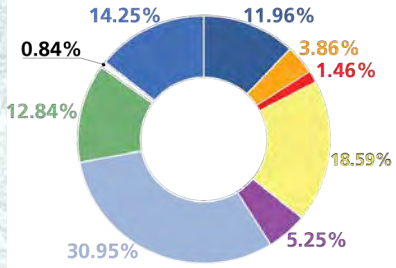
Land use is categorised according to different socio-economic activities occurring in a particular area, the human behaviour patterns they create, and their effects on the environment. Land use provides direction and guidance on how the city functions. Land use planning refers to the process by which institutions decide where, within their territory, different socio-economic activities such as agriculture, housing, industry, recreation, and commerce should take place.

The current land use Plan for Tabuk covers an area of 12,570 hectares with development mostly concentrated within the 4,200 hectares circumferenced by the Ring Road. The largest land use is currently registered at the airport, with an area of 3,890 hectares, equal to 30.95% of the total land use area. Residential land use stands at 18.59%, or 2,337 hectares, being the second most dominant land-use. Governmental institutions follow this at 14.25% or 1,791 hectares, and public facilities with 11.96% or 1,503 hectares. It should be noted that mixed-use accounts for only 3.86%, equal to 485 hectares, while commercial land use accounts for 1.46% or 184 hectares. The proposed land use plan does not provide an appropriate increment to this figure, considering only an additional 3% and 6.78% is dedicated to mixed and commercial land uses, respectively. The lack of consistent and diffused mixed-use impacts on an uneven distribution of commercial services and public facilities, affecting aspects of socio-spatial inequality and polarisation and hinders the overall socio-economic performance of the city. According to UN-Habitat's International Standards,[23] a prosperous city has to allocate at least 40% of floor space for economic and commercial uses, including residential areas, therefore, promoting mixed-use development. This model stimulates local jobs, promotes local economic opportunities, and helps to reduce socio-spatial inequalities.

The land use plan, which covers an area of 44,284 hectares, filling up, and in some parts even exceeding, the 1450 UGB, with an overall increase of 31,714 hectares in comparison with the current land use area. The land use plan is dominated by residential land use, which occupies 33.45% of the total area, and equal to 14,813 hectares. This is followed by governmental institutions at 26.99%, or 11,951 hectares, and public facilities at 0.65%, or 290 hectares. Proportionately, the amount of land dedicated to the proposed land use speaks to an increased urban sprawl, especially because of the spatial distribution of these new residential areas, together with exacerbating the tendency to expand the city, following a pattern dominated by large monofunctional areas.

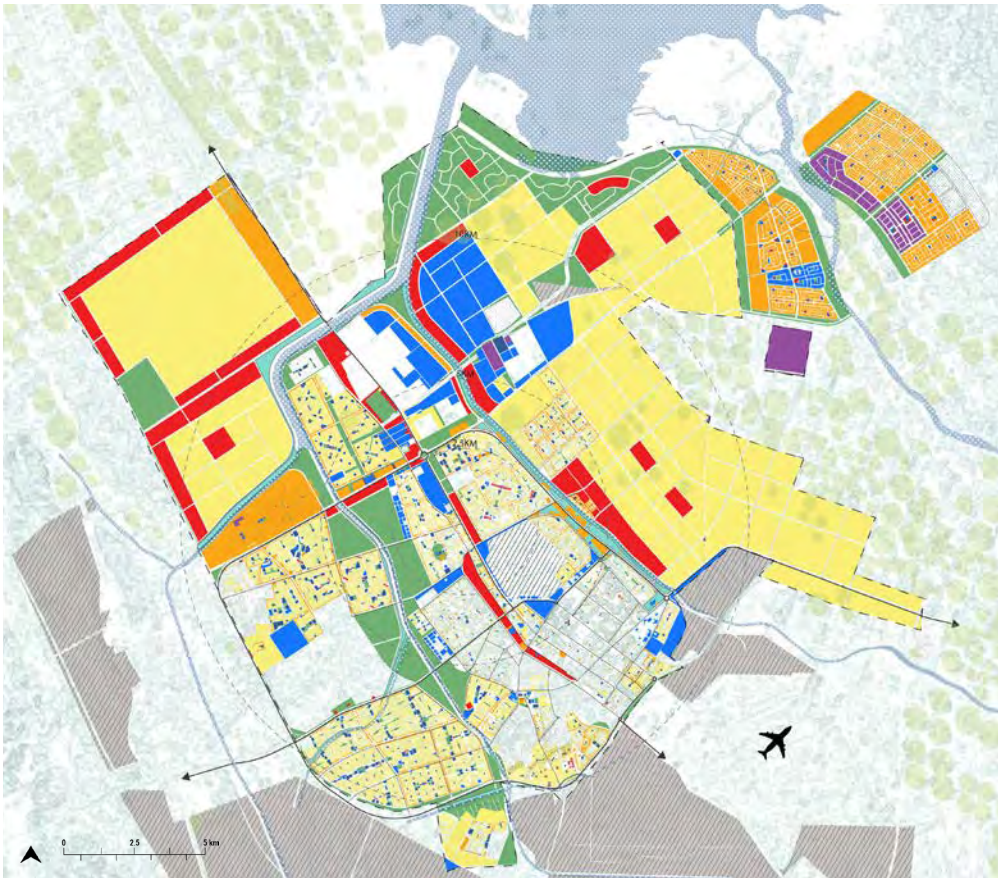
The city should revise this foreseen land use planning approach, promoting a correct mix of commercial, residential, and mixed-use areas as the city grows, while devoting special attention to increasing the allocation of both agricultural fields and open public spaces. Comparing the current and future land use plans, agricultural and green open spaces, already scarce in the central areas, appear to have been proportionately reduced. In order to be a competitive, attractive, sustainable, balanced, and livable city, and to capitalise on its climatic and topographic conditions, Tabuk needs to enhance and increase its green open spaces correctly, allocating and aligning their provision to the city's growth.

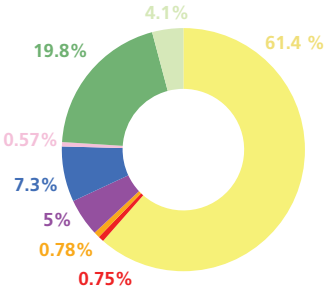




Residential
Commercial
Mixed-use
Industrial
Agriculture
Public facilities
Warehouses
Parking area
Open spaces

Fig. 30. Existing land use





Residential
Commercial
Mixed-use
Industrial
Agriculture
Public facilities
Warehouses
Parking area
Open spaces

Fig. 31. Proposed land use in the Tabuk Plan (2013)

4.2.4 Vacant land

Within Tabuk's Ring Road, where the largest part of the city's built fabric is concentrated, there are 5,206 hectares of available vacant land; over a total area of about 14,316 hectares. This vacant land within the Ring Road can be categorised as areas that are completely vacant, (3,096 hectares) and as areas that are underdeveloped, (2,110 hectares) a combination that offers a great deal of opportunity to infill and densify. Any future developments should first focus on developing the available vacant land, instead of spreading to the edges of the city and beyond, falling into the category of urban sprawl.

UN-Habitat's 5 Principles for Sustainable Urban Development[24] state that compact cities should aim at developing the recommended density of 150 p/ha. According to this parameter, if UN-Habitat's recommended density is applied to the present conditions of available urban space, the current amount of vacant land within Tabuk could inhabit up to 780,900 people. At the current growth rate, this amount of land would take approximately 30 years to fill, bringing the total population to 1,475,000 inhabitants concentrated within the Ring Road.

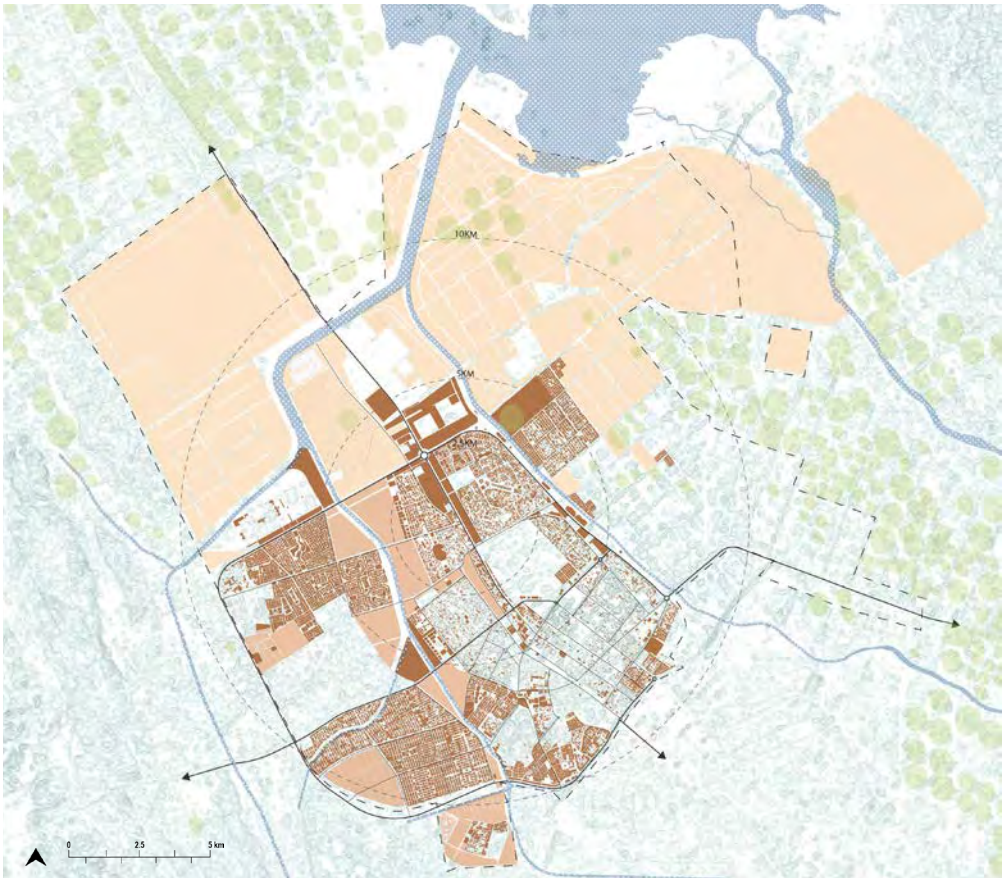
Extensive portions of vacant land, equal to 29,483 hectares also exists beyond the Ring Road but within the 1450 UGB. This represents an oversupply of land that will lead to extensive sprawl and inefficiencies. Therefore, future development should be restricted to within the Ring Road where ample vacant land is available for development.

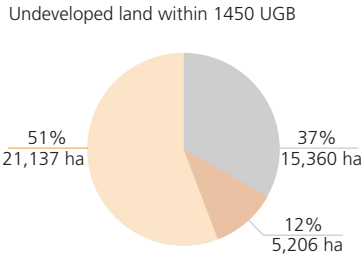
However, most of this remanent spaces have issues over legal versus tribal ownership, which has ceased activities and maintenance, enhancing, therefore, a state of abandonment. The city needs to develop comprehensive strategies for the strategic development of the vacant land under the guiding principles of increased density and providing public spaces. This will ensure the gradual and planned densification, and appropriate expansion of Tabuk, consolidating a more efficient and sustainable form that better performs in terms of land use and high-density distribution, accessibility, and connectivity.

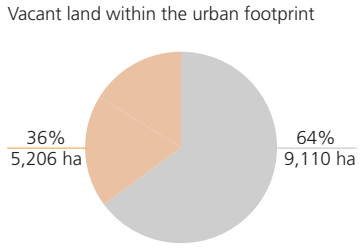
4.2.5 Accessibility to urban cores and facilities

Drivability

In order to test the overall accessibility to the core of the city by car, a study of movement dynamics was performed, assessing the percentage of population within a 15 and 30-minute driving distance. The central area was identified based on density, and concentration of commercial and public facilities, corresponding with the older part of the city. The result of the analysis shows that the city has good vehicular accessibility, with 596,100 residents, or 85.8% of the population, that can reach the city centre within 15 minutes. Additionally, 680,507 residents, or 98% of the population, can reach the centre within a 30-minute drive. These high percentages of vehicular accessibility are indicative of the robust road network available







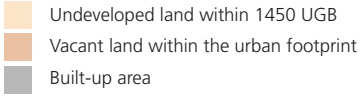
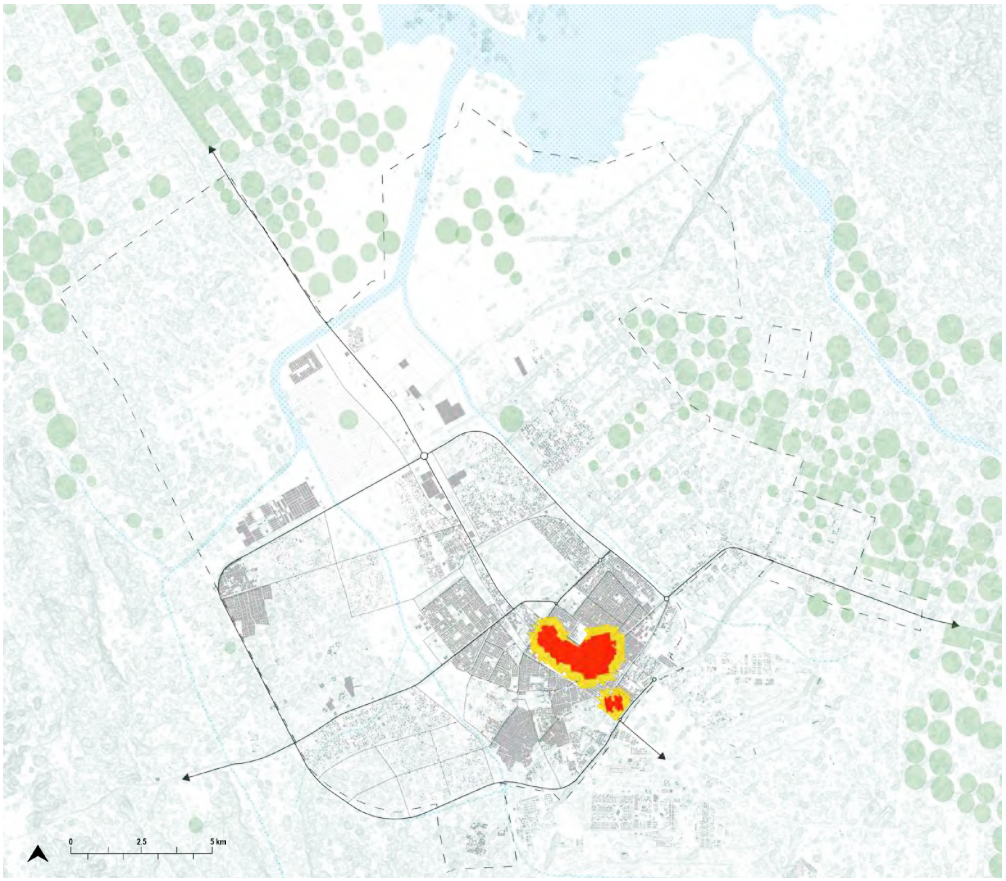


Fig. 32. Vacant land and undeveloped areas



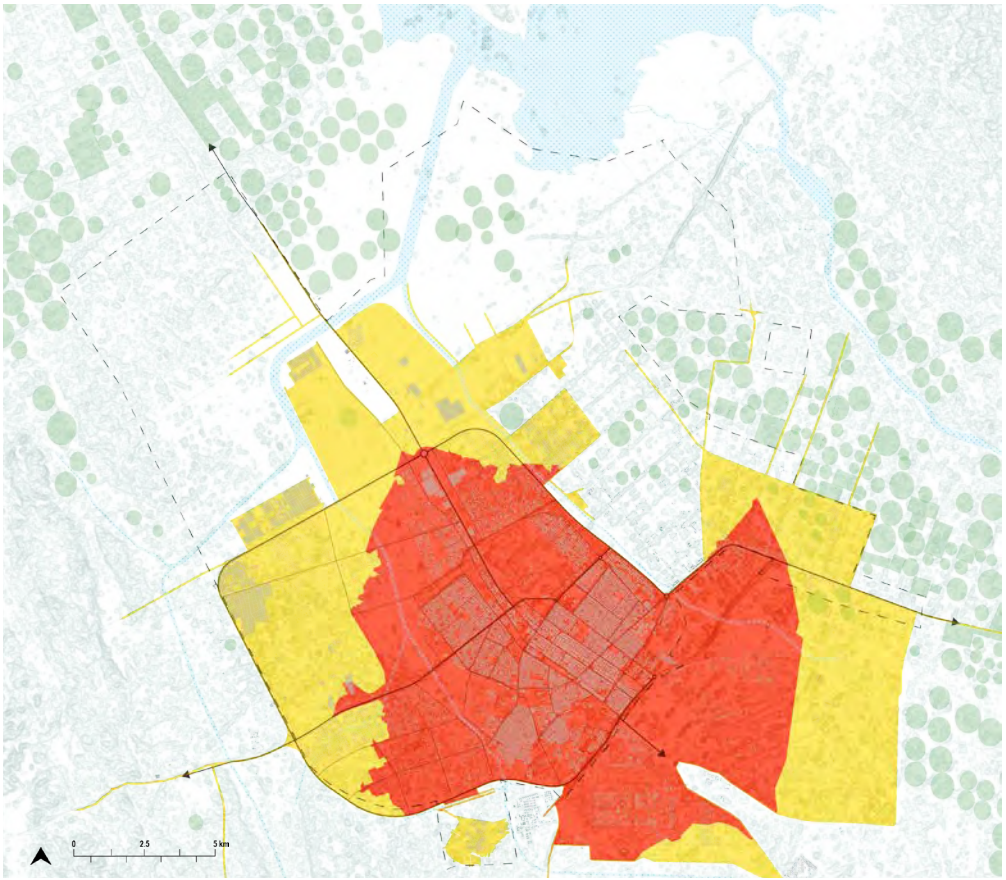
7.8% (54,139p)
of the population reside within 5-minute walking distance from city centre

14.5% (100,740p)
of the population resides within 10-minute walking distance from city centre

5-minute walking distance from Metro Line 1

10-minute walking distance from Metro Line 1

Fig. 33. Walking accessibility to commercial city centre



85.8% (596,100p)
of the population reside within 5-minute driving distance from city centre

98% (680,507p)
of the population resides within 10-minute driving distance from city centre

5-minute driving distance from Metro Line 2

10-minute driving distance from Metro Line 2

Fig. 34. Drivability to commercial city centre

in the city. It should be noted that these numbers do not reflect considerations related to congestion, traffic congestion, and waiting time, or environmental impacts.

Walkability

Though the road network extension in Tabuk is consistent, the pedestrian connections remain insufficient. To evaluate the dynamics of accessibility to the main commercial core by walking distance, a similar analysis was run considering a five and ten-minute distance accessibility range. The analysis shows that, in reference to access to the main commercial center, overall walkability is currently a challenge for residents, where only 54,139 residents, corresponding to the 7.8%, can access the commercial centre within a five-minute walk Only 100,740 residents, or 14.5%, can access the commercial area within ten minutes. This analysis denotes that the city needs to emphasise on expanding pedestrian networks and pedestrian-friendly routes. Proper urban design and architectural interventions need to target the enhancement of urban walkability, through elements such as shading, greenery, wide sidewalks, and active and lively streets supported by mixed-use activities.

Similarly, the accessibility of public facilities, consisting of educational and healthcare, was examined. The analysis of their distribution-pattern shows that facilities are well distributed in the older areas and over the commercial centre located on the East side of the Ring Road. However, there is a lack of facilities to the West and beyond the Ring Road, especially referring to healthcare. The walkability analysis shows that within the built-up area, 73% of the city's residents (equal to 509,084 people), can access educational facilities within 10-minute walking distance. Also, healthcare facilities located within the built-up area can be accessed by 51% of the residents, or 354,132 people, within a 10-minute walking distance. It is recommended to evaluate the distribution of healthcare facilities to align with population density. All public facilities should also be linked or located in proximity to the public transportation network.

4.3 Assessment of Future Plans

4.3.1 Tabuk Local Plan

The city of Tabuk, in collaboration with a local engineering consultant, had developed two scenarios for the Local Plan. The city approved Scenario Two, as the basis for the Local Plan.

The proposed plan, acting at a high strategic level, showcases a clear urban structure based on a central mixed-use commercial spine, identified in the plan as the city center. The city centre spine runs from the airport in the Southeast through the city, towards the Northwest edge of the 1450 UGB. The city centre is supported by a land use distribution mixing residential, business district, government facilities, regional services, and investment parks. A large industrial area is located on the Northeast side of the 1450 UGB. Previously military land located in the city centre will be converted into a business

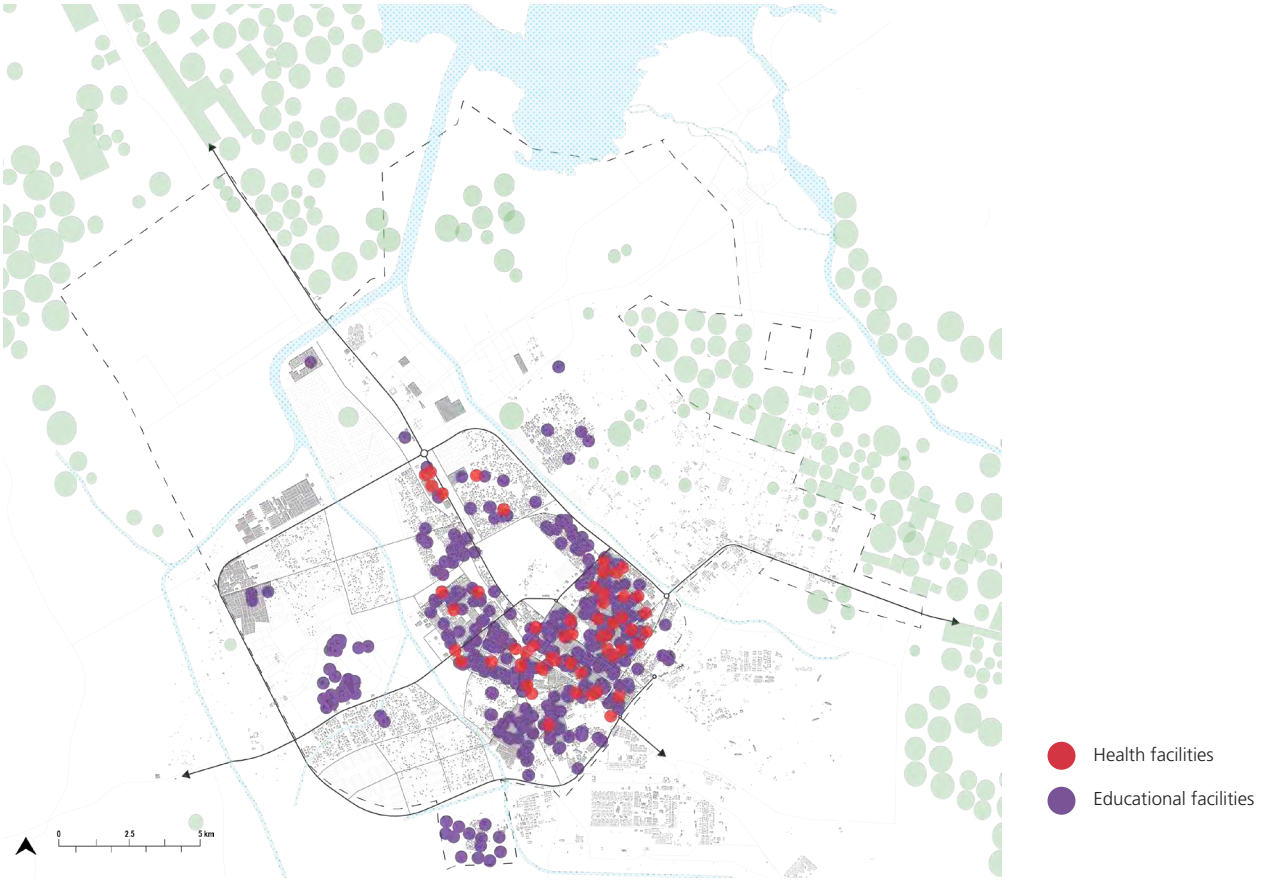
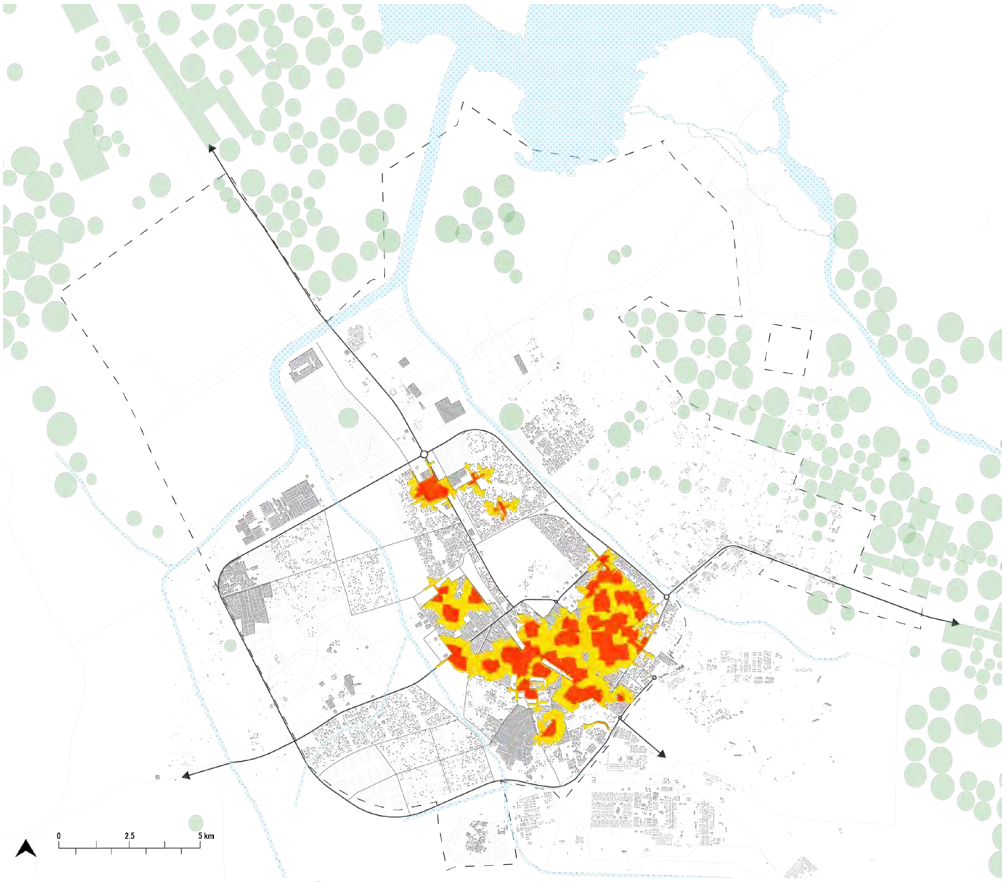


Fig. 35. Distribution of public facilities



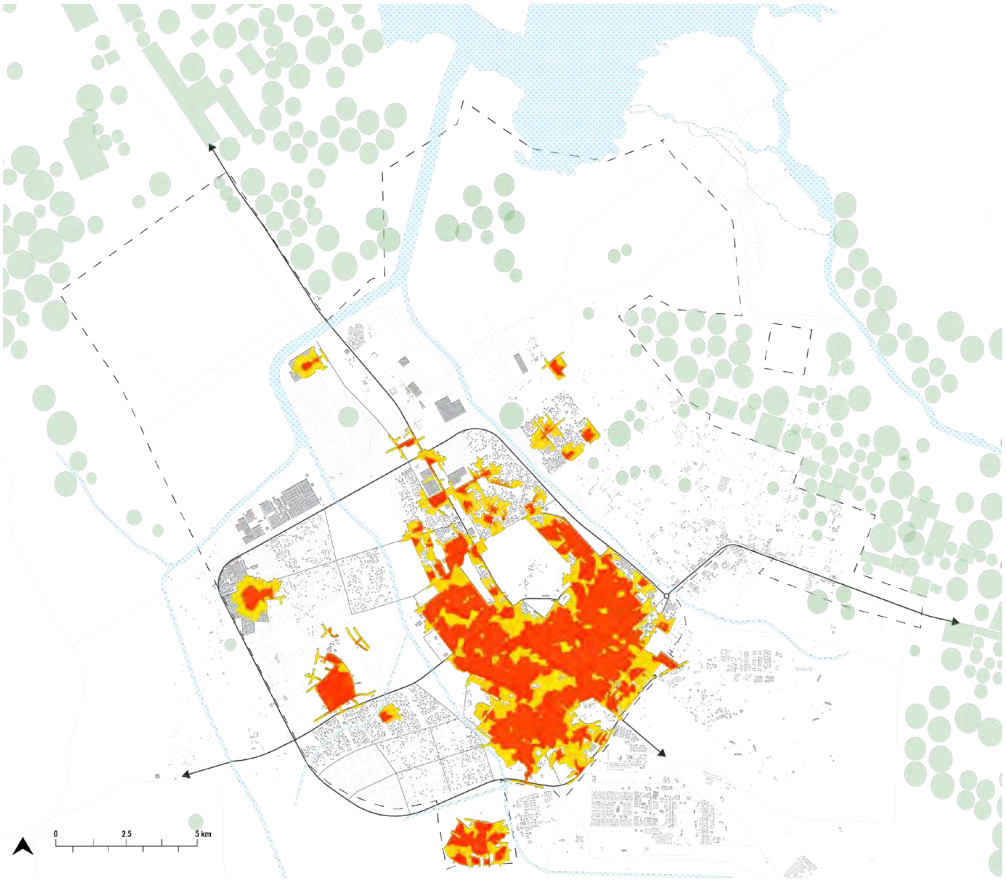
35.4% (246,125 p)
of the population reside within 5-minute walking distance from healthcare facilities

50.9% (354,132 p)
of the population resides within 10-minute walking distance from healthcare facilities

5-minute walking distance from Metro Line 1

10-minute walking distance from Metro Line 1

Fig. 36. Accessibility to healthcare facilities



67.3% (467,418 p)
of the population reside within 5-minute walking distance from educational facilities

73.3% (509,084 p)
of the population resides within 10-minute walking distance from educational facilities

5-minute walking distance

10-minute walking distance

Fig. 37. Accessibility to educational facilities

district and residential land-use. According to Scenario Two of the Local Plan, all the military land is located outside of the 1450 UGB, South of the airport, whereas a smaller portion of military land is located North of the airport.

A critical review of the Local Plan highlights two major points that need to be considered in its implementation and the next phase. First, though there are large zones of preserved agricultural land within the Development Protection Boundary, there is a consistent lack of green, open spaces permeating the city. The plan preserves the wadi or the blue network but does not call for a strong and interlinked green network permeating the city.

The second point to be considered is the preservation of lands between the Development Protection Boundary and the 1450 Urban Growth Boundary. Scenario Two suggests future residential and industrial land-uses, as well as another Ring Road in this zone. This goes against the primary function of the Development Protection Boundary, which is to manage development and prevent sprawl or unplanned city extensions beyond the foreseen UGB, thereby, protecting and preserving key ecological assets and agricultural land.

4.3.2 Public transport accessibility analysis

As previously stated, there is no public transportation service currently available in the city. However, the Tabuk Local Plan highlights a proposal for the implementation of a comprehensive public transport system, consisting of two light-rail lines and three bus lines, which should be integrated with the regional and national rail network. These initiatives denote a step in the right direction, as not only will the public transport support a more sustainable urban development, but it could also potentially be a catalyst for the re-activation of parts of the historic Hejaz rail network.

Light Rail

According to the plan, two lines will form the Inner City Light Rail, Line 1 (Red Line) and Line 2 (Green Line). Line 1 and 2 will intersect at a central location where an intermodal exchange terminal will be located, providing integration amongst alternative modes of transportation as it will also work as a bus terminal. Both the proposed light rail lines have been analysed by UN-Habitat to assess the population access to the respective stops within walking distance, once they are implemented:

- Line 1 will be 28 kilometres long with five stops, running in an East to West direction on the Northern edge of the King Faisal Ring Road. It's Eastern terminal is planned on the 1450 Urban Growth Boundary, with the line then moving westwards, along King Faisal, till the regional rail terminal, with the intention of offering intermodal connectivity. The analysis of accessibility to the five stops indicates that only 0.07 % of the residents, equal to 489 people, will have access to these stops within a 5-minute walking distance, and 0.7%, equal to 4,720 inhabitants, within a 10-minute walking distance.

Fig. 38. Accessibility from proposed LRT stops by Amanah

- Line 2 will be 32 kilometres long with seven stops, running in a North to South direction. Its Southern terminal will be on the edge of Tabuk Airport, adjacent to the historic urban center, while its Northern terminal will be located on the edge of the 1450 UGB. The analysis of accessibility to the seven stops indicates that only 16% of the residents, equal to 11,349 inhabitants, and 3.8%, equal to 26,689 inhabitants, will have access to these stops within a 5 and 10-minute walking distance, respectively.

When combining the two tram lines, approximately 1.7% of the city's population, (11,838 inhabitants) will have access within a 5-minute walking distance, while 4.5% of the city's population, (31,487 inhabitants) will have access within a 10-minute walking distance.

These pedestrian accessibility numbers are substantially low, indicating an unbalanced cost-benefit ratio in relation to the investment needed to implement the light rail system.

Bus Network

The bus network proposed for the city is composed of three lines: Line 1 (Red Line), Line 2 (Purple Line) and Line 3 (Blue Line). These three lines combined cover the city in all directions, from the centre to the edges of the 1450 Urban Growth Boundary. As per the light rail lines, the bus network has also been analysed by UN-Habitat, in order to assess the population access to the respective stops within walking distance:

- Line 1 will cover the central commercial district, reaching out to the densest parts of the city. In its full extension, the line will be serving approximately 16% of the total population, equal to 112,290 residents;
- Line 2 will cover the industrial district, connecting the regional train station and passing through low-density areas. This line, in its full extension, will be serving approximately 1.8% of the total population, equal to 12,817 residents;
- Line 3 will cover the University District and will serve approximately 4.2% of the population, equivalent to 29,557 residents.

Even with all of t three bus lines combined, only 12% (84,891 inhabitants) of the population will have access, and even then only within a 5-minute walking distance, and 22.3% (154,664 inhabitants) will have access within a 10-minute walk.

Assessment of proposed transportation systems

Overall numbers appear to be very low concerning pedestrian accessibility to both the light rail system and bus network. Nevertheless, having a public transportation initiative is a positive step for the future development of Tabuk and its

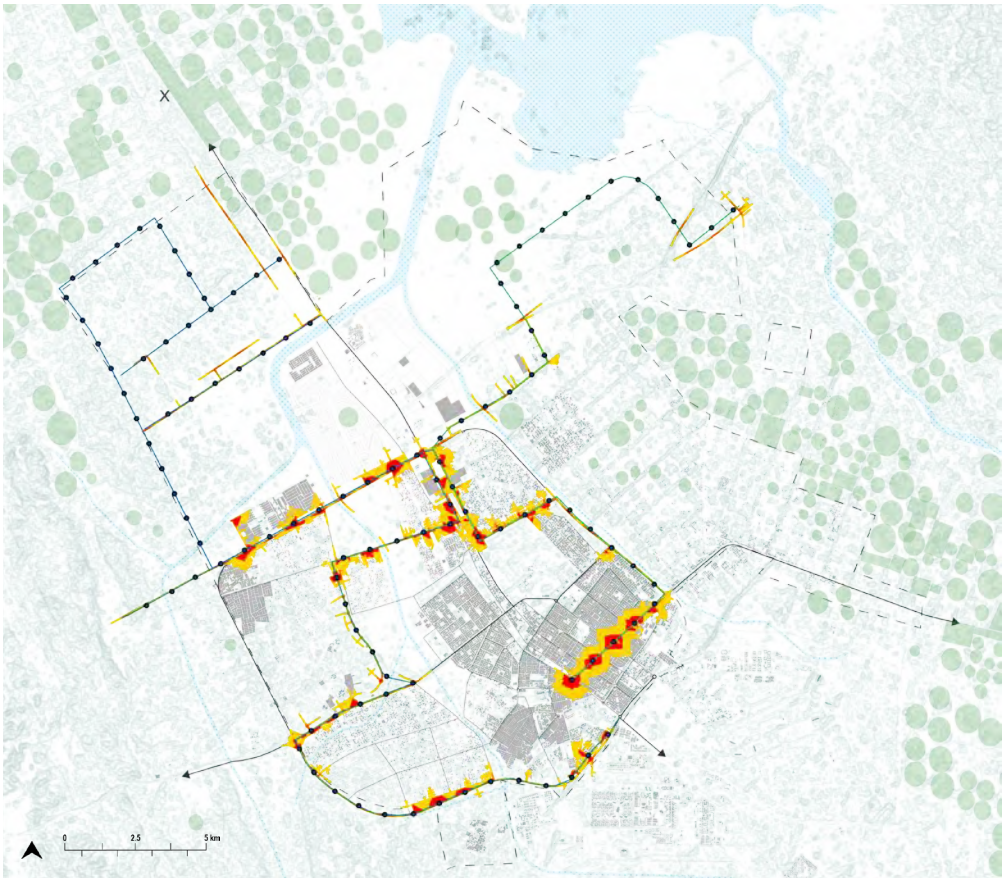


Fig. 39. Accessibility from proposed bus stops by Amanah

citizens quality of life. A few recommendations, based on the performed analysis, can help improve efficiency of the system and enhance the proposal before it is implemented:

Light Rail

- For the improvement of efficiency and accessibility of the light rail system, further analysis should be conducted on the two proposed light rail lines to address the following recommendations:
- Line 1 is on a very inefficient path and its possible relocation should be further studied; and
- Line 2 could extend into the area of Tabuk Airport, functioning also as an airport shuttle service.

Bus Network

- Efficiency and capillarity of the three proposed bus lines could be improved by taking into account the following considerations:
- Current bus line routes are linear, and routes should be designed to serve on a loop, as this is an efficient design strategy since loop-routes serve a higher number of users and allows different bus routes to overlap for better transfer options;
- Ensure routes penetrate neighbourhoods instead of being routed on the edges, which increases walking distance for users;
- In the denser urban fabric, where the streets are narrower, implement smaller feeder buses that can navigate and serve the district; thus reducing walking distance for users, especially in the commercial centre and university district; and
- Consider the possibility of extending bus lines 1 and 2 to connect them with the Tabuk Airport.

4.3.3 Density scenario analysis

Crosscutting the diagnosis of the current urban conditions and the approved/submitted projects proposals, UN-Habitat operated a scenario-analysis for increased urban density, according to various choices. The scenarios depict three conditions: the current situation, the situation developed in line with the approved planning instruments, and a situation where density distribution is allocated following the City Profile's recommendations, and based on the UN-Habitat standards.

The UN-Habitat scenario is based on the Five Principles for Sustainable Neighbourhood Planning, which are as follows:

1. Adequate space for streets and an efficient street network: The street network should occupy at least 30% of the land and at least 18 kilometres of street length per square kilometres,
2. High density: At least 15,000 p/km², that is 150 p/ha or 61 p/acre,
3. Mixed land use: At least 40% of floor space should be allocated for economic use in any neighbourhood,
4. Social mix: The availability of houses in different price ranges and tenures in any given neighbourhood to accommodate different incomes; 20% to 50% of the residential floor area should be for low-cost housing, and each tenure type should be not more than 50% of the total,
5. Limited land use specialisation: This is to limit single function blocks or neighbourhoods; single function blocks should cover less than 10% of any neighbourhood.

Current Condition

The current population of Tabuk amounts to 694,384 people spread across a built-up area of 15,360 hectares. This generates a population density of 45.2 p/ha, which is just above the recommended UN-Habitat density of 150 p/ha. A population density of 45.2 p/ha, which is just above the recommended UN-Habitat density of 150 p/ha.

Scenario 1: The Tabuk Plan

The current annual population growth rate is 2.5%, and by 2030 Tabuk's population is projected to grow to approximately 950,000 people. In parallel, the total amount of planned developable land within the 1450 Urban Growth Boundary is approximately 44,245 hectares. Based on the projected population for 1450 (equivalent to 2030), spreading the population growth over the foreseen land to be developed would result in a density of 21.4 p/ha, dramatically decreasing the already low urban density for Tabuk, indicating an inefficient and sprawled development pattern.

Scenario 2: UN-Habitat Recommendations

The UN-Habitat scenario supports sustainable neighbourhood planning for Tabuk, promoting an increased density of 150p/ha in line with the average UN-Habitat recommended density. Based on this recommendation, it would only take an area of 1,700 hectares to accommodate the same amount of population for the year 2030 (255,616 people); an area that is equivalent to 1/10th of the developable land area available within the 1450 UGB. The projected population increase could be comfortably accommodated within the existing built-up area by utilising the vacant land available. By considering the 5,206 hectares of available and developable vacant land within the existing built-up area, this scenario shows that it is not necessary to grow outside the current footprint. Instead, it suggests strategic interventions and supports policies that will facilitate the densification of existing urban areas, providing citizens with maximum benefits for an improved quality of life, and a more affordable infrastructure provision and management for the municipality.

CURRENT CONDITION

population 694,384

built-up area 15,360 ha

average density on built-up area 45.2 p/ha

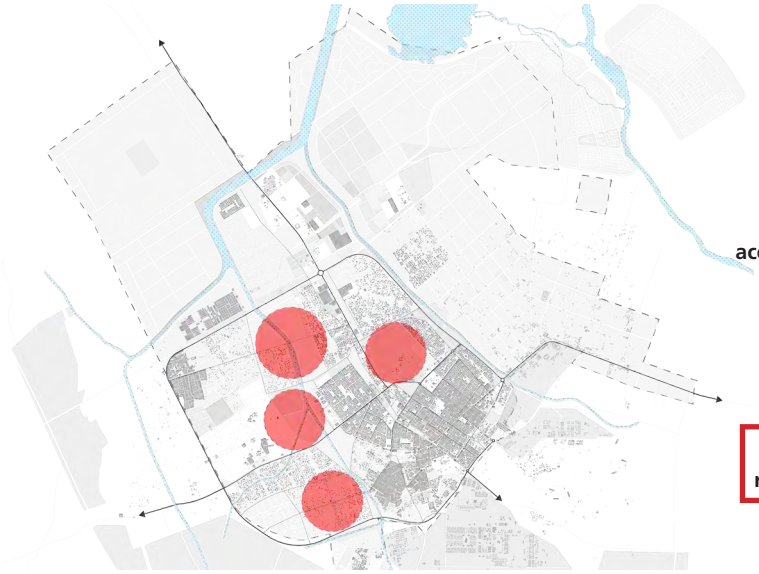
SCENARIO 1: THE TABUK PLAN

population 950,000

planned built-up area 188,978 ha

average density on planned built-up area 5.56 p/ha

SCENARIO 2: UN-HABITAT RECOMMENDATIONS



population 950,000

built-up area needed according to UN-Habitat recommendations 6,333 ha

vacant land needed to accommodate population growth 1,700 ha*

average UN-Habitat recommended density 150 p/ha

* 1/10th of the developable land within the 1450 UGB

4.4 Environmental and Climate Change Risks Implication

4.4.1 Loss of freshwater and aquifer pollution

The climatic conditions in Saudi Arabia result in water scarcity, with an availability of less than 1,000 cubic metres of water per person per year, and reduced green cover. The environmental features previously described coupled with the unsustainable urbanisation and inadequate infrastructure are putting pressure on the already limited water resources. Due to this constraint, a big percentage of water consumption comes from desalination plants. However, it is important to notice that in Saudi Arabia more than 80% of greenhouse emissions come from the energy sector, out of which desalination processes represent 12% of CO^2 emissions.[25] Shifting current growth trends and consumption patterns in order to incorporate natural water features and ecosystems dynamics is fundamental to make better use of existing resources and prevent pollution.

Current patterns are affecting renewable water resources per capita, which are dropping at an annual rate of 2%.[26] In Tabuk, though no permanent water bodies exist, integrating wadis into the urban realm has the potential of replenishing water into the aquifers. On the contrary, the urban area is waterproof due to impermeable surfaces and canals that direct the water out of the city. In this process, water is usually polluted, having a negative impact on the soil, the aquifers, and the sea it flows to. The impermeabilisation of the urban area, including floodplains, coupled with the location of the city in a valley among wadis and the changing rainfall pattern, is resulting in hazardous flash floods during extreme precipitation events. The city suffers from flooding in large areas during the rainy season,[27] especially in January, mainly along the wadis since they are the natural water pathways. The Tabuk Local Plan identifies urban development encroachment over the wadis as the main source of flooding.[28] To better understand how the city and its inhabitants relate to the natural water systems and how these are affected, the wadis were mapped in relation to the existing and future built-up areas of Tabuk. Since no detailed study on flooding in the city is available, an impact analysis based on a 100 metres buffer zone from the waterways was developed. The analysis showed that flash floods heavily impacts 10% of the existing built-up area and 40% of existing roads. Equally, if no resilient plan is put in place, around 30% of future development will also be affected. In order to prevent this from happening and reduce the impact of floods, the secretariat of the Tabuk Region is working on improvement projects, some of which are to be implemented in Tabuk's valleys. The most relevant strategies that will allow for better resilience are related to protection of wadis aimed at avoiding their encroachment, increasing the permeable surfaces to reduce water accumulation and allow filtration, and developing a green public space network, both on existing vacant land within the urban fabric and for the future urban areas, that can be deployed as a water management system. Along with stormwater

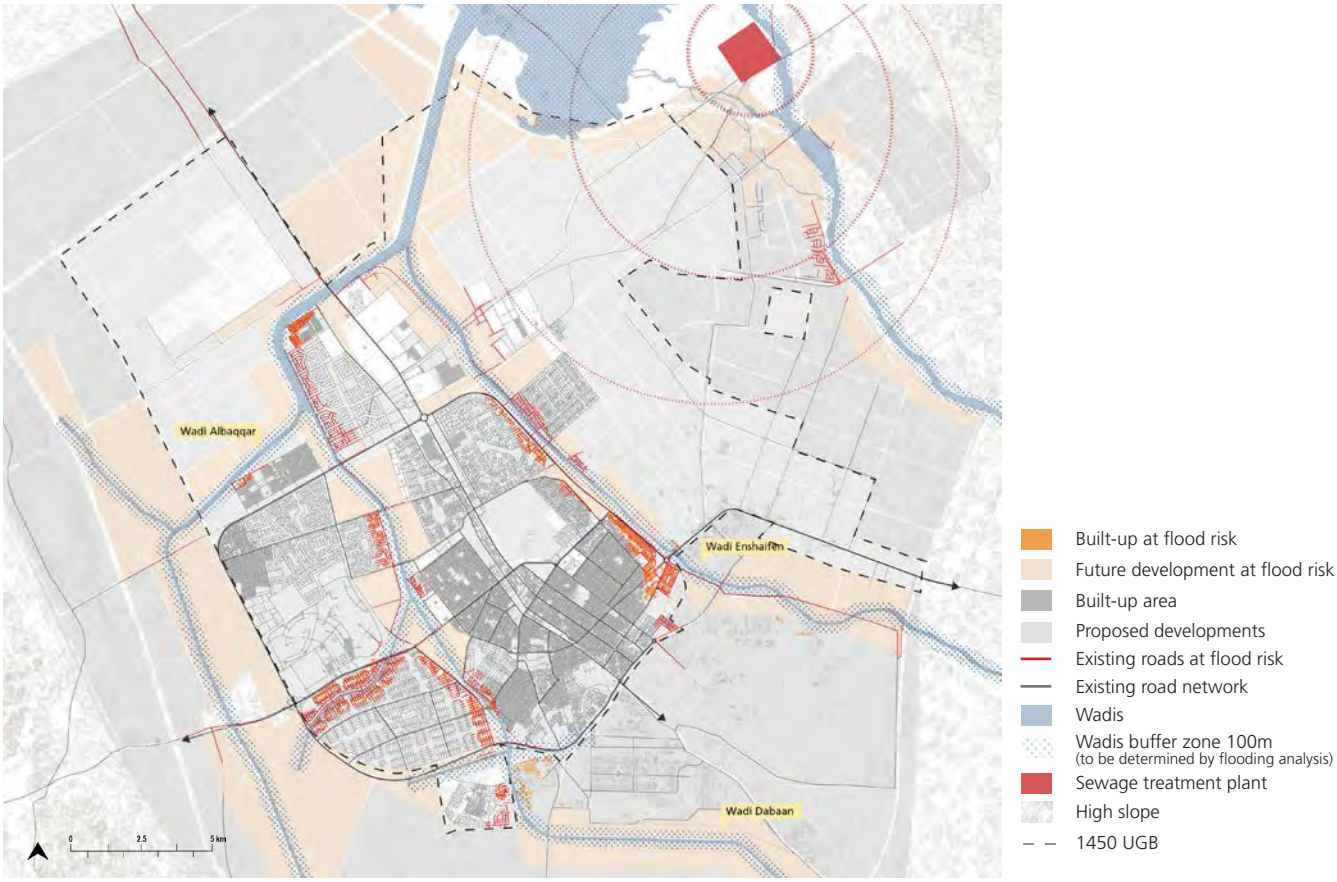


Fig. 40. Water and sewage management

management, sewage management is also a big challenge for the city, due to the negative impact that the sewage treatment plant is having on the aquifers as a result of its location. The natural slope on which the city lies on heads towards the Northeast. As such, the existing sewage treatment plant was constructed to the Northeast of the city, to benefit from the natural slope in designing the network. However, the plant wasn't appropriately built, leading to many environmental problems, in terms of groundwater pollution and the bad smell that permeates the city. Considering that new developments are planned to extend towards the sewage treatment plant location, improving its functioning is a key matter.

4.4.2 Loss of agricultural land and inconsistent green network

Traditionally, agriculture developed along the wadis make use of the scarce sources of water. Still, large areas of agricultural land are currently at risk due to the growth of the city. The newly planned areas for Tabuk have been mapped along with the existing productive plots, showcasing how new development is not respectful or integrating agricultural land. This implies that the majority of this valuable land is at risk to a change in land-use. In addition, it appears that large parts of the agricultural areas are irrigated through sprinkler systems, which have proven to be inefficient in such climatic conditions, due to high evapotranspiration levels, which further impacts the loss of freshwater. It is recommended to shift to more sustainable practices, such as drip irrigation systems, which can save up to one-fourth of water in comparison to surface irrigation.[29] This general misuse of water prevents the maintenance and enhancement of green infrastructure, such as parks, tree canopies, green plazas, etc. Extending and incorporating green networks within Tabuk's fabric would positively affect the urban microclimate, reducing high temperatures that climate change and development of concrete and tarmac surfaces have caused. These green spaces could become the infrastructure through which rainfall water is managed, allowing to be used for irrigation, while also enabling stormwater to filter back to the soil. This new articulated network could also become the backbone through which public transportation and non-motorised mobility are enhanced, resulting in a reduction of pollution from current transportation modes, which currently accounts for 21%[30] of CO^2 emissions. Potential to use existing vacant land within the city and especially along the wadis, for the development of a consistent and capillary network of green public spaces exists. If this green network is linked to the blue network of wadis and natural water channels, it would improve the overall urban resilience to floods while enhancing the quality of public space and walkability.

Fig. 41. Blue and green networks

STRATEGIC DIAGNOSIS

5.1 Identifying and Defining Main Strategic Issues

The in-depth, evidence-based analysis brought to light three main strategic, interrelated issues highlighting Tabuk's performance in relation to the principles of sustainable urban development. These issues represent the strategic framing of a complex diagnosis, synthesised through three conceptual lenses. The lenses, once defined in their conceptual nature, were then contextualised by examining how they manifest spatially in Tabuk, at different scales. They are synthesised as follows:

5.1.1 Unbalanced growth and development patterns

Spatial patterns are defined by structural elements, fabric morphology, and density distribution, and are highly influenced by land use policy. Inherently, a coherent land use policy influences spatial patterns by determining the appropriate amount of land needed to accommodate future growth and by distributing urban functions and densities accordingly. The combination of these attributes can either generate urban quality or create and increase urban issues such as sprawl.
This often happens when a city grows rapidly, presenting an extended sprawl phenomenon, and inharmoniously manifesting unbalanced developments across its territorial extension. Dysfunctionalities emerge in appropriate urban management and citizens experience. In this scenario, the city showcases low density and does not perform effectively, its services and facilities are not well balanced in distribution and accessibility, and therefore citizens do not equally benefit from the advantages of urban life. Additionally, it is costly and difficult for the municipality to provide and maintain basic servicesor efficient and sustainable infrastructure, such as public transport. This is an inherent issue in conditions of sprawl and low density as water, sewage, electricity and transport infrastructures require extension over longer distances to reach relatively fewer people. As such, the significant amounts of land per capita that urban sprawl tends to consume, requires larger capital investments for infrastructure installation and increasing maintenance costs. The current development trends in Tabuk tend to reproduce disperse patterns of low-density and monofunctional land-use, with scarce provisions for social activities and both empty interstitial spaces and large areas of vacant land between existing portions of the consolidated city. The tendency toward sprawl in requires urgent address in order to halt progression of the condition, which is heavily affecting the city's functionality by reproducing unsustainable development patterns of unbalanced growth at low-densities.

5.1.2 Divisions and lack of cohesion in city structure

In cases of unbalanced growth, sprawl, and inharmonious development, forms of non-contiguous and non-cohesive city structures tend to co-exist, without integration. Pockets of leapfrog development are widespread. Undeveloped land, overdimensioned infrastructures and/or large extensions of monofunctional developments, hinder the continuity of the city's fabric, and therefore, its social, economic, and ecological performance. As in cases of sprawl, this renders the equal provision of infrastructure and services to the entire city difficult and costly. The fragmentation phenomenon also spatially affects the social dimension of sustainability, creating urban inequalities and segregation in areas that lie at a distance to the largest hubs, and become isolated by a discontinuous urban landscape.

Fragmented cities tend to exhibit a presence of residential estates in the city outskirts, either as high-income gated communities or as low-cost housing enclaves, built separately and far from shopping and commercial facilities, industrial, business, and directional centres, and recreational areas. This adds to fragmentation and unsustainable urban patterns, as large highways are often the only viable means of connectivity over long distances, resulting in car-dependency and high mobility costs. As such, a city's spatial patterns can influence socio-spatial connectivity, and increase travel time, and congestion. People's ability to move from their homes to their workplace, shops, school, and health centres is essential for a city's performance and needs to be considered both in terms of distance and comprehensive fabric connectivity. If there are many physical barriers to walk and traverse the city, the city becomes inaccessible to its inhabitants. A well-connected urban fabric supports public transport and decreases congestion by increasing the overall accessibility. In well-articulated, dense, and cohesive urban areas, congestion is reduced, while social and economic vibrancy is increased.

1 UNBALANCE GROWTH AND DEVELOPMENT PATTERN
[SPRAWL]

2 DIVISIONS AND LACK OF COHESION IN THE CITY STRUCTURE
[FRAGMENTATION]

5.1.3 Socio-ecological and economic imbalance

Each city is formed by complex social, economic and ecological systems. In a sustainable city, the balance between these three interrelated systems is maintained and enhanced over time. If any one system is given continued preference over the others, over time, a structural imbalance will emerge that alters the sustainable trajectory of the city's growth and development. A socio-ecological and economic imbalance is also created when planning decisions for the city fail to consider preservation and management of existing natural resources, or the functional value of natural assets and their territorial continuity. Planning processes and spatial development practices that incorporate, for instance, integrated water-resource management, natural cycles, and more broadly, functional ecosystem services, are often undervalued by local municipalities all over the world. Socio-ecologically unbalanced urban systems result in a number of threats to the environment, to overall urban quality, and to the health of citizens. Unsustainable consumption patterns, pollution, loss of biodiversity and of agricultural soil, pressure on ecosystems, as well as increased subjection to natural and manmade disasters, are examples of these. All of these conditions additionally carries heavy effect on the economic performances of a city, that can become increasingly clear over long-term observation.

3 SOCIO-ECOLOGICAL AND ECONOMIC IMBALANCE
[LACK OF RESILIENCE]

5.2 Analysing Tabuk's Three Issues in Depth

5.2.1 Tabuk's unbalanced growth and development patterns

Recent developments in Tabuk are pushing away from the city centre towards the edges, expanding against the 1450 Urban Growth Boundary. The sprawled development is mostly occurring towards the North of the city center, beyond the Ring Road, leaving consistent portions of vacant land in between the new development pockets.

This growth pattern is defined as leapfrog development and uncontrolled sprawl, becoming an obstacle for the efficient use of land, and affecting delivery capacity for infrastructure and transportation services. Urban sprawl causes inefficiency in urban management and an elevated financial cost for the government in terms of delivery of infrastructure and public services. In a sprawled city, the cost of providing access to electricity, sewage, and clean water by the municipality is higher than in a compact city. Maintenance capacity is also affected as infrastructure is more widespread.

Ultimately, low density of population does not compensate the costs through an ordinary revenue system. As such, as these areas are a distance from the consolidated city, they place a strong economic pressure on the municipality to provide and maintain the necessary infrastructure to support them. These risks will potentially be worse due to the future development envisaged by the Tabuk Plan, which extends and fills up the area between the Ring Road and the 1450 UGB.

Considering the Future Land use Plan, this covers an area of 44,284 hectares, filling up and in some parts exceeding the 1450 UGB, with an overall increase of 28,924 hectares, in comparison to the current built-up area. This amount of land speaks to an increased urban sprawl, especially because of the spatial distribution of the new residential areas, exacerbating the tendency to expand the city, following a pattern dominated by large monofunctional areas.

Tabuk would need to counteract this sprawling and unbalanced growth pattern by strategically densifying within the existing footprint, as there are currently more than 5,200 hectares of vacant land within the Ring Road that could be used to incrementally consolidate and densify the city. This means that there is considerable potential for infill densification strategies, rather than promoting new developments away from the consolidated city, and satellite developments beyond the 1450 boundary.

Sprawl development along Tabuk's edges

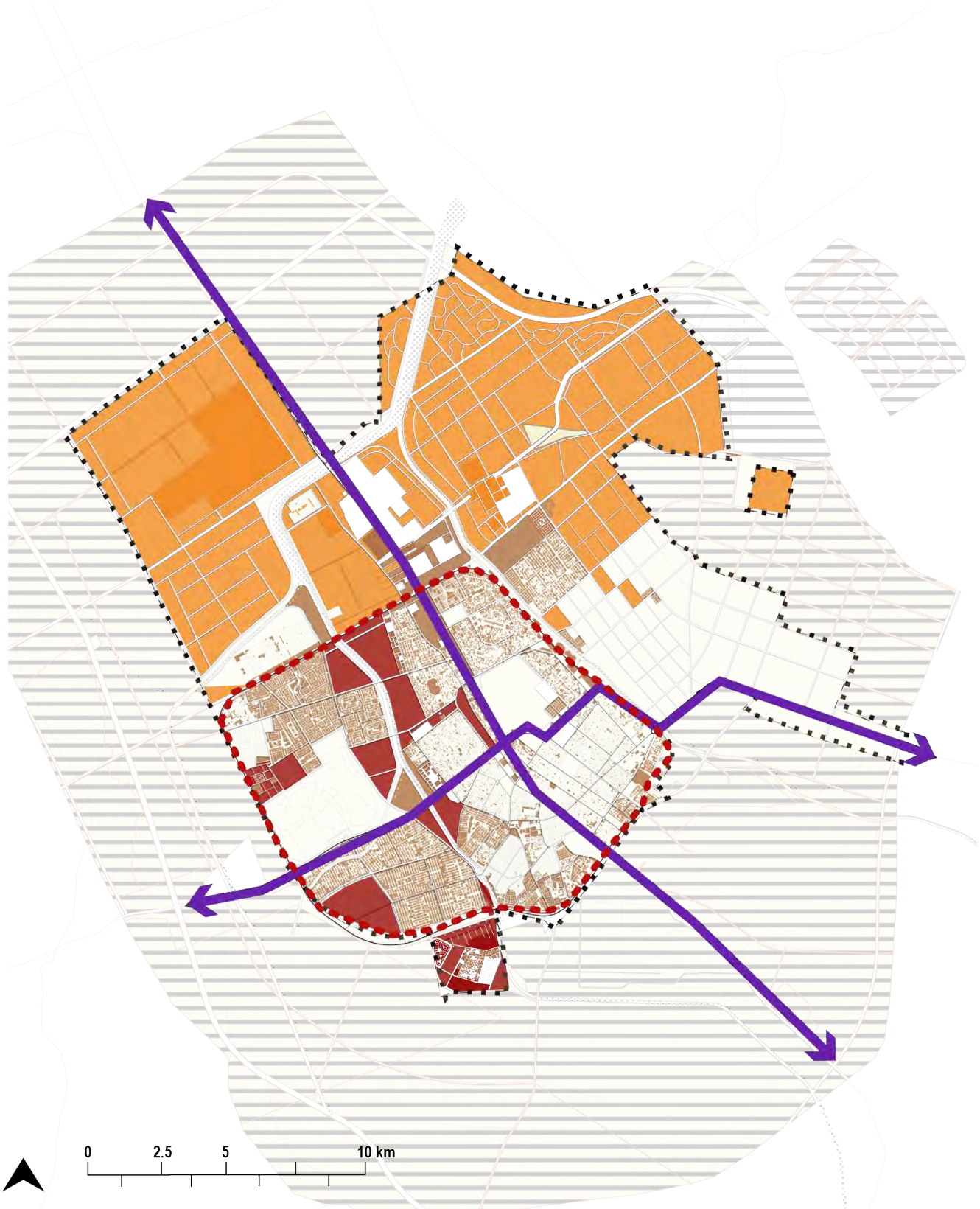


Fig. 42. Tabuk's unbalanced growth and development patterns

5.2.2 Divisions and lack of cohesion in Tabuk's urban structure

As an effect of the leapfrog development described above, Tabuk's urban structure is defined by the lack of a cohesive and well-integrated urban fabric. Isolated development beyond the built-up area appears as a series of disconnected patches. These patches are generally monofunctional lacking a variety of programs, and if not completely vacant, are often defining big cuts and disconnections in the urban fabric, as is the case of the National Guard reserve land. Other times they are internalised in their structure and layout and do not respond to the surrounding context, often lacking connectivity of the street grid with the neighbouring areas, as the university campus. Further, with 5,206 hectares of available vacant land within the Ring Road, the issue of disconnectedness is reinforced, resulting in an urban form that reads like a patchwork of developments lacking contiguity and continuity. In addition, a series of structuring elements, like the over-dimensioned road infrastructures increase divisions across neighbourhoods and in the overall city's fabric.

These elements define discontinuity in the urban fabric at various degrees, characterising Tabuk's urban landscape with an environment that lacks a dense, continuous urban fabric and the appropriate connectivity at the human scale. Large-scaled infrastructure, such as highways and major transportation corridors, do not support the principles of a human-scaled walkable city. They are frequently over-dimensioned without any proper pedestrian crossing points and surrounded by large superblocks. The quality and character of the public realm adjacent to these oversized infrastructures do not support a pedestrian-friendly and well-connected urban fabric.

One such example is King Abdulaziz Road, a major corridor in the heart of the city that is approximately eight kilometres long. Within its entirety, there is only one dedicated pedestrian crossing at the Railway Park. Another issue regarding infrastructure in Tabuk and many other Saudi cities are dead-end roads. Road patterns are not continuous to allow free flow of traffic. Many minor roads either terminate in a dead-end, rather than connecting to other minor or major roads, defining a disconnected and maze-like road network, which occurs at all the scales of the city, from neighbourhood to major crossings.

A further element that reads as a division in the urban fabric, because of the lack of integration with it, is the Wadi network. While the system of wadis is potentially a valuable natural feature for enhancing the quality of the urban environment, it is currently performing like a major divider of the city's fabric. The edges are treated with concrete and metal fences, limiting accessibility, natural functionality, and creative and diversified uses of the wadi space. While it should be noted that the municipality is currently creating parks and open green areas on the edges of the wadi system, it is also important to note that this is not sufficient as an approach to better integrate the natural features into the urban fabric.

Overdimensioned road infrastructure in Tabuk

Fig. 43. Divisions and lack of cohesion in Tabuk's urban structure

5.2.3 Socio-ecological and economic imbalance in Tabuk

Tabuk has a lack of green open spaces within the overall existing urban fabric, and especially in the city centre. The few available green open spaces are developed along transport axes and are far from the active parts of the city, and disconnected from the neighbourhoods. In addition, these few existing green spaces, are not connected amongst them; missing the chance of forming a consistent green network across the city.

From a social point of view, the uneven distribution of green open spaces highlights spatial inequality, reflecting scarce accessibility of most citizens to open public and green spaces, therefore, unequal allocation of green infrastructure across the city.

The wadi system forms the largest natural feature in the city. Wadi Dabaan crosses the city centrally, while Wadi Abu Nishfah and Albaar are adjacent to the ring road towards East and West, respectively.

In 2011 a park along Wadi Abu Nishfah was developed; the Prince Fahd Bin Sultan National Park, located at the edge of the consolidated city, far from the inhabited areas and cut from the main city by the large ring road. The park is wedged between King Faisal Road and Wadi Abu Nishfah with no direct pedestrian connection to the urban fabric and is currently only accessible by private vehicle. Overall, the entire wadi system lacks integration with the urban fabric, including Wadi Dabaan, which sits within the built-up area. This typifies an overall attitude that does not envision the wadi system as a social, economic, and ecological driver for the city.

Current analysis shows that some parts of the city are exposed to flooding, especially along Wadi Dabaan, located within the urban fabric. While the central wadi system presents an opportunity to form a structure of open spaces, flood management strategies should be developed to mediate and reduce flood risk. Furthermore, an assessment of possible negative impact is recommended to understand how the existing sewage treatment plant may affect the aquifers, and a close-by reservoir, located approximately 23 kilometres North of the city centre, and which is a primary water source for the city.

Additionally, networks of small, distributed parks and greenways should be introduced and connected to each other, as well as to the wadis; relinking green and blue networks between the built-up areas and the large wadi system, This could be done by selectively converting available vacant land within the built-up areas into green open spaces and linear parks serving the community. Along these parks and green connectors, pedestrian-scaled commercial activities and various social infrastructure can be introduced. This would configure a complex socio-ecological and economic network, working as a comprehensive system.

Overall, protection and integration of natural resources in the planning of the city should be considered a priority, and all new developments should occur with respect for the local ecology of Tabuk. The wadis, the watersheds, the green networks, and public spaces, represent a potential source of economic growth and social development for the city. A green economy approach could provide a useful framework whereby decisions and actions promote resource efficiency, effective environmental management, and a better standard of living for residents.

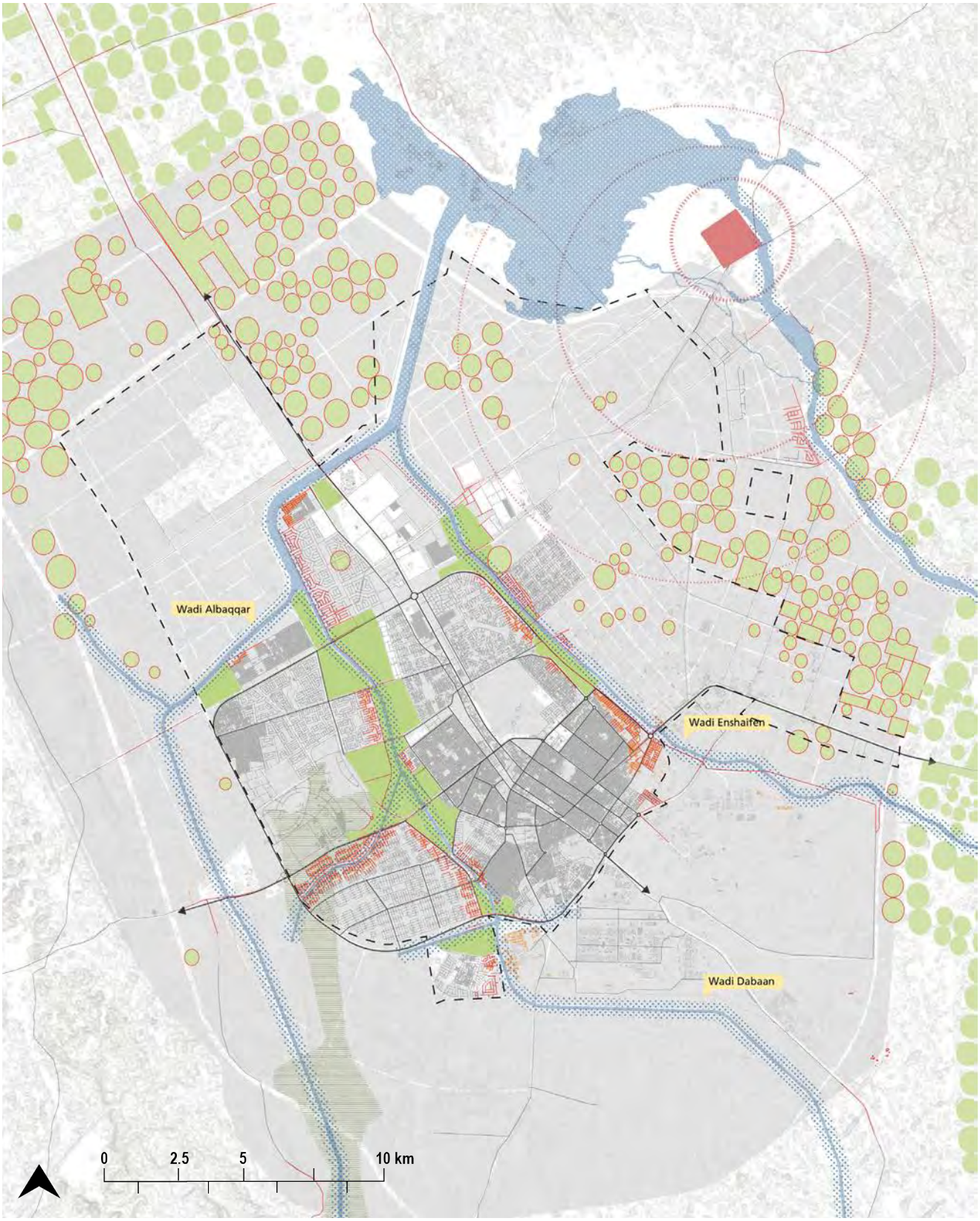


Fig. 44. Socio-ecological and economic imbalance in Tabuk

6

THE FUTURE CITY

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6.1 Strategic Responses

After performing a strategic diagnosis, and identifying three main issues affecting the urban development of Tabuk, three strategic recommendations were identified in response. Akin to the three strategic issues, the above-mentioned three strategic recommendations define the conceptual framing for a systemic and strategic level of solutions. Once defined in their conceptual nature, they are developed into a more detailed description, spatially interpreted and contextualised in Tabuk, at the various scales. This is followed by a roadmap to implementation, in the form of an articulated Action Plan.

6.1.1 The Compact City

According to the UN-Habitat principles, cities need to encourage spatial development strategies that take into account, as appropriate, the need to guide urban extension, prioritising renewal by planning for the provision of accessible and well-connected infrastructure and services, sustainable population densities, and compact design. They must consider integration of new neighbourhoods into the urban fabric, in order to prevent urban sprawl and marginalisation. UN-Habitat principles emphasise the relationship between urban form and sustainability, asserting that the shape and density of cities have implications for the sustainable use of resources into the future, and quality of life for citizens. Strong arguments have emerged to promote the Compact City as the most sustainable urban form. A Compact City is envisioned as a high-density urban settlement, characterised by mixed-use development, recognisable, dense, and revitalised central areas, with well-distributed services and facilities (hospitals, parks, schools, leisure, and entertainment). Establishing spatial and legal mechanisms, to consolidate a Compact City, should increase accessibility and walkability, therefore increasing use of public transport and public space, reducing congestion, boosting the local economy and increasing interactions across society. Policies to promote urban compaction involve the promotion of urban regeneration, the revitalisation of town centres, restraint on development in rural and peripheral areas, promotion of higher densities and mixed-use development, promotion of public transport, and the concentration of urban development at public transport nodes. In this scenario, a vibrant street life encourages people to walk or cycle more, and the high-density and mixed-land use developments will, in a sensible way, encourage a social mix who will enjoy close proximities to work, home, and services. Walkability helps to reduce automobile reliance, thus alleviating congestion, air pollution, and unnecessary use of available natural and financial resources.. In addition, compact urban development aims to preserve land resources and natural assets, while increasing the efficiency of public infrastructure and transportation services. A compact built form, supported by an efficient public transport backbone, offers opportunities to increase densities, protect environmental resources, and enhance accessibility to the central area for all residents.

1 THE COMPACT CITY
[CONSOLIDATE]

6.1.2 The Connected City

The New Urban Agenda asks cities to commit to creating access to public spaces, public transport, housing, education and health facilities, public information, and communication. The Connected City is envisaged as a continuous, well-connected, and well-balanced network of neighbourhoods, each with parks and public spaces, and accommodating a diversity of overlapping private and public activities, shaping a healthy and vital urban environment. The street network has a major role in shaping the urban structure which, in turn, sets the development patterns and scales for blocks, connective nodes, buildings, open spaces, and landscape. This involves development of a well-organised street hierarchy with arterial routes and local streets that is based on different modes of transport and traffic speeds, acting as connectors that should be considered both in terms of accessibility and of social interactions. In this scenario, public transport can provide fast cross-town connections linking public areas and functional cores of the city to the surrounding neighbourhoods. Most importantly, these neighbourhoods in turn, should provide opportunities and conveniently located facilities that are accessible locally by the community, which in turn reduces the dependency on private vehicles. In large cities, mass transit systems can provide high-speed, cross-town travel by linking one neighbourhood centre with another, leaving local distribution to local systems and foot traffic. This reduces the volume and impact of traffic, which can be calmed and controlled, particularly around the public cores of neighbourhoods. Local trains, light railway systems, and electric buses become more effective, and as a result, cycling and walking become more pleasant. Moreover, congestion and pollution are reduced drastically, and a sense of security and conviviality in public space is increased.

2 THE CONNECTED CITY
[RE-STITCH]

6.1.3 The Resilient City

A Resilient City takes into consideration appropriate built form and physical infrastructure to increase resilience to the physical, social, and economic challenges that arise from depleting carbon-based fuels and climate change. As such, a Resilient City can be defined as a sustainable network of physical systems and communities,[31] in which physical systems consist of both the constructed and environmental components of the city. They include roads, buildings, physical infrastructure, communication facilities, soils, topography, physical features, geology, waterways, population density, etc. In sum, the physical systems act as the body of the city, its bones, arteries, and muscles. Resilient cities as explained by Godschalk (2003)[32] are cities which are capable of withstanding severe shock and stress without either immediate chaos/damage or permanent deformation or rupture. These cities are designed in advance to anticipate and recover from the impacts of natural or technological hazards. According to the New Urban Agenda (NUA), cities need to ensure environmental sustainability by promoting clean energy and sustainable use of land and resources, protecting ecosystems and biodiversity, promoting sustainable consumption and production patterns, reducing disaster risks, as well as mitigating and adapting to climate change. These elements amount to resilience. The NUA states that cities need to invest in the generation and use of renewable and affordable energy, and sustainable and efficient transport infrastructure and services. This will provide benefits of connectivity and reduce the financial, environmental, and public health cost of inefficient mobility, congestion, air pollution, noise and urban heat island effects. Alongside this, a Resilient City also supports and is mutually supported by its territorial ecosystems, activating positive urban metabolism mechanisms, ensuring a reliable resource supply and balanced value chains.

3 THE RESILIENT CITY
[PROTECT & IMPROVE]

6.2 Appropriate Models for Tabuk's Urban Development

6.2.1 The Compact City: Consolidating Tabuk's development and densifying centres

The first strategy focuses on counteracting sprawl by concentrating all new developments in and around the existing urban fabric, thereby compacting city developments to an optimum level. This would help in progressively compacting the city's fabric, allowing for increased density and a more sustainable urban form. There are several perceived benefits of the Compact City over urban sprawl, which include:

- Less car dependency thus lower emissions;
- Reduced energy consumption;
- Better public transport services;
- Increased overall accessibility;
- The re-use of infrastructure and previously developed land;
- A regeneration of existing urban areas and urban vitality;
- A higher quality of life, the preservation of green space, and;
- The creation of a milieu for enhanced business and trading activities.

The first strategy for a sustainable Tabuk concentrates on the importance of limiting urban sprawl beyond the ring road, while, in parallel, reducing the fragmentation of the city's fabric. This can be achieved by firstly increasing density within the built-up areas, pushing for the development of vacant land both within the existing urban fabric and within the Ring Road. Currently, there are 5,206 hectares of vacant land available within the ring road. Considering the UN-Habitat recommended density of 150 p/ha, this amount of land could accommodate an additional 780,900 inhabitants.

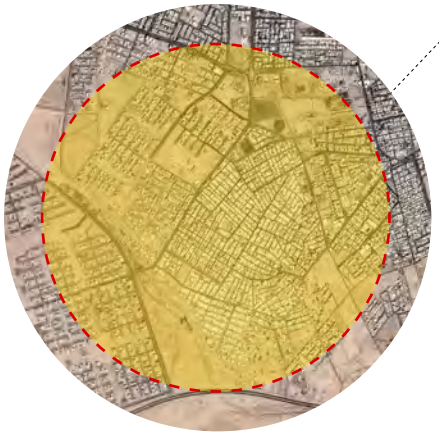
As mentioned in chapter 4.1.2, another relevant issue impacting urban sprawl is the underdeveloped land, of which there are approximately 2,110 hectares within the Ring Road and to the West of the urban core. If redeveloped at the UN recommended densities, this amount of land has the potential to accommodate an additional 316,500 inhabitants. This means that Tabuk has many opportunities to consolidate and densify its urban form and structure, and have consistent capacity to host its expected population increase within a new compact urban system.

Accordingly, appropriate incentiìves and regulations should be set in place and enforced with the goal of prioritising the development of residual vacant land, discouraging the practice of land-banking by enforcing existing White Lands policies.

In addition, appropriate densification policies should be set, in parallel with the implementation of a new public transport system (see chapter 6.2.2), prioritising strategic densification along its routes and nodes. This will promote and improve incremental densification based on the TOD principles, where high-density urban growth will be prioritised along the public transport routes, towards the inner parts of the city. This will also allow for the creation of new mixed-use centers around the main public transport nodes, that are supported by an appropriate population density.

These measures will relieve the city from the pressure of providing an extended network of infrastructure to sprawling, scattered, new development areas, while providing opportunities to redirect the investments on improvements and upgrades to the existing urban fabric in order to accommodate the increased density within a more compact and efficient city. In the long term, this will be cost-effective, making infrastructure efficient, reducing resource-consumption, and reducing costs for the overall city's functioning.

Limiting urban sprawl beyond the ring road, and increasing density within the built up areas.



Reducing the fragmentation of the city's fabric by pushing for the development of vacant land both within the existing urban fabric.

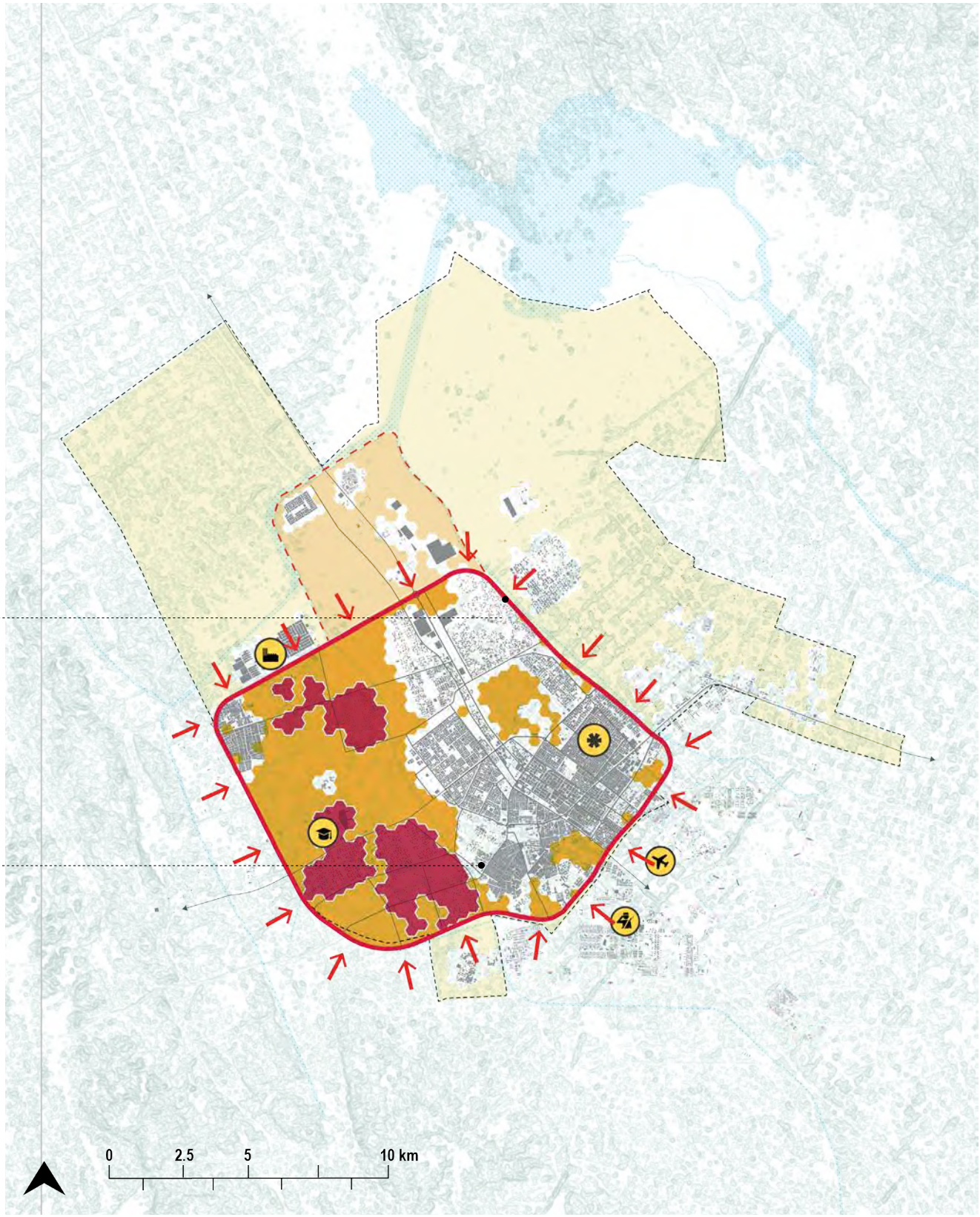


Fig. 45. The Compact City: Consolidating Tabuk's development and densifying centres

6.2.2 The Connected City: Linking Tabuk through public transport

The second strategy addresses Tabuk's need to revert the divided urban structure and reduce spatial fragmentation, granting a more diffused accessibility to all its citizens. Dismantling the spatial divisions in the city is an incremental process, involving the phases of analysis, understanding, and actions, defined by a careful mix of sectoral and area-based evaluation and implementation tools. However, and more importantly, a new mindset that values public transport needs to be promoted in the city. Future growth policies and plans will need to follow this new mindset through a strong normative framework, with attention to the principles of sustainable development.

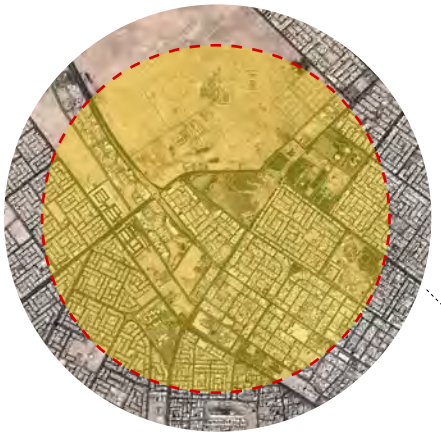
This means that to heal the city of its fractures and disconnections, the municipality needs to develop adequate urban design guidelines that support densification and compactness while shaping a pedestrian-friendly, walkable and well-connected, human-scaled environment. In parallel, the road network should be redefined in size and scale, switching from an automobile-oriented transport network to a more public and pedestrian-oriented one. In order to rebalance the ratio between public/private mobility, the redefined road system will need to be complemented by a well-integrated public transport system that is multimodal, integrated, and capillary. In this scenario, the public transport network should act as a backbone for the definition of new centralities with different roles, to be formed around inter-modal nodes. With such a system in place, it will be easier to limit the cost of movement for residents, discouraging cost-ineffective private mobility, increasing walkability, improving access to opportunities, and enhancing socio-economic interactions across the city.

Two main public transport routes can be developed in Tabuk to match the vision outlined above; King Khalid Road, connecting the airport in the Southeast to the industrial zone towards the Northwest, as already envisaged in the transport plan; and King Fahad Road, connecting the University in the Southwest to the Military base in the Northeast, following the revised route proposal by UN-Habitat for improving the proposed public transport plan.

Lastly, the same voids and cuts that now define the fragmented urban fabric of Tabuk can also be considered a resource in terms of available space for public services. A new network of public spaces and green infrastructure systems should be set in place, to take advantage of these residual spaces. Part of the available vacant land should be used to relink detached neighbourhoods, provide public spaces and establish lively commercial areas, (e.g., open-air souqs) along the new public transport routes and nodes, with the goal of promoting walkability and creating a system of small public spaces and active areas across the city.

Following the principles of the New Urban Agenda and its implementation, there is a strong need to promote safe, inclusive, accessible, green, and quality public space, including streets, sidewalks, and cycling lanes, squares, gardens and parks, that are multifunctional areas for social interaction and inclusion, human health, and well-being. These spaces can play a fundamental role in fostering economic exchanges and cultural expression, as well as connectivity and social inclusion.

Transportation lines
Define transportation lines along major axes



Nodes
Consolidate and densify land uses along major nodes

Transversal network
Create a secondary network for improved accessibility

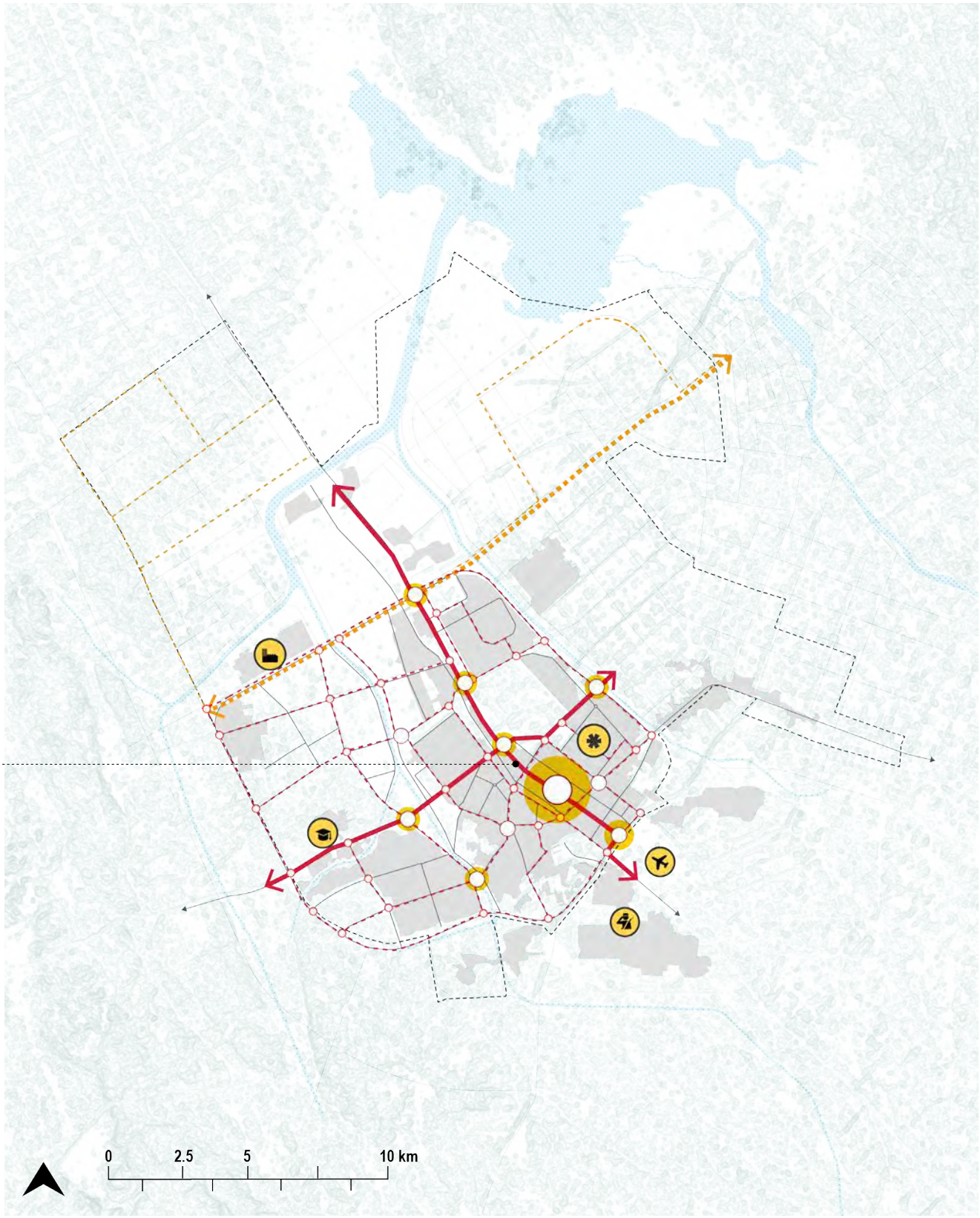


Fig. 46. The Connected City: Linking Tabuk through public transport

6.2.3 The Resilient City: Rebalancing Tabuk's socio-ecological and economic systems

This strategy aims to promote the development of urban spatial frameworks that support sustainable management and the use of natural resources and land, appropriate compactness and density, polycentrism and mixed-uses, including urban planning and design instruments. This can be achieved through infill or planned urban extension strategies, as applicable on a case by case criteria, that are able to trigger economies of scale and agglomeration, strengthening planning for sustainable development, enhancing resource efficiency, urban resilience, and environmental sustainability.

As such, an urban structure that aims to balance aggregated demand for economic, social, and institutional spheres needs to incorporate:

- The ecological dimension - to provide a healthy and natural productive environment;
- The economic dimension - to contribute to economic progress in the sense of prosperity and sustainable resource management;
- The social dimension - to provide for prosperity and equitable social opportunities;
- The institutional dimension - to contribute to conducting socio-ecological systems towards sustainability through participatory governance, (IRF 2015, 2013).

Within this framework, the wadi system, the agricultural land, and green networks represent a potential source of economic growth and social development, which can help to regenerate damaged urban ecosystems.

Along these lines, green and blue networks should be considered as a structuring element, integrated to the urban fabric, and developed as socio-ecological infrastructure able to perform multiple functions, from stormwater management to food production, and public space provision. Re-linking the city and the wadi system through green networks and corridors would improve accessibility and the quality of public life while reconnecting the urban ecological systems to the wider territory and surrounding landscapes. Using ecological networks as a natural infrastructure for stormwater, agriculture and urban open spaces would improve the city's environmental conditions while providing new economic opportunities, from environmental and cultural tourism to urban farming. Lastly, integrating public transport and green networks would create a pleasant, pedestrian-friendly public realm, optimising ecological and economic benefits of public transport investments.

Socio-ecological & economic systems
The agricultural farmlands, wadis and the public green space networks represent a potential source of economic growth and social development

Blue and green network
There are many potential places for the development of public space network along the wadi, some of them are alocated for agricultural uses.

Wadis
Using the wadis as new green public spaces, could help to redefine new socio-ecological infrastructure for the city

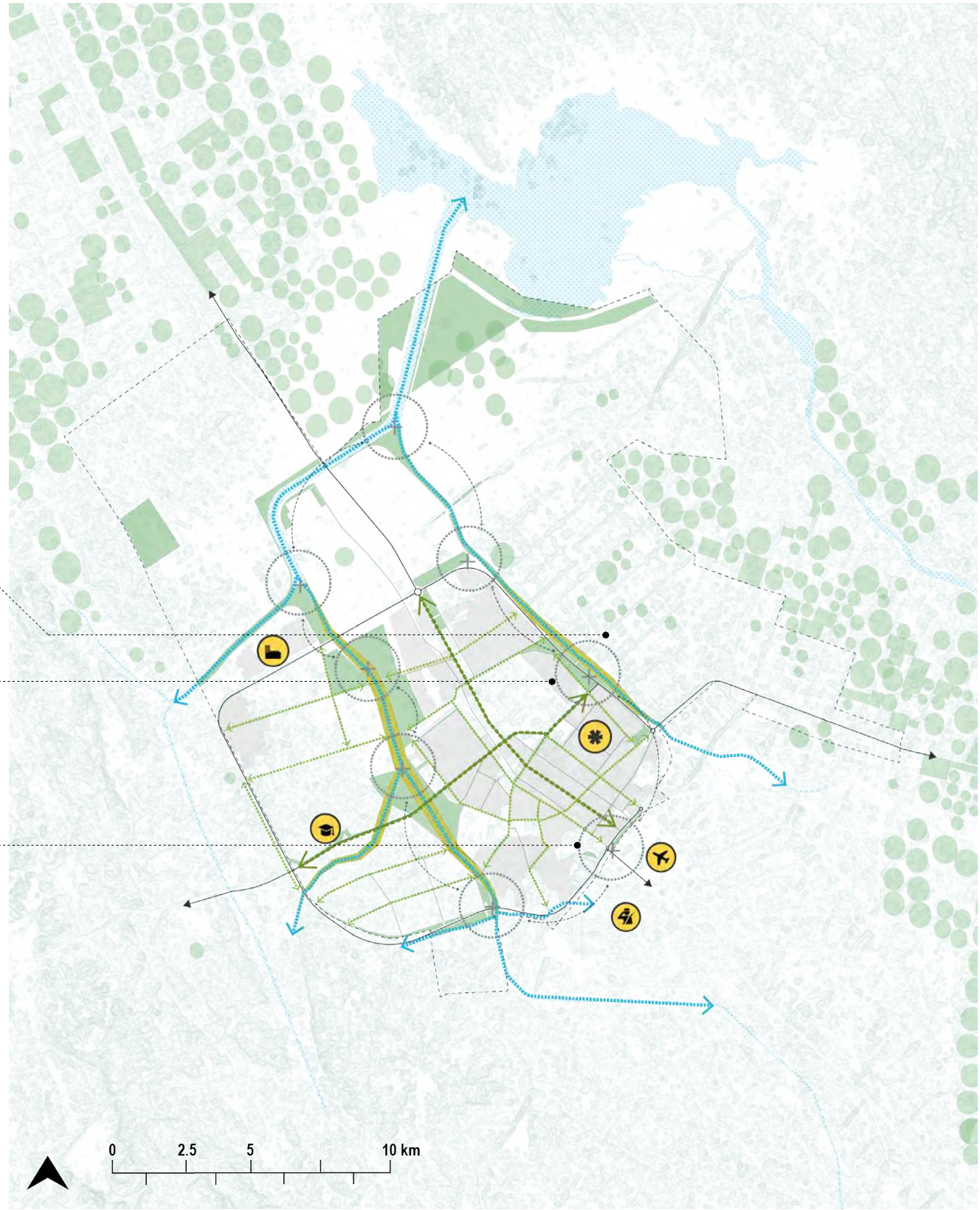


Fig. 47. The Resilient City: Rebalancing Tabuk's socio-ecological and economic systems

6.3 Vision for a Sustainable Tabuk

Tabuk is a city rich in history; from the Prophet setting foot on its soil in the early days of Islam, to eventually becoming a gateway settlement for pilgrims arriving from the North. Tabuk also demonstrates influences from the Ottoman Empire, traces of which still exist today. Since then, Tabuk has been growing and developing into a modern secondary city, and hence, Tabuk has great potential to reconcile its glorious past with a bright and sustainable future.

The three strategies proposed for Tabuk are aligned with the visions and goals of the New Urban Agenda and based on the three dimensions of sustainability. As such, the overall vision that emerges from the combination of the four strategic recommendations aims at structurally changing Tabuk's urban form in order to achieve the following three aspects of sustainability:

- Securing social equity in the distribution of wealth and social services (social sustainability);
- Keeping a stable economic growth while restructuring the productive system, in order to save resources and energy (economic sustainability); and
- Maintaining safe and comfortable living environments through lower emissions and opting for ecological restoration and complex socio-ecological infrastructure, that can devise basic services innovatively, (environmental sustainability).

To enact this vision, which aims to trigger an incremental but radical urban transformation process, it is necessary to translate the four conceptual recommendations into a logical and framed system of actions that sets clear priorities and builds on endogenous potential and competitive advantages. As such, the Vision capitalises on the strengths and opportunities present in Tabuk, to develop diverse and inclusive economies with job opportunities for all, vibrant and sustainable communities, and efficient and resilient infrastructure. The actions are discussed in detail in Chapter 7.

People playing the traditional songs

Diverse terrain in Tabuk

6.4 Strategic Impact of the Vision on Urban Patterns

The vision laid out for Tabuk in the preceding text has direct and tangible impacts on the spatial organisation of the city. The outcome of the strategic recommendations based on transit-oriented development principles can be assessed using the same methodology that was used to analyse the current conditions. The text and maps discussed in the sections below illustrate the impact of this vision on the density, land use, productivity, and accessibility of Tabuk.

Land Use

As previously mentioned, Tabuk has a proposed public transportation system that includes a Light Rail network, consisting of two lines, and a three-line Bus network. While the bus network has a wide reach, the Light Rail lines help structure the city by creating prominent and accessible North-South and East-West axes. While UN-Habitat suggests rethinking the location of Line 1, as densifying along these corridors by re-aligning land uses within a 10-minute walk from the rail stops, and the development parcels adjacent to the main street Light Rail lines can significantly transform the urban structure. As shown in figure 51, the new corridors should focus mainly on commercial and mixed land uses along these transportation routes to maximise their use and increase accessibility. The primary node at the intersection of the Light Rail lines would become the focal point of activity and multi-modal transport connections. Drawing from studies and guidelines on sustainable urbanism, the breakdown of the land use assigned to this new, dense corridor is 60% mixed-use, 20% commercial, and 20% residential. Accordingly, the UN-Habitat proposed redistribution of land use suggests a substantial increase in mixed-use, from 3.9% (487 hectares) to 9.8% (1,308 hectares), which means an increase of over 150%. In parallel, an increase in commercial land use from 1.5% (184 ha) to 3.6% (478 hectares) should also occur.

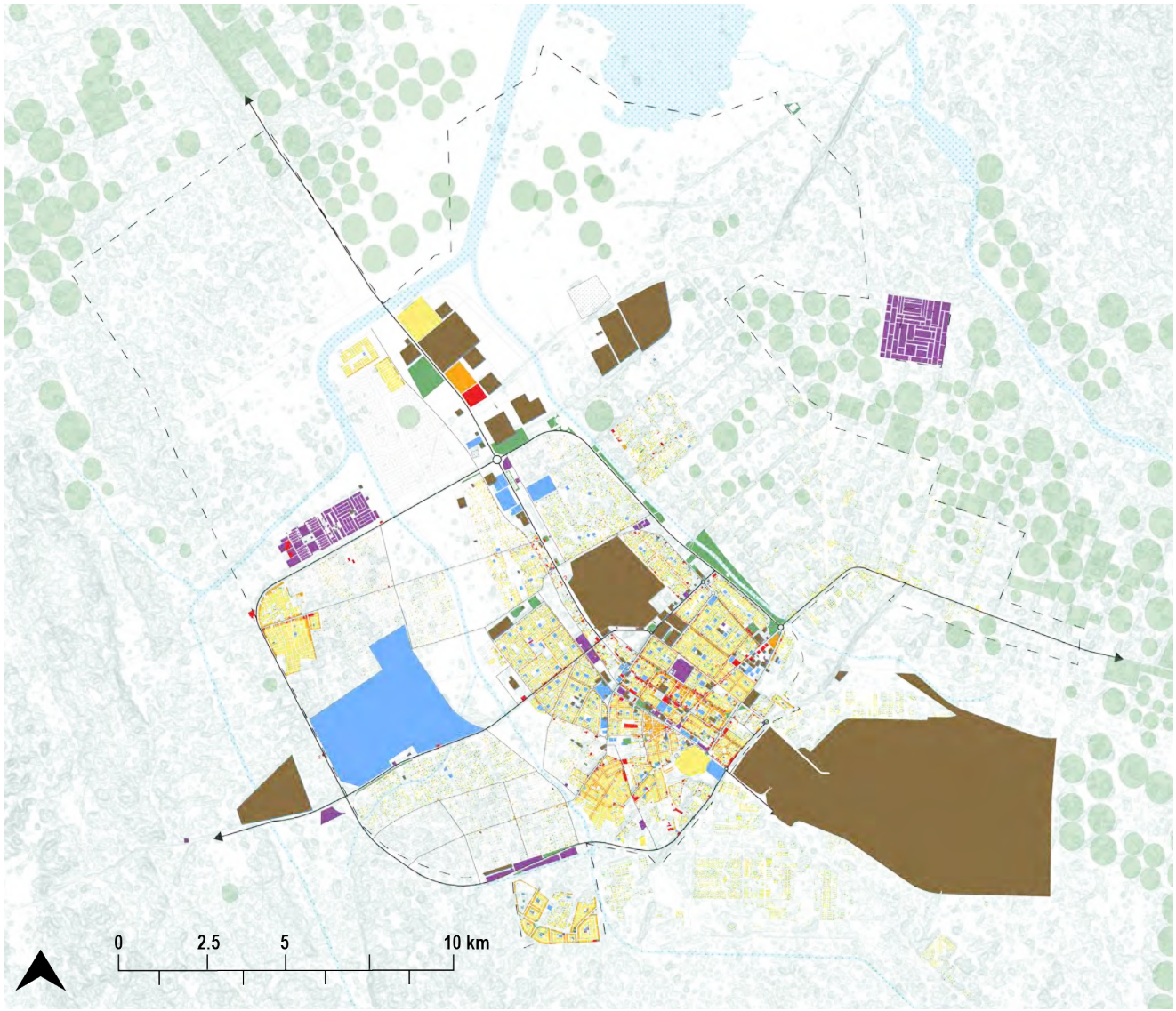


Fig. 48. Current land use

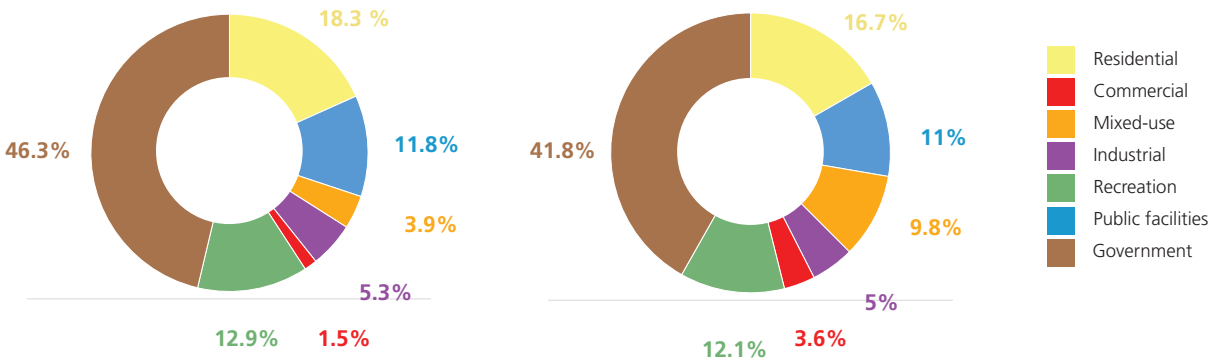


Fig. 49. Current land use and UN-Habitat proposal for new land use (%)

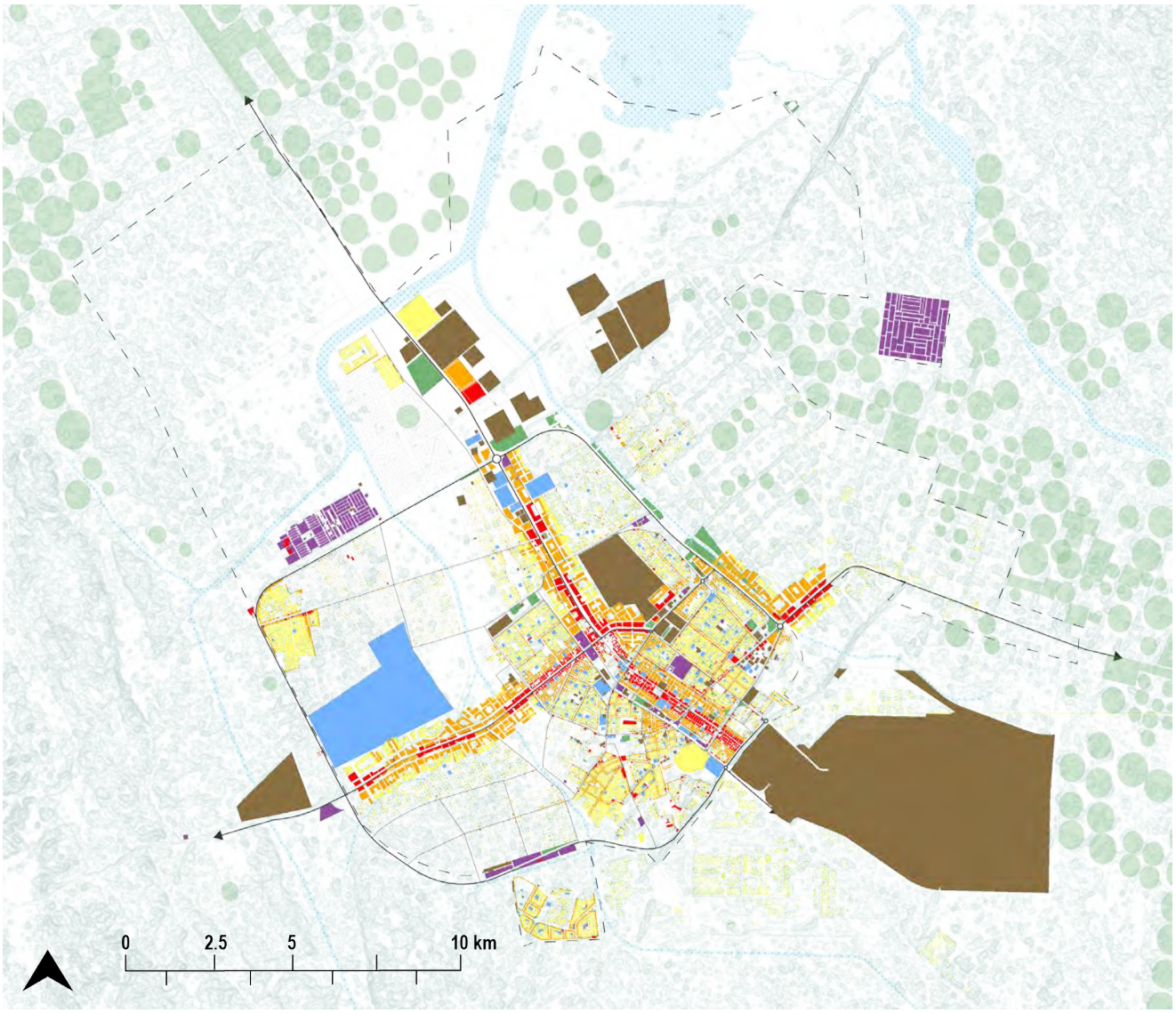


Fig. 50. UN-Habitat proposal for new land use

Density

The new land use designations along the two Light Rail lines can accommodate and support a higher-density of residents, providing walking access to public transport. If built to its maximum potential, as per the UN-Habitat recommended density of 150 p/ha, the corridors can accommodate up to 1,113,776 people within a 10-minute walking distance catchment area, providing a better and more serviced urban environment, and therefore, discouraging new developments outside the current footprint.

Figure 52 shows the current population density distribution that averages 45.2 p/ ha. With the proposed mix of land uses, and UN-Habitat recommended density, the average rises to 72.5 p/ha, a 27.3 p/ha increase, which seems reasonable within the Kingdom for a city the size of Tabuk.

Figure 53 shows the density distribution under the proposed scenario, with an average of 150 p/ha, along the transit corridors. The highest intensity of activities is concentrated on these corridors, bringing about economic vibrancy and improved accessibility, as well as improved quality of life.

Even with more conservative estimations, this area, enriched with new developments on the vacant land, and with increased density in other parts, can comfortably accommodate the proposed population of 1,113,776 in the next 19 years.

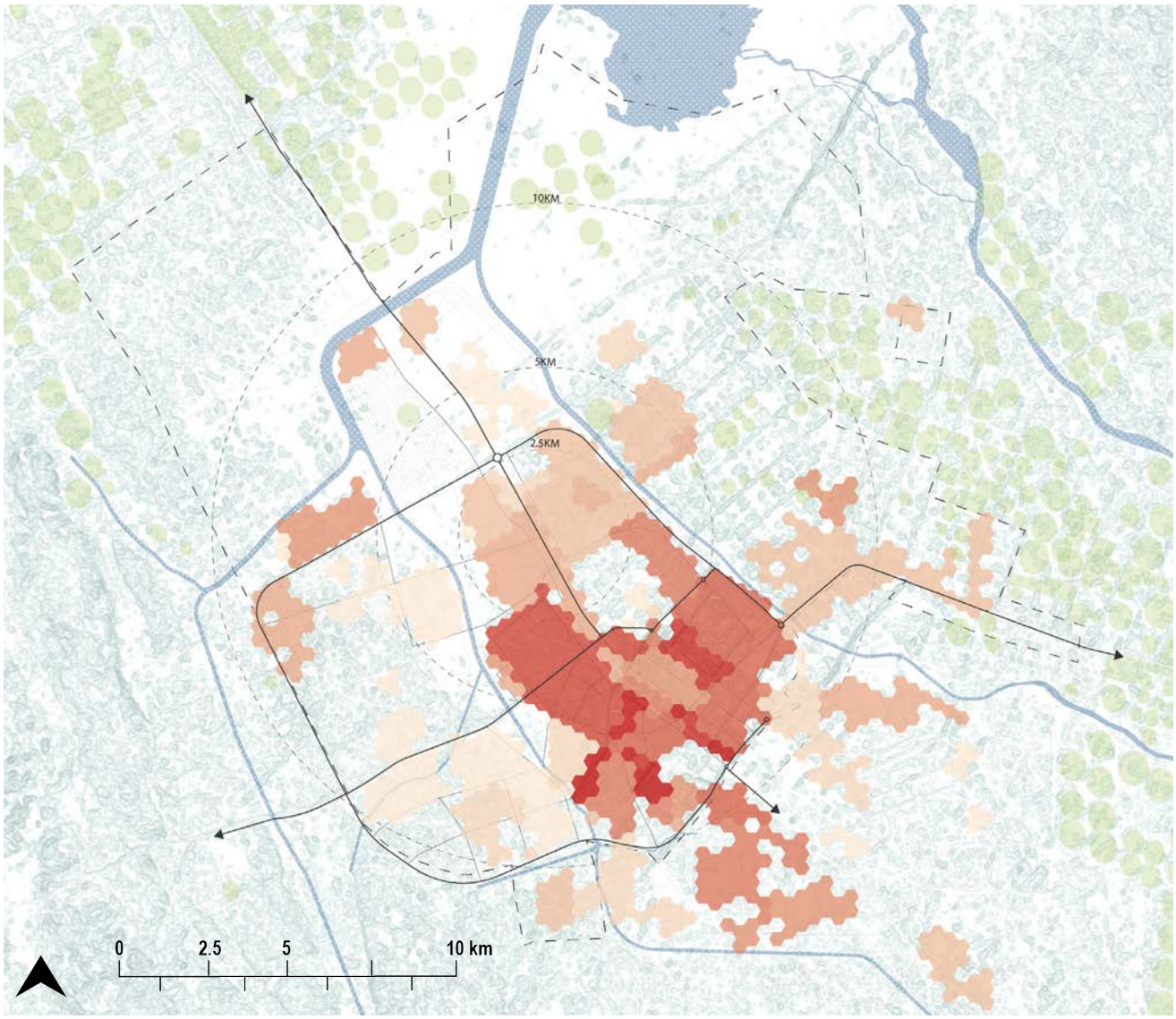


Fig. 51. Current distribution of population density

Average current POPULATION DENSITY on built-up area

42.5 p/ha

Average proposed POPULATION DENSITY on built-up area

61.8 p/ha

Average POPULATION DENSITY in transit corridor

150 p/ha

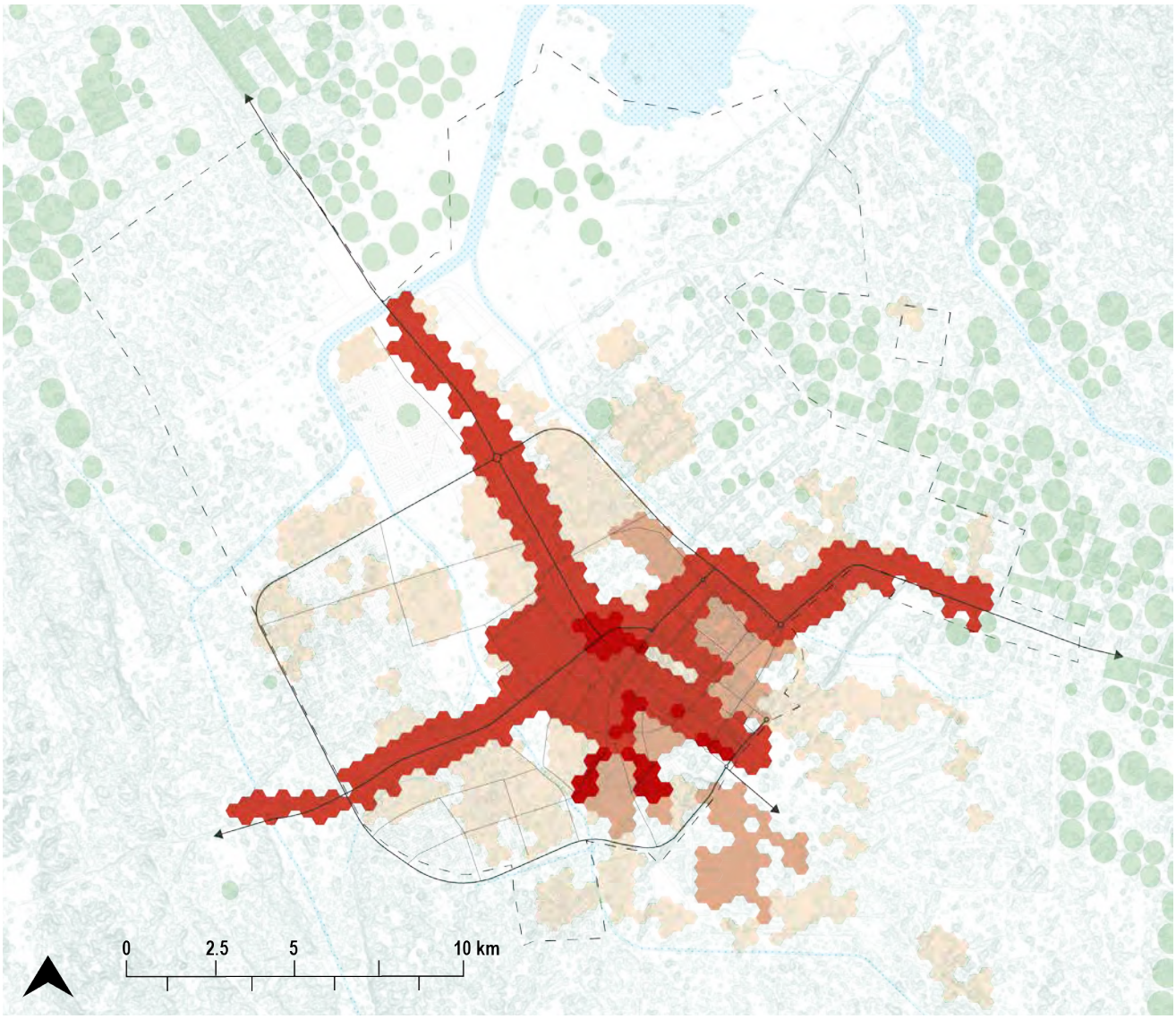


Fig. 52. UN-Habitat proposal for distribution of population density

Productivity

Access to jobs is a pivotal factor in the future growth and economic development of a city. The current land use allotment and the population distribution across the city of Tabuk can help estimate the number of jobs, which is a critical indicator of the spatial representation of economic opportunities. With greater access to jobs within close distances, the productivity of residents increases, as they spend less time on daily commutes and more time in productive work. Economic opportunities attract businesses and talent, which contribute to the competitive advantage of the city.

The productivity analysis is based on a few assumptions, which assign a certain number of jobs per square metre of a built-up area for each land-use. While this assumption is broad and an approximation, it helps to understand the trends of job distribution in the city and reveals the inequities and gaps in their spatial distribution and access. The total jobs in the city at present is at 22 jobs per 100 residents. This number increases to 30 jobs per 100 residents in the proposed scenario by simply densifying land use and building heights within a 10-minute walk corridor along the two metro lines. Thus, for twice the increase in population, the estimated increase in jobs is 2.5 times.

Job accessed by walking

While the total number of jobs in the city increases at a rate higher than the population growth rate, the spatial distribution of these jobs is a critical factor in planning for future growth of the city. The map in figure 54 represents the number of jobs accessible within a 10-minute walk from different city regions. More jobs are concentrated in certain parts of the city, which reveals and corroborates a trend discussed in the land use section, with a distinct core in the centre of the city that has a higher percentage of mixed land use, with some clusters in the South and the North, which show greater access to jobs. As expected, the farther extents of the city, which are majorly residential, have a low job density and hence lower access to jobs.

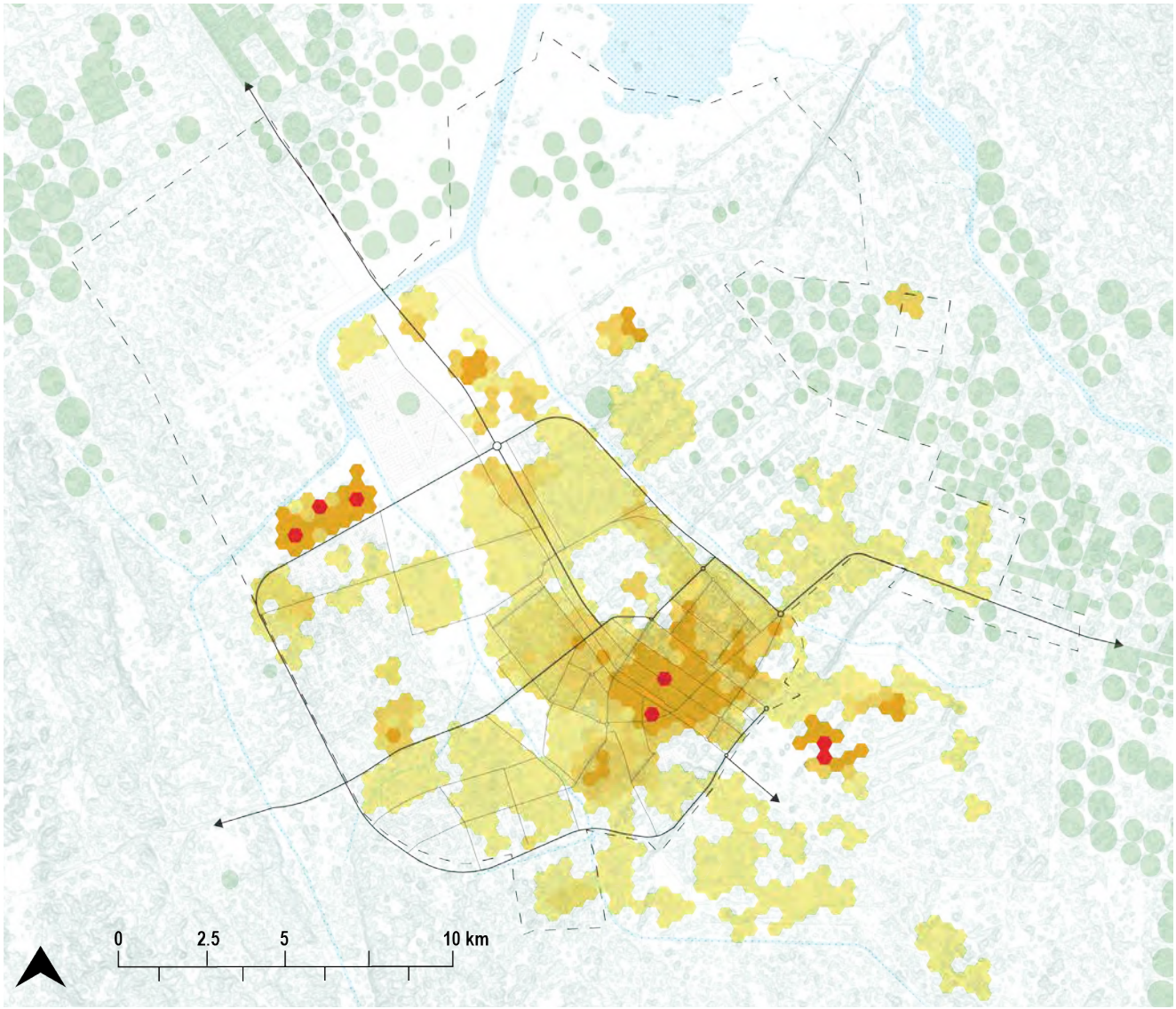
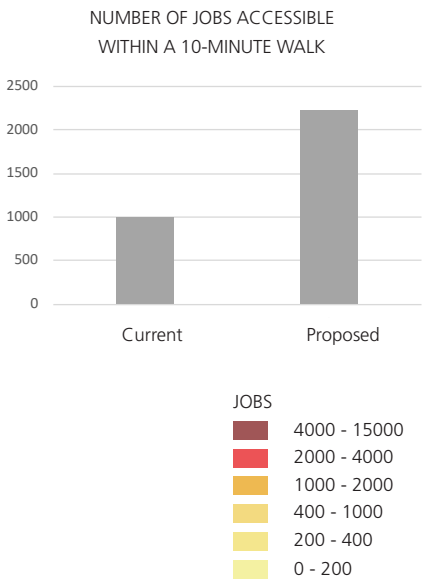


Fig. 53. Current job accessibility within a 10-minute walk

The proposed land use scenario for Tabuk will increase the number of jobs accessed within a 10-minute walk from different city regions. In the new scenario, each person can access 1,500 more jobs within a 10-minute walk anywhere in the city. Focusing on creating opportunities within the urban footprint by filling in the gaps and densifying existing developments along the North-South and East-West axes will increase access to jobs by more than 200%, (see figure 54). Redistributing land-uses by ensuring a balance of commercial, mixed and residential land use, will improve the spatial distribution and access to jobs across the city.



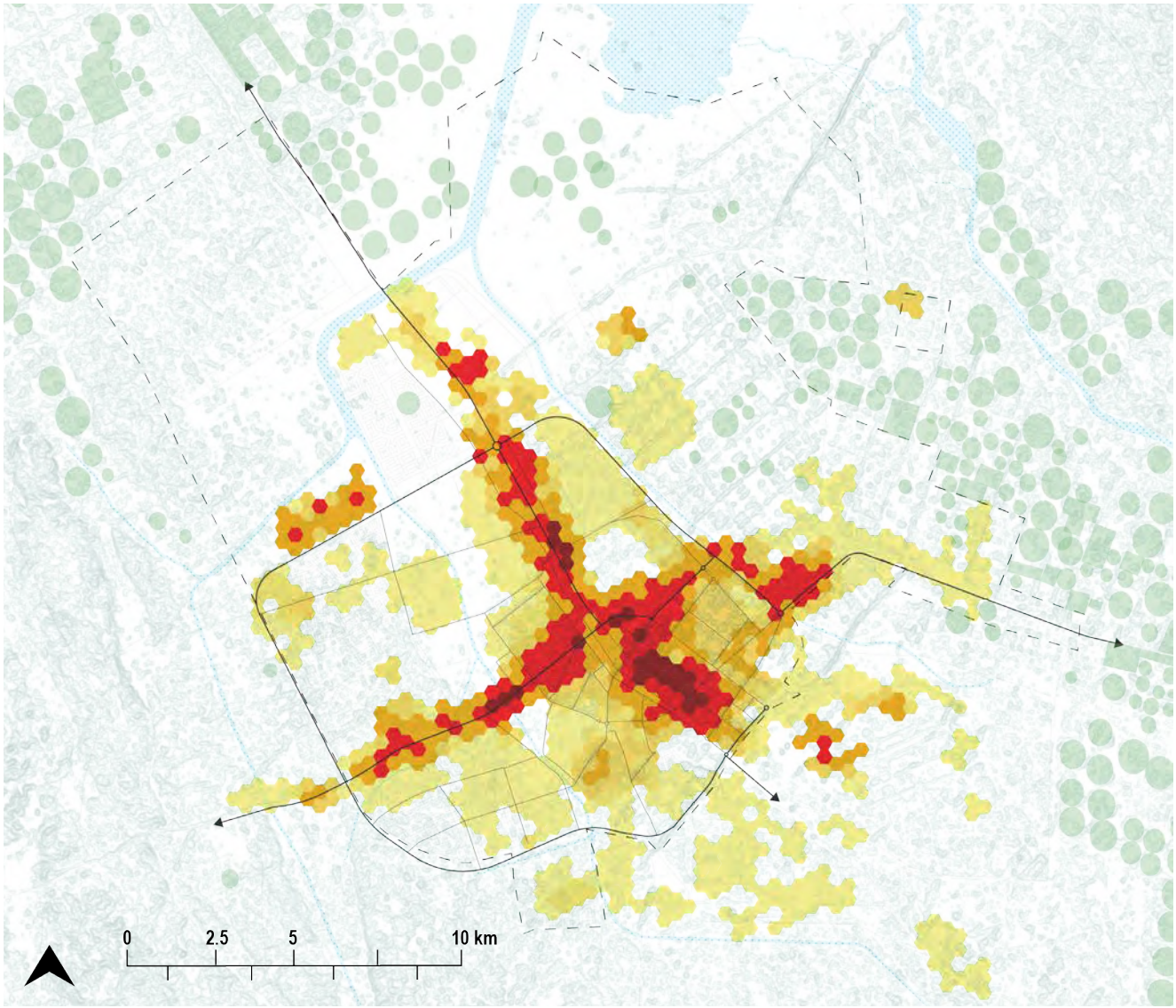


Fig. 54. UN-Habitat proposal for job accessibility within a 10-minute walk

Jobs accessed by public transport

The proposed ram lines, with the current land use pattern and distribution, give access to 30% of all jobs in the city to people residing and working within a 10-minute walk buffer and assuming a 20-minute metro ride. With the current density and distribution of land use, the public transportation system will not be successful as it would struggle to serve a large percentage of the population.

Densifying and changing land use along the 10-minute walk catchment area from the tram stations after re-aligning the second tram line through the centre of the city, significantly increases the number of jobs accessed, increasing access to 70% of all jobs within the city. The exact proportion of jobs added along these corridors will vary based on the density and distribution of land uses during implementation. However, developing along the guidelines mentioned in this document will ensure that the city benefits from the economic advantages of bringing people together and connecting them via public transport.

Fig. 55. Current job accessibility from tram stops

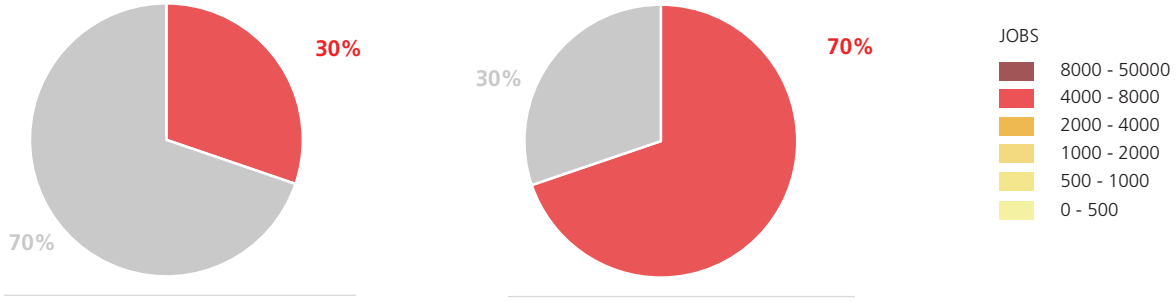


Fig. 56. Current and proposed job accessibility from tram stops (%)

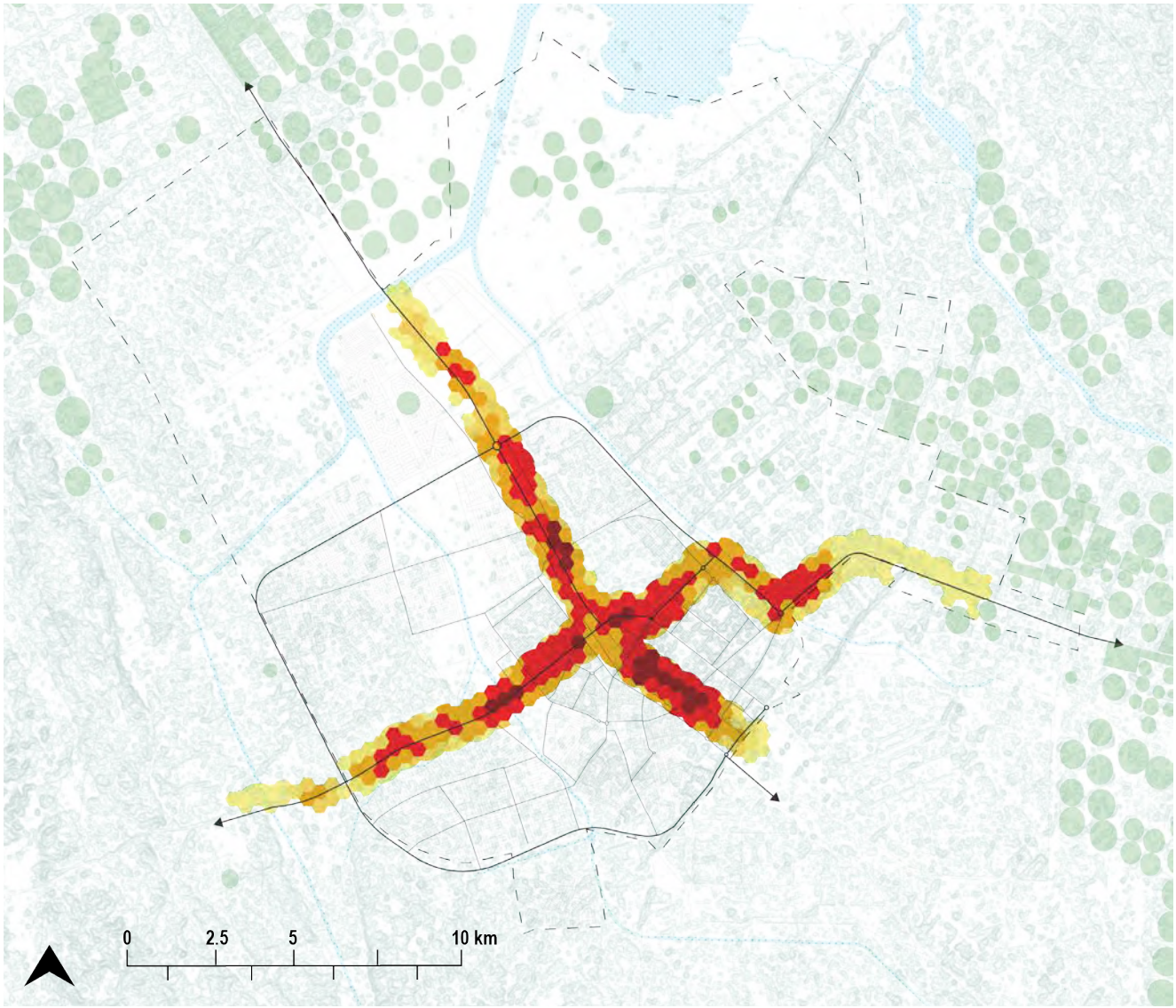


Fig. 57. UN-Habitat proposal for job accessibility from tram stops

Jobs accessed by driving

Job distribution is calculated by estimating a certain number of jobs per square metre of the built-up area for each land-use. As shown in figure 59, about 71% of all current jobs in the city can be accessed within a 20-minute drive from anywhere in the city, which is quite high compared to other cities in the Kingdom. This analysis is dependent on the even distribution of land use and the road network itself. This means that central locations have a greater reach to jobs within the city. Tabuk is well-connected by roads, but poorly connected by public transit in the current state.

As the population increases and with a denser distribution in the city center, the access to jobs by road should increase. However, with an increase in the number of people on the current road network, the travel speeds would reduce due to congestion. This is a fair assumption, as trends worldwide indicate that growing cities witness increased congestion and an overall reduction in travel speeds. Hence, the number of jobs accessed by car within 20-minute will reduce to 41%, (figure 60). This statistic endorses the need to supplement this reduction in the number of jobs accessible by car by putting a public transportation system in place as the city grows. The public transportation system will increase the total number of jobs accessed when all modes of transport are considered together.

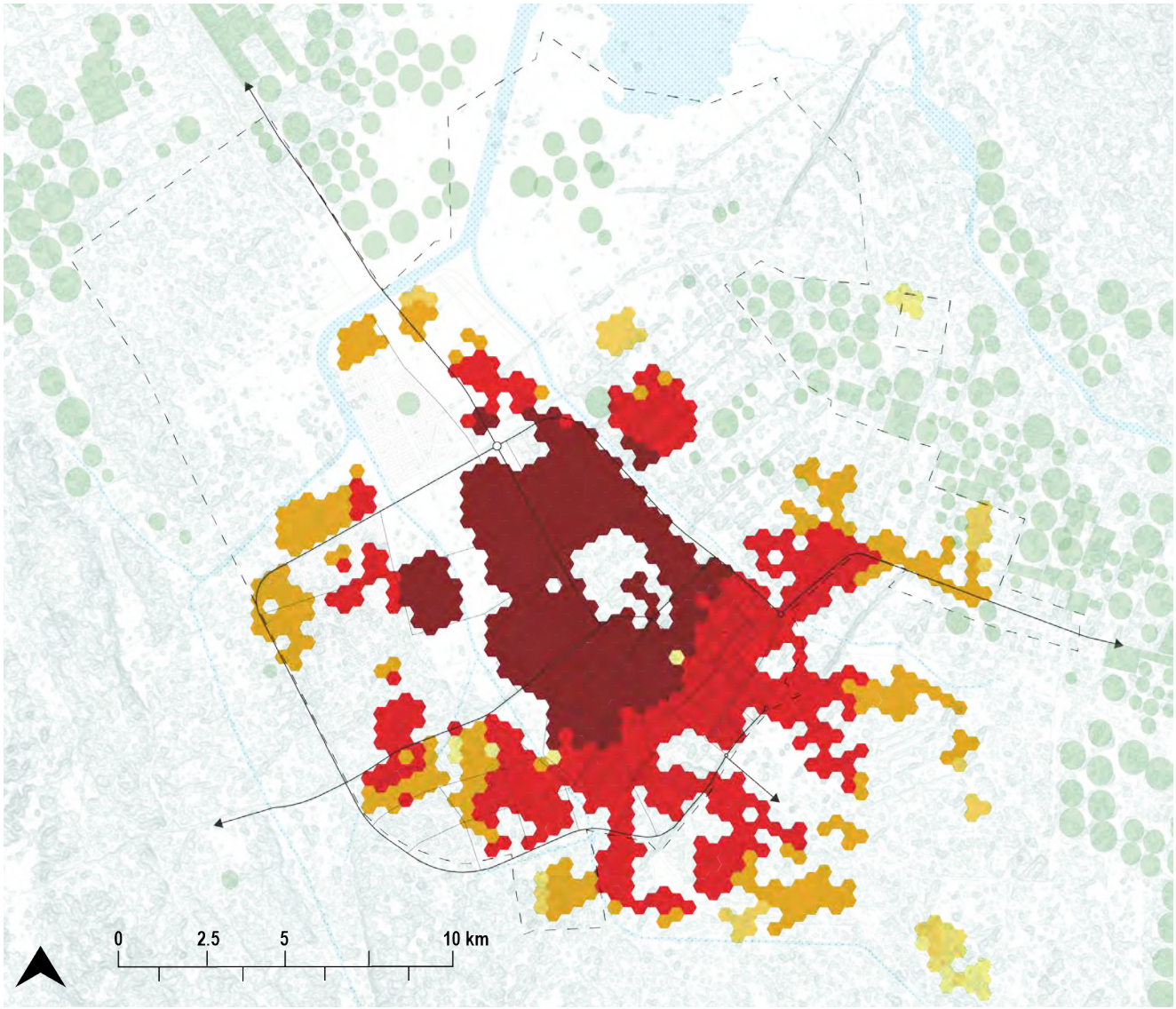


Fig. 58. Current job accessibility within a 20-minute drive

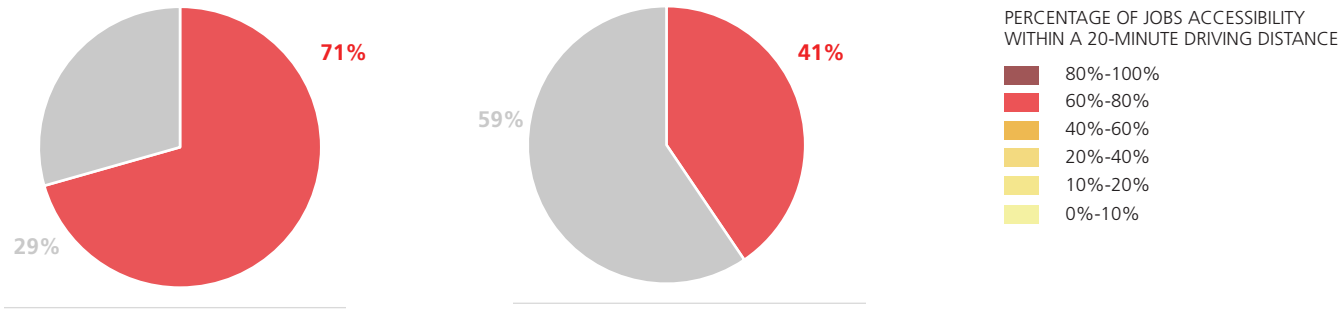


Fig. 59. Current and proposed job accessibility within a 20-minute drive (%)

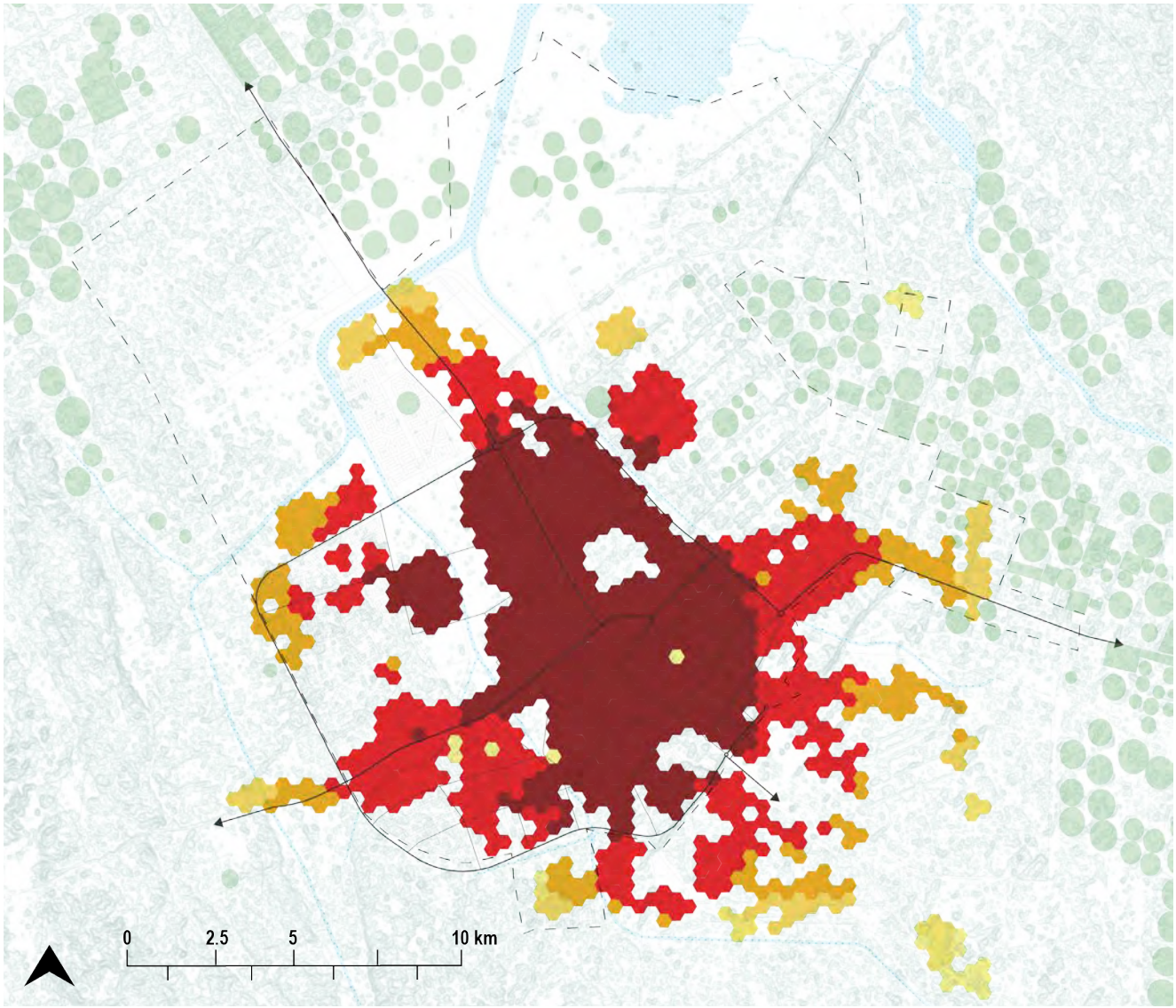


Fig. 60. UN-Habitat proposal for job accessibility within a 20-minute drive

Accessibility

As a consequence of the new land use designations, and the higher-density along the two Light Rail lines in Tabuk, the accessibility to public transport would significantly improve. As such, the increase in density would provide access to public transportation to a greater number of residents, giving them a choice to switch to more sustainable travel modes and making the municipal investment for providing public transport more efficient.

With the new distribution of land uses and updated density levels, the population captured within a 5-minute walk to the Light Rail stations would shift from 1.7%, or 11,838 inhabitants, to 47.2%, or 524,960 inhabitants. Similarly, the population captured within a 10-minute walk would shift from 4.5%, or 31,409 inhabitants, to 65.9%, or 734,032 inhabitants. Movement within the city would be more efficiently managed, serving a higher number of people, while reducing congestion, and pollution.

Densifying along these corridors will not only improve accessibility and increase density for a more sustainable urban form, but it will also create a coherent and comprehensible structure for the city of Tabuk, that is currently plagued with fragmented pockets of sprawling developments. As illustrated in the sections above, the proposed scenario brings together spatial planning policies, urban mobility and economic development in Tabuk. By densifying and developing along mobility corridors, the total number of jobs in the city and the access to opportunities increases and the overall social and economic well being of the city benefits from agglomeration advantages.

Fig. 61. Current accessibility within a 10-minute walk from tram stops

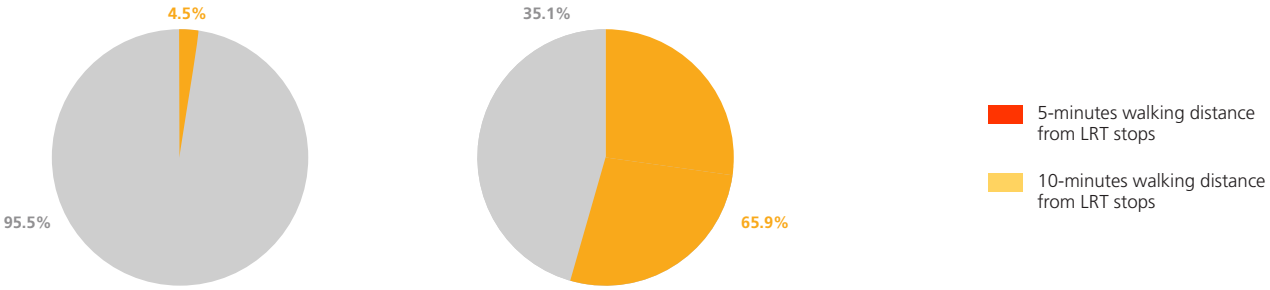


Fig. 62. Current and proposed accessibility within a 10-minute walk from LRT stops (%)

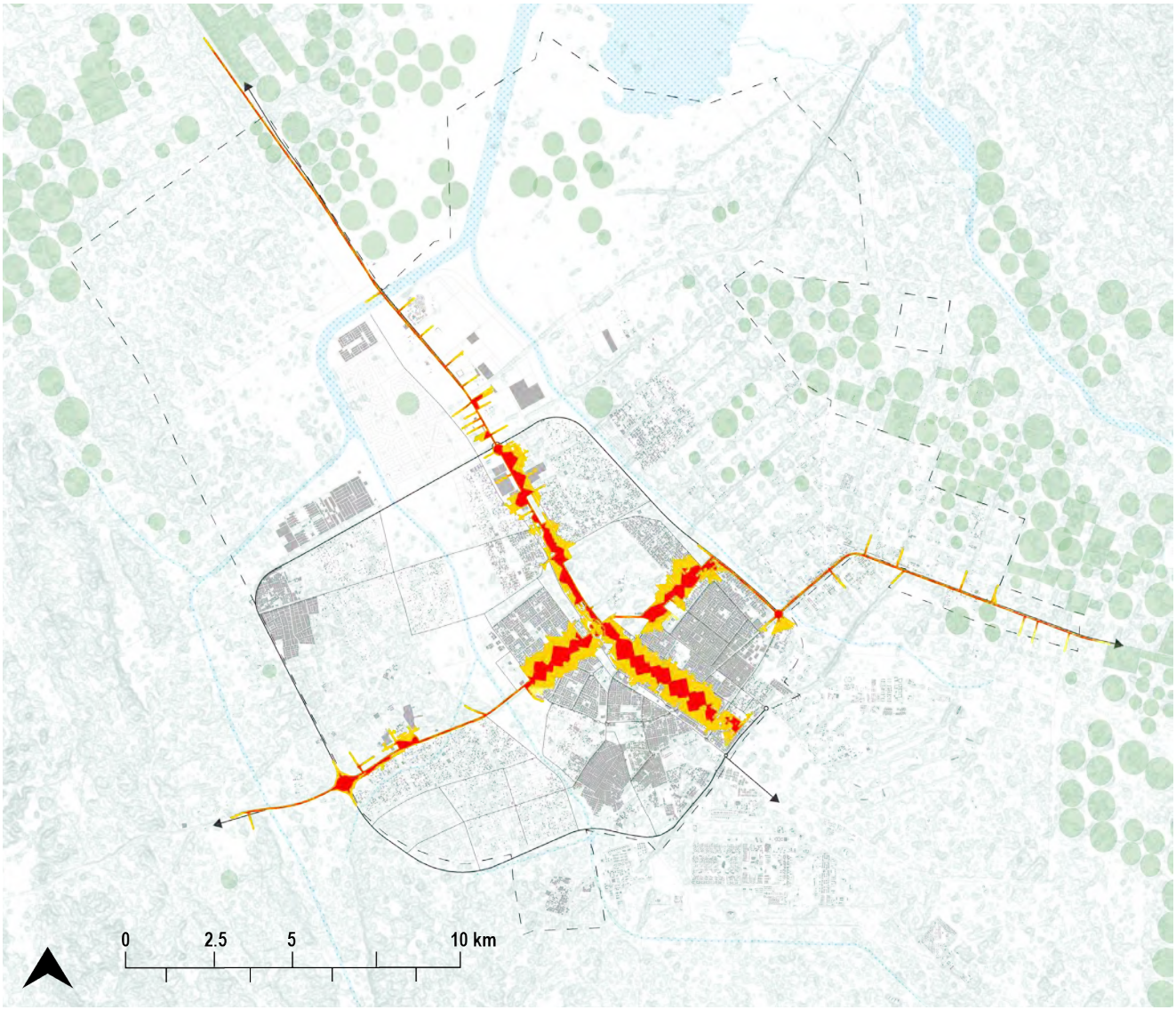


Fig. 63. UN-Habitat proposal for accessibility within a 10-minute walk from tram stops

7

ACTION PLAN

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7.1 From Strategy to Action

Transforming conceptual recommendations into concrete and implementable strategies requires detailed actions that can trigger the envisaged spatial, economic, and social transformations. An Action Plan that is rooted in the four strategic recommendations and serves to guide future planning efforts to ensure a vibrant and prosperous Tabuk.

The Action Plan comprehensively addresses the needs of Tabuk, touching upon all elements of the city structure. It supports the consolidation of development to create a compact and integrated city, helps directing investments in new infrastructure to improve connectivity, and lays out a blueprint for future growth, as well as suggesting legal and financial frameworks that support these transformations. Although all three strategic actions target specific interventions, they work collectively towards achieving the overarching vision for Tabuk:

- **ACTION 1: Create a public transport backbone to support densification;**
- **ACTION 2: Promote strategic densification around main nodes and along the transportation network;**
- **ACTION 3: Create a diffused and well integrated blue and green infrastructure system.**

Overall, the Action Plan creates impact at two scales: the urban and the neighbourhood scale. Action 1 addresses the need for restructuring the city's development around an efficient public transport system. Action 2 focuses on the neighbourhood scale, through surgical densification on available vacant land, and the concentration of mixed-use developments around main transportation nodes. Action 3 builds broad conditions for a socio-ecological rehabilitation of the city's natural elements, framing the wadi network as the main green infrastructure, interlinked with the overall built fabric. It is also accessible and supported by the two major transportation corridors while linking it to a widespread green network made of smaller open and green public spaces at the neighbourhood scale.

Vibrant street in Tabuk

Iconic mosque in Tabuk

7.1.1 Action 1: Create a public transport backbone to support densification

The first action addresses the need to restructure the city starting from its mobility patterns. Embracing the proposal for a new public transportation system, Action 1 guides priority setting for its phased implementation, suggesting an amendment on the proposed transport that prioritises citizens accessibility within the existing city. This integrated multi-modal transport network will be able to expand the reach of the public transit system and make the city structure more navigable. Furthermore, it sets the preconditions for promoting an incremental increase of urban density and the creation of new centralities around the emerging major transport nodes. If correctly designed, with attention to a pedestrian-friendly, green, pleasant streetscape, supported by mixed-use and served by public transportation, this new system will improve walkability and generate economic and social vibrancy across the city. As such, Action 1 can be summarised in the following steps:

1.1 Develop a primary public transport North-South spine along King Khalid Road, connecting the airport, the city center, and the military base

The first step concerns the implementation of the proposed Tram Line along King Khalid Road. This new public transport line will connect the city centre to the airport on the Southeastern part of the city, extending towards the ring road on the North-West, which marks the edge of the built-up area. The transformation of King Khalid Road into a new public transport spine will offer incentives to increase density along the new corridor by developing mixed-use typologies and concentrating a variety of services and facilities along the new spine.

1.2 Develop a transversal East-West public transport spine along King Fahad Road, connecting the University Campus and the city center

In line with the previously proposed variation of routes for the second, transversal public transport spine, King Fahad Road will need to be transformed into the other major transport spine, connecting the University Campus to the city centre by crossing the city on the East-West direction. The Tram Line 1 (Red Line) will be running along King Fahad, crosscutting Tram Line 2 (Green Line) in Tabuk's most populated area. The main public transport system would cover most of the city, linking its nerve points, and offering a viable alternative to private vehicles and a solid anchoring system to support a progressive densification.

1.3 Develop and link a secondary public transport network (feeder bus) across the city

Over time, while urban densification and compactness processes move forward, (see Action 2) these two main spines will need to be supported and linked to a more capillary public transport system. As such, a bus feeder network will need to create transversal links. With the feeder system serving at the intermediate level (distribution at the neighbourhood scale), a coherent, intermodal, and capillary public transport network will drastically increase and improve the connectivity across the city. Smaller block sizes with frequent public transit stops will ensure all scale connectivity and encourage a shift from private modes of transport to public ones.

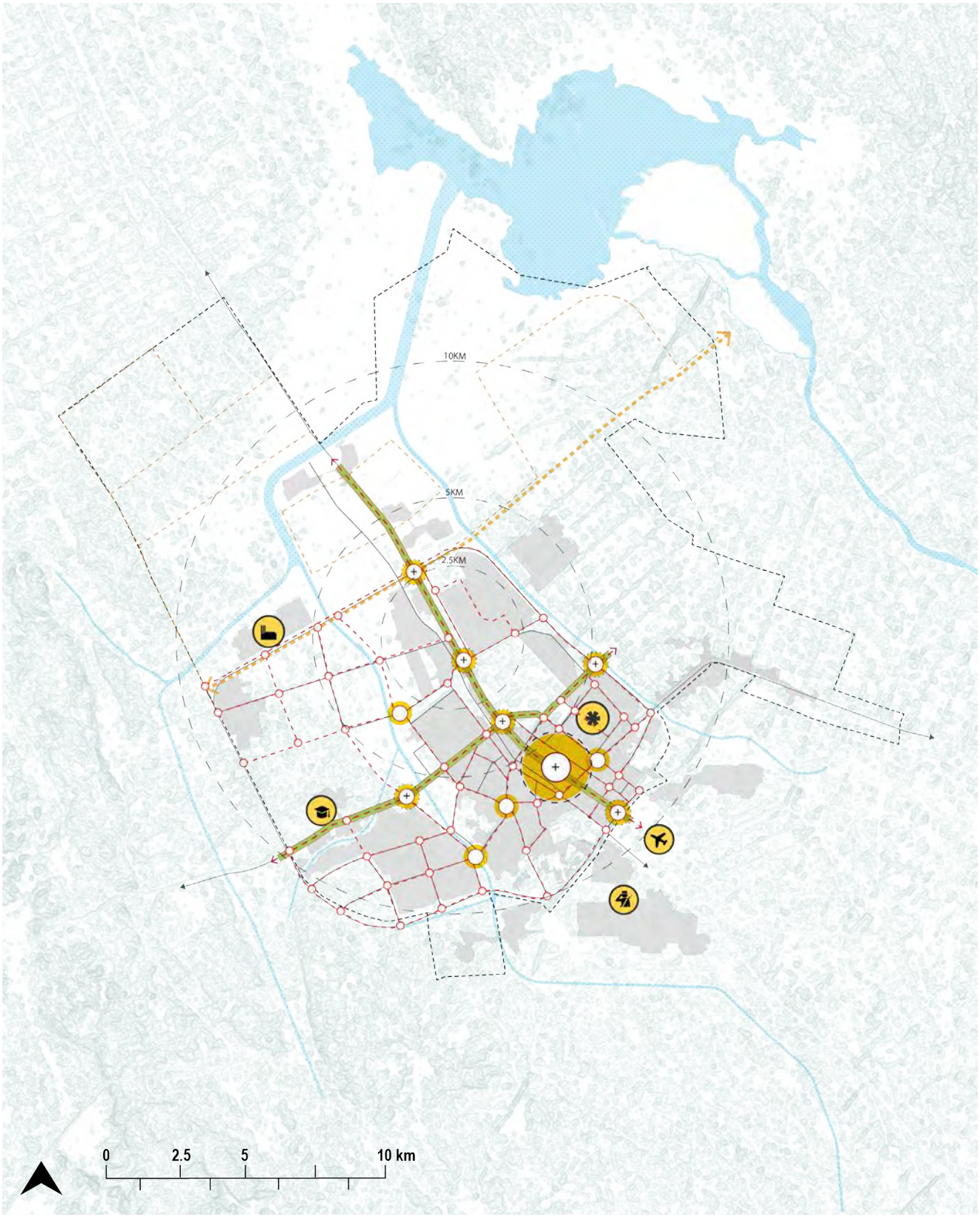


Fig. 64. Create a public transport backbone to support densification

7.1.2 Action 2: Promote strategic densification around main nodes and along the transportation network

Following the implementation of a public transportation network, the city should start actively promoting transit-oriented development (TOD), and incentivising residential densification in the areas with walkable access to public transport. Strategic densification should be applied to selected major nodes to define emerging new centralities by incentivising mixed-use development and concentrations of services and facilities around them, also targeting incremental infilling of available vacant land. This should all be complemented with the creation of public spaces and pedestrian-friendly streetscapes, defining an urban environment that is pleasant and rich in activities. For example, Tabuk is currently transforming part of Al Amir Fahd Ibn Sultan Road into a solely pedestrian promenade and Action 2 builds on this approach and proposes new complementary functions to enrich the social life of the renewed public realm. This will help to establish a pedestrian-friendly environment that promotes walkability and create a network of well-connected open spaces that support the density of people and functions. Action 2 can be summarised in the following steps:

2.1 Develop a hierarchy of mixed-use nodes at strategic points along the public transport system

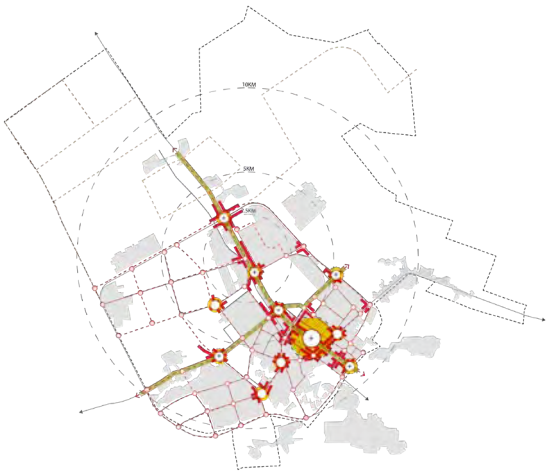
Some intermodal stations and other main stations of the public transport network will have to incrementally be consolidated into new mixed-use nodes, with a high residential density. Main mixed-use nodes should be developed at major intermodal intersections, including entry and exit points of major urban roads, acting as entry/exit gateways to the city. Secondary nodes should be distributed following the criteria of rebalancing access to services, facilities, and jobs across the city. The nodes will need to become a hierarchically well-structured system of sub-centralities, equipped with a variety of programs. This will help in establishing a clear urban structure, able to support strategic densification and compaction while maximising a diffused accessibility to services, facilities, and opportunities.

2.2 Promote strategic densification along the public transport system (TOD)

The consolidation of mixed-use nodes will need to be followed by the intensification of mixed-use development along the public transport backbone. The transportation corridors are the most suitable to support a variety of high-density, mixed-use typologies, following the criteria of having a high number of people within five to ten-minute walking distance to public transport connections, granting easy access to public facilities and amenities. This will increase the efficiency of public transport and encourage walkability, alleviate traffic, and pollution by reducing the dependence on private vehicles. This incremental, strategic densification, embedding the principles of transit-oriented development, will help to develop a more sustainable, vibrant, and livable Tabuk.

2.3 Incrementally develop available vacant land within the current built-up fabric

To complete the strategic densification process, developable vacant land within the built-up area should be incrementally turned into dense and compact mixed-use developments, with the goal of accommodating growth within the consolidated city structure. Density should be allocated taking into account the public transport infrastructure, following the criteria of maximising residential access within a 10-minute walking catchment area from public transport. In parallel, part of the available vacant land should be kept as public, open, green space and other special functions supporting a rich and vibrant public realm. Complementing the pedestrian-friendly environment with a series of open-air souqs along King Fahd Road would expand the network beyond the city center. Three possible locations were identified for this purpose: one on the Southwest side, at the crossing between the university campus and the Ring Road, a second one mid-way between the university campus and the intersection of the two major public transport spines, and the last one on the Northeast side, between the city centre and the Ring Road.



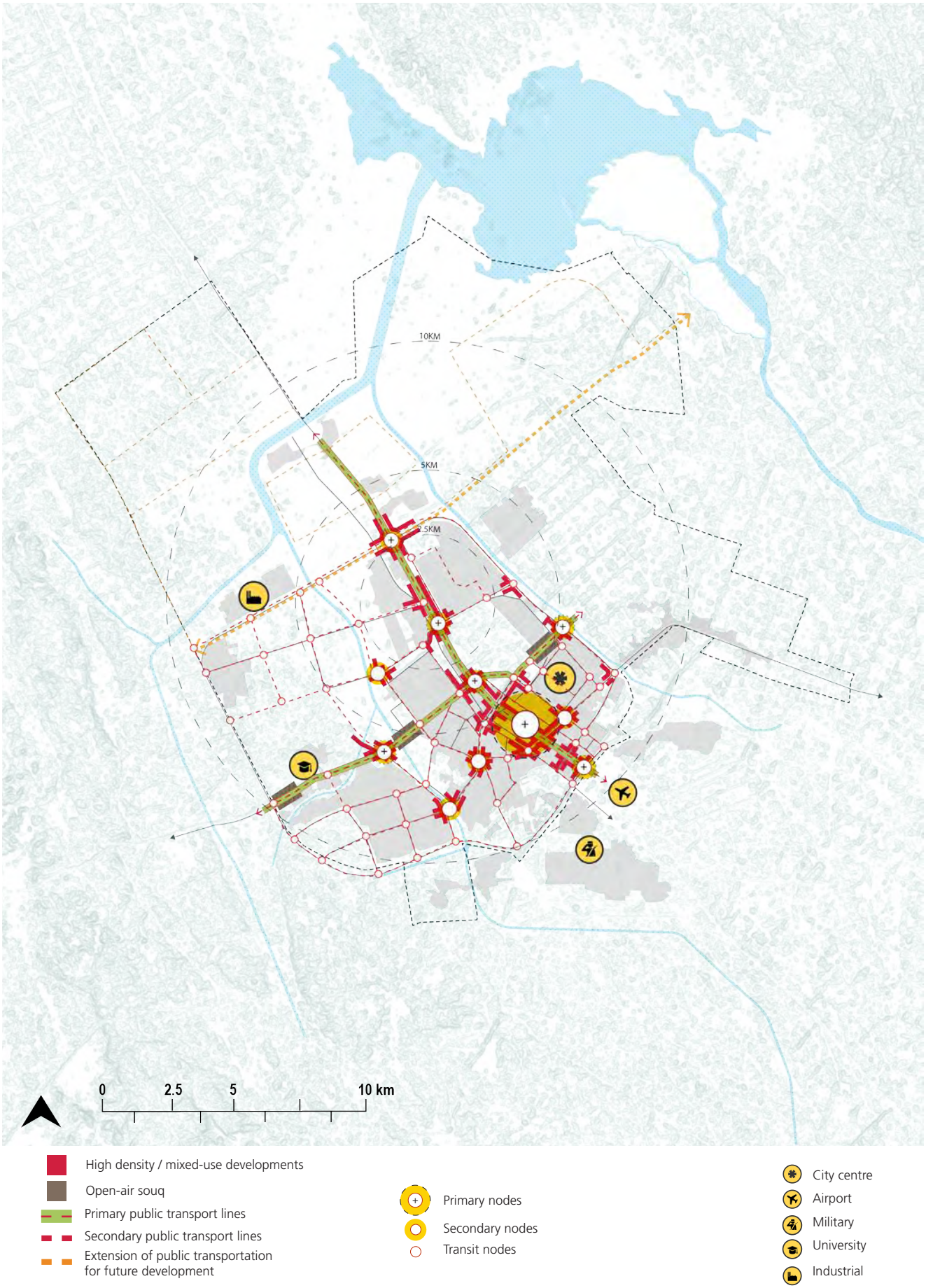


Fig. 65. Promote strategic densification around main nodes and along the transportation network

7.1.3 Action 3: Create a diffused and well-integrated blue and green networks

Action 3 aims to make the city more resilient, more sustainable, and enjoyable for its residents. Wadis, green open areas, and agricultural land define networks of green and blue elements. If preserved and extensively interlinked, the blue and green networks can define a system able to perform an articulated series of ecological and social functions, from natural stormwater management and storage, to reduction of the heat-island effect, from the provision of areas for urban agriculture to the supply of wide areas for recreational and sport functions. As such, and in parallel to the strategic densification process of Tabuk, vacant land will have to be selectively preserved for the creation of green, public space, especially in areas subjected to densification. Reviving the wadis within Tabuk's urban footprint and integrating them into the urban pattern will help to diversify the city's economy, and at the same time serve as open spaces for residents, resulting in significant improvements in their quality of life. In addition, the promotion of urban and peri-urban agriculture along the wadis will gradually support the relinking of green and blue networks, while strengthening food security, and resilience. Action 3 can be summarised in the following steps:

3.1 Preserving and integrating the blue network to strengthen its role as natural infrastructure

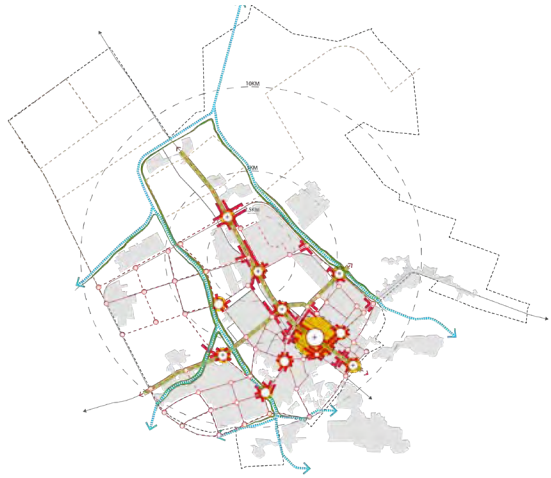
The natural system of wadis, currently neglected as a structural element in the city's functioning, will have to be naturalised and strengthened, moving towards natural water management systems at the entire urban scale, so as to play a key role in the city's development. Integrating the three wadis running across the city into the existing urban fabric and developing them into multi-functional linear parks, to be used as natural water management infrastructure during the wet season and having alternative recreational uses during the dry season, is the first step in this direction. Establishing a natural water management infrastructure by protecting and integrating the wadis with water retention ponds and water features would create a new dispersed system of water reservoirs to capture the stormwater and rainwater runoff, helping to mitigate flood-risk in affected areas and replenishing water-tables. At the same time, repositories that are connected to water recycling stations would complement the city's water supply.

3.2 Create a consistent green network by using vacant land to increase and connect major green areas

As mentioned in Action 2, part of the available vacant and residual land should be converted into green open spaces, parks, and parklets for public use. Transforming available vacant lands into green open spaces linked to existing parks and open spaces will help to expand the public green open areas into a capillary, better connected green network, supported by small commercial, and leisure activities along its spaces. This way the linear parks along the wadis will be linked to a wider and more consistent green network, becoming more accessible, better performing in ecological and social functions, and more vibrant. At the same time, increasing green areas will help to reduce heat island effects across the urban fabric while improving the ratio of green open space per capita.

3.3 Complete the green network by greening streetscapes

The greening of the overall streetscapes will complete a well-connected green network, linking major green spaces to the public transport system through tree-lined streets that encourage pedestrian mobility. Trees and plants along major and minor transportation corridors will have to be chosen amongst local species, to conserve resources, and reduce maintenance cost, focusing on shading pedestrian areas and waterways to reduce the heat island effect and the evapotranspiration phenomena, therefore, mitigating the urban microclimate. This will encourage overall pedestrian mobility and outdoor life at the urban scale, and better protect the city against high temperatures and sandstorms.



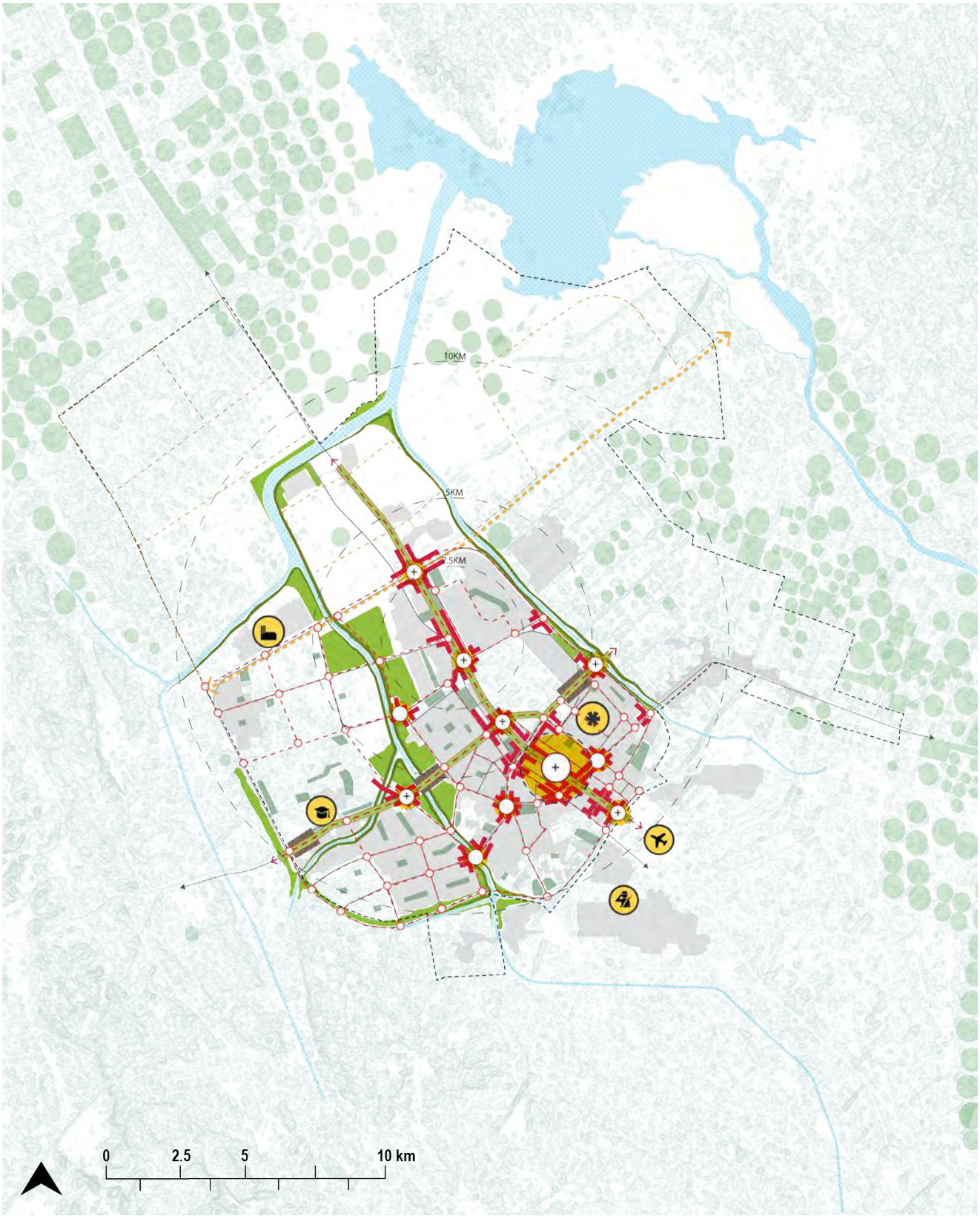


Fig. 66. Create a diffused and well-integrated blue and green networks

7.2 Three Systemic Actions for Structural Change

The Action Plan presented hopes to incrementally trigger a structural change in Tabuk, moving away from an unsustainable model towards an integrated, ecological framework for urban development. A sustainable city brings together environmental, social, and economic factors, along with comprehensive urban planning and management efforts for a long-term sustainable society. This implies an integrated approach to sustainable urbanisation that should be based on a holistic view of social development, economic opportunities, environmental management, and governance frameworks.

This integrated approach should entail the coordination of objectives and programmes, among different city stakeholders (e.g., citizens, government, and the business sector), as well as the development of linkages between and within socio-economic sectors and activities. As such, the above-described framework of actions will drive an overall transformation on the spatial, social, and economic fabric of the city. If the steps illustrated in the Action Plan are followed, Tabuk will manifest the strategic vision into a reality, making the city:

- Compact,
- Connected, and
- Resilient.

Open spaces in Tabuk

Sand skiing in Tabuk

8

FINAL RECOMMENDATIONS: THE THREE-PRONGED APPROACH

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8.1 Spatial Recommendations

8.1.1 A strategic view of the Tabuk Region spatial development

When framing a strategic vision for the future of the Tabuk Region, the planned mega projects, like Neom City and the Red Sea Project must be considered in terms of possible impact and opportunities. These large-scale projects can rapidly change the landscape of the built and socio-economic environment of the region. In particular, such projects tend to reshape the city region dynamics by increasing its attractiveness and competitive power, as well as by affecting its economic growth and future development. On the other hand, these complicated and long-term projects can face many challenges as well, like economic fluctuations and shortcomings, especially when it comes to forecasting methods, results, and effects of political conditions during all phases of planning, implementation, and operation.

Whatever the case may be, once these mega projects are complete, there will be considerable transformations in the land and housing markets of the areas close to and surrounding these projects, as well as cause changes in the employment dynamics of the region, in addition to mobility patterns and socio-economic settings. In order to prevent possible negative externalities, urban managers need to set up a system of policies to control the land and housing markets, ensuring appropriate construction permission and coordination between users, in order to prevent undesired changes in urban land-use, and cope with the other changing urban systems in the transition period.

Along the same lines, relevant authorities should reassess and develop urban and trans-urban transportation systems and infrastructure, with the goal of creating a special transportation network between the major cities of Tabuk, Diba, and Haql, and the proposed projects of Neom City and the Red Sea project. This, together with the quantitative and qualitative development of urban services, can help these cities, and the city-region at large. Capitalising over these new investments also encourages megaprojects investors to play a positive role in addressing interrelated urban issues. Strengthening relevant infrastructure and urban services can, de facto, contribute to the creation of new job opportunities, increasing innovation and the capacity to generate good employment opportunities for the local population.

Tabuk's centre is located at about 140 kilometres to the future city of Neom, a 26,500 square kilometres development where a planned bridge, covering approximately 20 kilometres, will cross the Gulf of Aqaba, connecting Neom and the famed city of Sharm El-Sheikh, in Egypt, a country with a population of roughly 94 million. This offers Tabuk the potential and opportunity to develop its agricultural services and tourism sectors. The agricultural sector has the potential to become the breadbasket for Neom, while the tourism sector will be anchored on Tabuk's historical and cultural artifacts. Overall, Tabuk can and should link its strategic role in the region, and in the Kingdom at large, to the new opportunities offered by Neom and the opening to the West that will come with it. As such, Tabuk will have the opportunity to redefine itself as the Gateway to Neom for the Kingdom, and as the Gateway to the Kingdom for the neighbouring western countries.

8.1.2 Towards Tabuk, a Gateway Eco-city

The strategic vision for the future of Tabuk, with the actions described in Chapter 7, aims to promote the development of urban spatial frameworks that redistribute appropriate compactness and density around polycentrism and mixed-use. A more compact urban form, structured along public transport networks, will support sustainable management of natural resources and land, greening the city, and making it more resilient, while offering opportunities for diversifying the economic base of the city. Tabuk's Action Plan illustrates basic steps to trigger a structural change, activating an incremental system for spatial modifications to the fabric of the city, which will also modify its social, economic, and environmental structure. By enacting the systemic transformations depicted in the Action Plan, Tabuk will become more compact, connected, and resilient.

- **Tabuk Compact City**

  A compact urban form, with mixed-use nodes, ample public spaces, and a well-connected public transportation network should create a healthy urban environment, and improve the quality of life of the residents. A dense urban form should help optimise resource allocation and equitable distribution of services, like public transportation among the residents of Tabuk. Infilling the vacant spaces with public spaces and diverse uses would help reactivate and connect various city centres establishing continuity and infusing the city with vibrancy.

- **Tabuk Connected City**

  The Strategic Vision for Tabuk envisions a public transportation system that connects the different areas and a system of new centres in Tabuk. Concentrating new development and a mix of uses along this transportation spine should reduce travel times and dependence on personal modes. The public transportation system combined with the supporting extensive road network, a pedestrian-friendly walking environment should encourage shifts in modal behaviour. The city should also focus on improving last mile connectivity and improving the bus system to extend reach, access, and connections

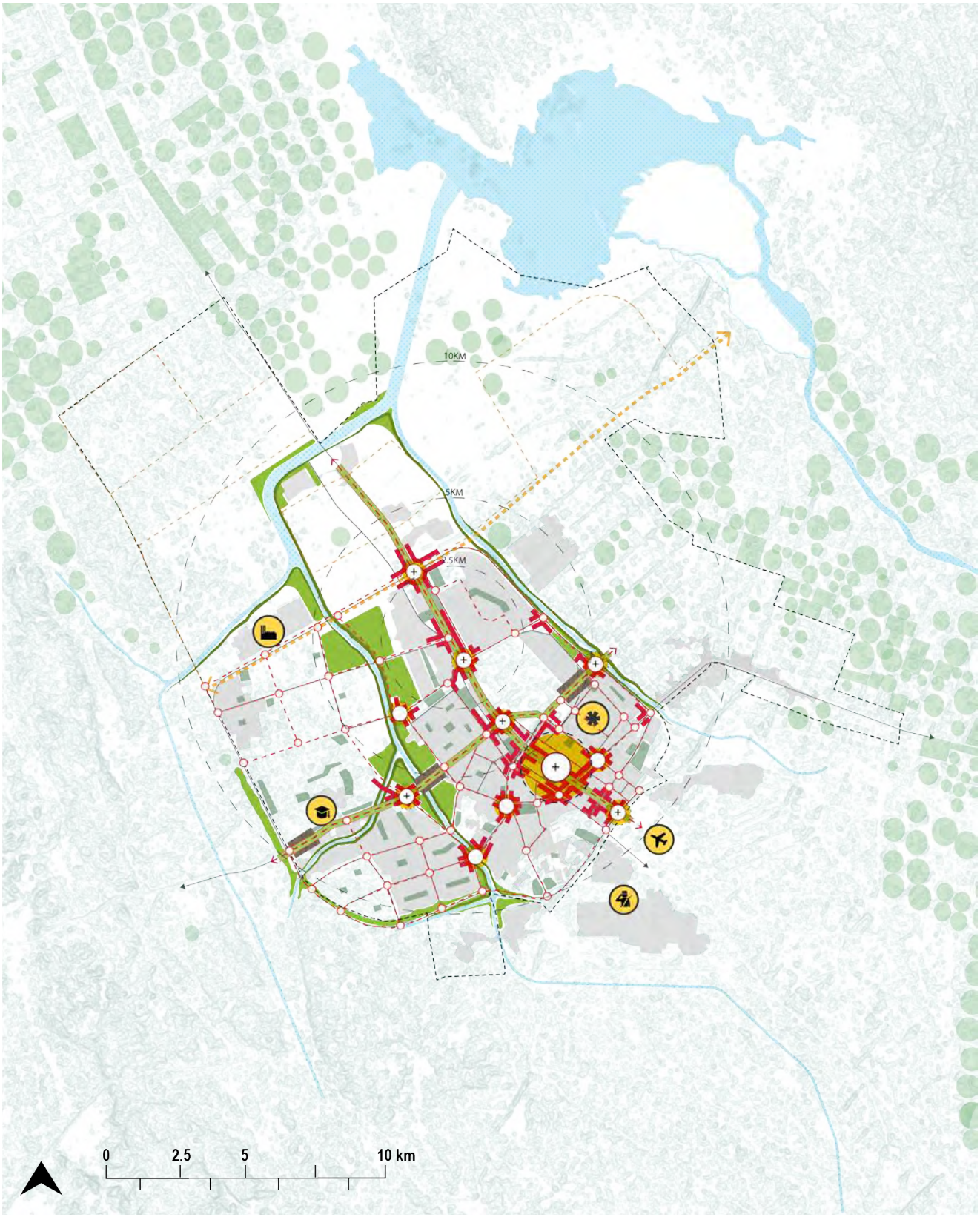


Fig. 67. Action Plan for Tabuk

across the city. Active street life, thriving public spaces, and well-connected public transportation systems are crucial elements in creating vibrant urban environments.

- **Tabuk Resilient City**

  Tabuk should pursue environmentally sustainable practices to restore and strengthen its natural assets. Protecting the wadis with functional green buffers and small, diffused water reservoirs would help adapting to climate change, mitigating flooding risks, and tackling both groundwater depletion and water scarcity. Responsible use and management of the natural resources would help Tabuk transition to a resilient and thriving urban centre while encouraging lifestyle shifts to sustainable alternatives. Natural systems that are integrated and protected will stimulate ecological awareness and respect among the residents to co-exist and care for the environment as an extension of their city.

The restructured urban development patterns, grounded in a well-distributed and efficient public transport network, supporting a new system of mixed-use centralities will entirely transform the way the city functions. By incrementally greening the city, re-establishing a healthy and functioning relationship between the built and the natural environments, Tabuk will enhance and rebalance the ecological, social, and economic dimensions, providing a healthy and productive urban environment for its citizens, while becoming more attractive to tourism, thus, increasing job opportunities. Overall, the city will become more livable and pleasant, vibrant, and attractive. Tabuk to be able to better capitalise on its strategic location, at approximately 50 kilometres West of the future city Neom, and the crossroad of the centuries-old pilgrim routes from Jordan, Syria, and beyond, making Tabuk de-facto, a Gateway Eco-city, and the pulsing heart of Tabuk Region.

8.2 Institutional and Legal Recommendations

In terms of legal reform, Tabuk would benefit from both fiscal and jurisdictional decentralisation to facilitate independent and innovative solutions to urban social problems, at the Amanah level. This should entail:

- The transfer of local planning power, authority and function from MoMRA to the Amanah, with provision for independent action without recourse to effectively address community needs. This is supported by the New Urban Agenda, which specifies that territorial urban design and planning processes should be led by sub-national and local governments, but their implementation will require coordination with all spheres of governments, as well as the participation of the civil society, the public sector, and other relevant stakeholders;
- Fiscal decentralisation, which gives autonomy to the Amanah to source funds to finance development activities. Revenue generation activities in cities may also include taxes and levies. Urban areas should be allowed to collect some form of property taxes to fund development activities. The recent White Lands Act that imposes fees on undeveloped plots in urban areas to tackle land speculation, housing shortages, and indiscriminate land development shows that regulatory mechanisms can be leveraged to generate revenue while fostering an efficient development framework;
- The opening of avenues for actors, including the private and voluntary sector and the general community, to participate in decisions regarding projects that affect them.

Consolidation of the legal planning instruments would also support development intervention in Tabuk and add legitimacy. These laws should be reviewed, intending to update and modernise, in order to bring them in line with the current development paradigm. This will also give legitimacy to the plans that Tabuk relies on. Additionally, the city of Tabuk could benefit from a functional, effective legal instrument that:

- Manages scattered settlements located on agricultural land, preserves this land use and factors these areas in the urban boundary;
- Safeguards the city's urban identity, particularly the surrounding cultural areas;
- Transfers development rights outside the city's urban core, particularly the significant pockets of land of the Eid Mosque and the Ministry of Defense.

The lawmaking process could also be revised to limit the number of actors. The mere existence of the laws in the KSA will not guarantee sustainable urban development as they must be functionally effective, i.e., precise in achieving their intended results, clear, consistent, and simple to understand. There is a need for a functionally effective urban planning law that, inter alia:

- Introduces incentives/requirements that will enable more compact city growth;
- Defines clear institutional roles and responsibilities at each level;
- Enforces linkage between all levels of plans (national-regional-local);
- Provides effective coordination and monitoring mechanisms; and
- Increases meaningful public participation and engagement in planning.

Revising the Urban Growth Boundary Law to include clear criteria on how it is set would enhance technical and vertical accountability. The Law also needs to place more emphasis on establishing the Development Protection Boundary as a no-development zone to not only prevent haphazard development but also avert private interests from taking advantage of the laxity in the legal text. These initiatives will strengthen policy formulation designed to make the city more sustainable,

compact and dense. Primarily, a post-legislative scrutiny of the urban growth boundary law should be done to assess if it has met its policy objectives. This could in turn inform the legal reform process as well as the planning policy options.

8.3 Financial Recommendations

8.3.1 Own-source revenue instruments

The geographic, cultural, social, demographic, and economic advantages of the KSA have made it a crucial international player and economic power. Historically, oil and gas have been the country's primary exports, but the KSA has begun investing in other strategic sectors of the economy.

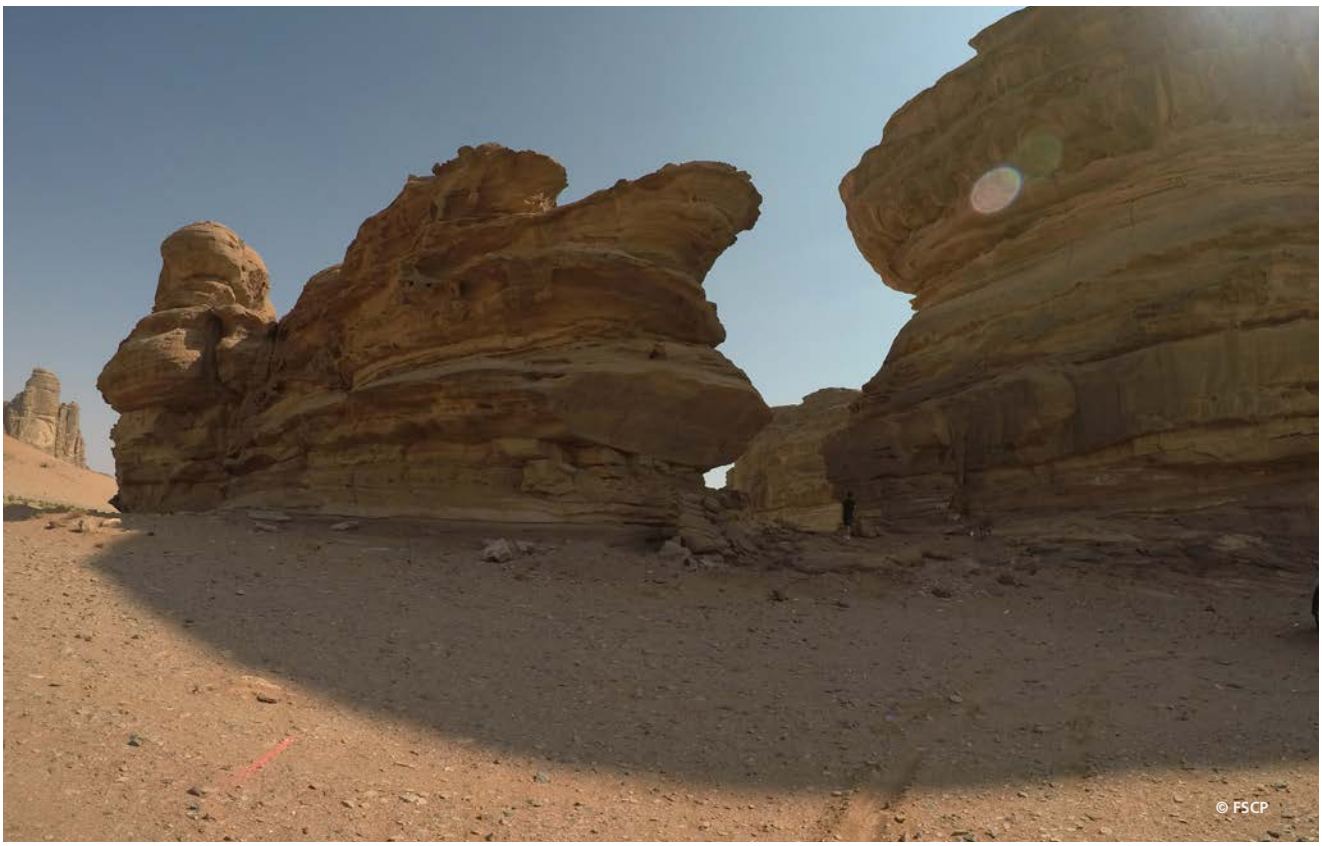
Economic diversification into non-fuel sectors is also supported by Vision 2030, KSA's development roadmap.[33] One of Vision 2030's objectives is to facilitate economic development in new industries as well as fostering innovation and economic competitiveness. One of the objectives of Vision 2030 is to facilitate economic development in new industries and foster innovation and economic competitiveness. In part, NTP 2020 was launched to build the institutional capacity needed to reach the Vision 2030 goals, including supporting economic growth and diversification. The NTP utilises innovative methods to identify economic challenges, seize opportunities, adopt effective planning tools, increase engagement with the private sector, implement reforms, and evaluate performance.

In addition to improving local finance and economic dynamism, the reforms were also aimed at supporting the implementation of the New Urban Agenda (NUA) by fostering inclusive, sustainable, and equitable local financial, and economic frameworks through progressive tax policies, and own-source revenue generation.[34] One example of these reforms is the WLT, introduced in 2015, which requires owners of empty urban plots designated for residential or commercial use to pay an annual tax of 2.5% of the land value. The goal of the WLT is to:

- Promote real estate development that addresses supply shortages in the region;
- Increase the availability of land for affordable housing developments;
- Safeguard competitive markets and minimise monopolistic practices;
- Increase local revenue generation.

Thus far, the WLT has been adopted in the cities of Riyadh, Jeddah, and Dammam and applied to 10,000 square metres of urban land. In addition to improving the own-source revenue base of these three cities, reforms such as the WLT support the framework for sustainable urbanisation introduced in the New Urban Agenda (NUA).

In the case of Tabuk, a policy aimed at deepening and diversifying own-source revenue should consider socio-economic and demographic factors, such as the population



Diverse terrain in Tabuk

growth rate, population density and urban sprawl. Additionally, policies that support agricultural land are encouraged in order to protect local agricultural activities, especially in the production of dates.

Taking all of these factors into consideration, financing instruments that mobilise local revenue with an eye on the trajectory of expenditures in the long-run are crucial to supporting locally sustainable public finance and urban development. Hence, exploring own-source revenue mechanisms through land-based taxation, among others, will be a crucial step in achieving the goals put forth in the NTP.

Land-based taxation is supported by a large body of evidence from a diverse set of countries. In particular, capturing the value created by new infrastructure projects, zoning changes, and/or infrastructure upgrades, (figure 69) through land-value capture has proven to be effective in mobilising local revenue. Land-value capture is based on the idea that individuals, businesses, and landowners in the adjacent areas that benefit from government and/or private investment in infrastructure, (e.g., roads, railway, industrial infrastructure, schools, and hospitals) benefit from the land value increase resulting from these types of public infrastructure projects.

Source: United Nations Human Settlements Programme (2018)

Fig. 68. Components of mixed land use

THE IMPACT OF INFRASTRUCTURE DEVELOPMENT ON LAND VALUE

Case Examples	Key Findings
Dubai, United Arab Emirates	The impact of public transportation on property values for dwellings and commercial properties is about 13 % and 76%, respectively, within an area of 1.5 kilometres.
Cairo, Egypt	• Urban development that included retail facilities resulted in a price premium of 15 – 20% • Schools increased residential land prices by approximately 13% • Walkability within a residential community increases home values by up to 9%
Bogotá, Colombia	Research suggests that for every additional 5 minutes of walking time to a public transportation station, rental prices falls by 6.8 - 9.3%

Source: GVA (2018); Mohammad et al. (2017); Colliers International (2017); Rodríguez and Targa (2004).

Fig. 69. The impact of infrastructure development on land value

Land-based financial instruments are particularly well suited to Tabuk where a new public transport system can support local government in raising both own-source revenue and the density of population around the main stations.

One type land-based tax mechanism is betterment levies.[35] Betterment levies are effective financing instruments that enable the cost recovery of large capital investments. Betterment levies are tailored to the type of infrastructure and mixed land use encouraged by the sustainable urbanisation principles supported by UN-Habitat. In practice, betterment levies would enable the municipal government of Tabuk to capture a percentage of the additional value created by public infrastructure development projects ,and land use changes that accrue to landowners and other beneficiaries.[36]

Adopting and enforcing betterment levies requires that municipalities remain transparent, accountable, and in communication with the public regarding the use and effectiveness of the betterment levy. In addition, local governments should analyse the costs and the benefits of various types of land-based financing tools. Conducting a thorough cost-benefit analysis will enable public officials to develop proactive solutions, anticipate potential issues and bottlenecks, and seize opportunities. Figure 71 shows some of the factors that local governments should consider when conducting a cost-benefit analysis of various land-based financing instruments.

KEY FACTORS IN DESIGNING BETTERMENT LEVIES

Determining land value capture object

Revenue targets based on either (a) a percent of infrastructure cots or (b) a percent of the increase in land value

- Betterment levies are a good option for scenarios involving public transportation and industrial development projects
- Data on changes in land value and efficient tax administration are critical success factors

Timing and collection of payments

Payments collected:
Upfront, as with developer contributions made before the infrastructure is built
Annually, as with an increment to local government rates
At the time the property is sold

- Consideration should be given to whether there are negative financial consequences for landowners who may not have the capacity to pay a levy or who are asset rich, but income poor
- The government might consider only requiring the levy to be paid when a property is sold or transferred

Application of the levy by land use groups

- Real estate developers
- Commercial landowners
- Residential landowners

- The application of the levy should be determined using the beneficiary-pays principle
- If it can be demonstrated that benefits will flow to specific types of property owners, then there is a strong case to include them in the land value mechanism design

Application and boundaries of levy

Levies can be structured to have a broad based (e.g. city-wide) or time/distance based

In Tabuk, land value benefits are maximized for a 1.5 kilometres area with a walking distance from public transportation.

Setting the rate

The rate structure is variable and is determined on a case-by-case basis

- The choice of rate structure will need to reflect the choice of who to tax and the revenue base selected.
- In Tabuk, the base is related to the percentage of land value increase.

Governance structures for land value capture

- Existing legal instruments that could be used for the purpose of supporting value capture tools
- Regulation of new area-specific levies associated with infrastructure projects or urban planning
- Selecting the right legal instrument reduces the potential for unintended consequences
- Lessons learned from current instruments (e.g. white land tax) can inform the selection and implementation of appropriate legal instruments that support land value capture instruments.

Source: Youngman, J.M. (1996). Tax on land and buildings. In Thuronyi, V., (Eds.) Tax law design and drafting. International Monetary Fund. Washington, DC. and drafting. International Monetary Fund. Washington, DC.

Fig. 70. Key factors in designing betterment levies

COST-BENEFIT ANALYSIS FACTORS IN LAND-BASED FINANCING

BENEFITS	COSTS
- Alignment of Saudi reforms with New Urban Agenda (4th pillar)	- Effort to enable and support legal framework and local governance
- Efficient and reliable source of local revenue	- Different administrative functions and tasks involved
- Incentive for efficient land development and mixed land use	- Length of the start-up process
- Increased density and economic agglomeration	- Investment in diagnostic tools for land information, monitoring systems (e.g., fiscal cadaster), and data collection
- Stimulate the development of specific infrastructure (e.g., public transport, educational, health and social infrastructure)	- Effort needed to combine urban planning with infrastructure investments
- Alternative investment incentives (e.g. PPPs)	- Investment in capacity building and training
- Increase in civic awareness and accountability	- Investment into communication systems and civic participation

Source: Farvacque-Vitkovic and Kopanyi (2014); United Nations Human Settlements Programme (2016).

Fig. 71. Cost-benefit analysis factors in land-based financing

8.3.2 Leveraging urban productivity

Harnessing the economic and own-source revenue potential of Tabuk will foster development across local industries. In addition, investment in public infrastructure opens the door to improving the accessibility, density, and mixed land use of cities.

One way in which urban productivity can be enhanced is through the use of PPPs. PPPs are effective financing tools that facilitate public-private sector engagement. In PPPs, the private sector can provide the public sector with much-needed expertise in the provision of high-quality public goods and services. Moreover, PPPs can help drive economic innovation and diversification into value-added industries, improve product marketing, and reduce coordination costs among trading partners. It is important to note here that a crucial input into supporting the development of the workforce, especially in specialised fields, is education.[37] Sustainable urban development, therefore, must include policies that support public education.

Saudi Arabia has already taken steps to support PPPs. The KSA established a Public-Private Partnership body, the National Centre for Privatisation, housed in the Ministry of Economy and Planning. PPPs in Tabuk could be a powerful financing tools in transportation, tourism, and industry to (1) increase land values through development projects, (2) enhance own-

source revenue, (3) efficiently operate and manage public services, (4) create opportunities for collaboration with the private sector on publicly funded projects and services, and (5) attract national and international investment.

Furthermore, private capital can support cities such as Tabuk in reaching a variety of development needs through the (1) development of vacant land, (2) increased population density, (3) enhanced local revenue, (4) reduction in municipal dependence on intergovernmental transfers, and (5) economic stimulus.[38] Several tax instruments are available to local governments interested in expanding own-source revenue. Municipal governments can maximise the benefits of these tax instruments, (especially PPPs) by:

- Coordinating and collaborating with different levels of government to connect national strategies with local priorities. For example, establishing a local liaison office, or a local PPP unit linked to the National Centre for Privatization in charge of proposing, implementing, and monitoring PPP projects.
- Investing in capacity building and improving tax administration. The success of PPP projects is strongly correlated with the ability of officers to manage three strategic phases: (1) feasibility, (2) procurement, and (3) delivery and monitoring.
- Using a comprehensive approach. PPPs should be focused on linking infrastructure investment and land development and, thus, maximising benefits that correspond with mixed land use.
- Generating a diverse portfolio of income streams tailored to local needs. Indeed, sprawling and urban mobility behaviour needs to be faced by the government for the sake of increasing density and reducing the massive vehicle dependency of Saudi citizens for mobility.[39] In this instance, impact fees might be suitable instruments to constrain sprawling, and in generating additional revenues for local government.[40] In parallel, new parking fees and congestion fees are highly recommended to increase the use of public transportation and, consequently, the profitability of investment for the private sector.

Lastly, coordinating planning, legislation/regulatory frameworks, and municipal finance is crucial to creating the conditions necessary for sustainable urbanisation and economic development, as outlined in the New Urban Agenda.

CASE STUDIES AND BEST PRACTICES

WASTE MANAGEMENT

In the Tamil Nadu State of India, a waste management project proposed that the central government (35%) and the state government (15 %) would share 50% of the total project costs. A private entity (via a PPP) would provide the remaining 50% of project funding. The private concessionaire would be responsible for planning, designing, building, financing, operating and maintaining the municipal solid waste management facility for the concession period. Land would be provided by the municipality through an annual lease, as specified by the Government of Tamil Nadu.

CONGESTION FEES

Congestion fees reduced traffic in central London by 26% from its levels in 2002, generating £122 million net in 2006. The introduction of the Ecopass as a cordon-pricing scheme in Milan city centre has allowed the traffic to be reduced by 16.2% in 2011. The annual revenue was €5.905 million. The implementation of the Area Licensing System (ALS) in Singapore reduced traffic volume from 12,400 to 7,300 vehicles. Revenues from the sale of area licenses amounted to US$ 47 million.

PARKING FEES

Chicago leased 34,500 curb side parking meters to the bank Morgan Stanley for 75 years, trading metre revenues for an upfront payment of nearly USD $1.16 billion. This type of PPP contract includes a fixed schedule of metre rate increases, which raised rates two to four-fold by 2013. As a result, Chicago had the highest curb side metre rates in the United States. Meters were netting USD $20 million annually, while Morgan Stanley managed pricing and maintenance of the metres.

PUBLIC-PRIVATE PARTNERSHIPS

In Vancouver, greenhouse gases emitted by the city's landfill are managed and operated by a private company that transforms the gas emissions into useable energy for the city. The municipal government demanded that the private company selected be responsible for designing, building, operating and financing the project. Heat generated from the city's waste has been recovered and used by village farm greenhouses to produce vegetables and also to heat the landfill's administrative and maintenance buildings.

Source: Ernst and Young Pvt Ltd., Ministry of Urban Development of the Government of India, & the Confederation of Indian Industry. Compendium on public private partnerships in urban Infrastructure: case studies. (2017). World Bank. Washington, DC.; Weinberger, R., Kaehny, J., & Rugo, M. (2010). U.S. parking policies: an overview of management strategies. Institute for Transportation and Development Policy. New York, NY.; Croci, E. (2016). Urban Road Pricing: A Comparative Study on the Experiences of London, Stockholm and Milan. Transportation Research Procedia 14, 253-262.; Phang, S., & Toh, R.S. (2004). Road Congestion Pricing in Singapore: 1975-2003. Transportation Journal, 43(2), 16-25. The Canadian Council for Public-Private Partnerships, & PPP Canada. (2011). Public private partnerships: a guide for municipalities. The Canadian Council for Public-Private Partnerships.

Jabal Al Lawz

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ANNEX

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9.1 Picture Credits

9.2 List of Figures

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3 Tabuk workshop, UN-Habitat 2018

4 The planning system in Saudi is not formalized and therefore there is lack of consistency in the naming of plans across the cities. Normally, the strategic component is labelled as the Comprehensive Plan or Structure Plan but in the context of Tabuk, it is referred to as the Structural Plan.

5 According to Article 7 and 8 of Regional Law, the Minister of Interior chairs the meeting with all regional Amirs to discuss issues affecting each region and the general services required.

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34 United Nations (2017). New Urban Agenda. United Nations Human Settlements Programme, Nairobi, Kenya

35 This instrument has "a long tradition of being implemented in Colombia" with the first implementations going back to the passage of Act 25 in 1921. Medellin was one of the first cities to use this funding instrument. It is estimated that more than 50% of Medellín's main road grid was paid by betterment levies. Walters, L. (2016). Leveraging land: land-based finance for local governments. United Nations Human Settlements Programme. Nairobi, Kenya.

36 According to UN-Habitat accessibility evaluation, the Smart Mass Transport System will be within an area of 10 minutes walking distance for 267,794 people (19.3 percent) in the first phase, for 211,463 people (15.3 percent) in the second phase, for 223,982 people (16.2 percent) in the third phase. United Nations Human Settlements Programme. Nairobi, Kenya.

37 As pillar for economic diversification, Education was key topic during the UN-Habitat workshop held in Tabuk, April 2018.

38 Ministry of Finance, Kingdom of Saudi Arabia (2016). In 2016, intergovernmental transfers represented 89% of the municipal budget.

39 General Authority for Statistics, Demographic Survey (2016). The people living in the Taif Region are 2,080,436 and the number of cars is around 1,487,869.

40 Impact fees force developers to consider more seriously the costs of development. This fee is calculated on the infrastructure cost provision and charged by developers before to develop the project. This instrument is highly recommended for facing the sprawling generated by massive investment in real estate sector and development. Carruthers J. I., & Ulfarsson G. F. (2003). Urban sprawl and the cost of public services. Environment and Planning B: Planning and Design, 30, 503-522

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