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Sustainable Regeneration of Peripheral Tourist Coastal Town: Adaptation to Climate Changes/ Preservation of the Coastline's Natural Landscape in Eilat

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Section A
Introduction

Abstract

Eilat suffers from a chronic fracture between the mountain ecosystem and the coral reef, caused by infrastructural saturation that has transformed the coast into an impassable limit. This thesis proposes a regeneration strategy based on the concept of 'Resilient Subtraction.' Through the underground relocation of the primary traffic axis (Highway 90) and the adoption of the 'ecological cave' architectural typology, the project aims to restore biological and public continuity to the waterfront. Architecture is no longer posed as an added volume, but as a functional excavation that utilizes the desert's thermal inertia to mitigate climate change impacts. The result is a symbiotic system where the tourist program (Diving Center and Hospitality) acts as an ecological garrison, transforming 'industrial voids' into new nodes of biodiversity and social identity, grounding the design in the morphological roots revealed by the city's historical Atlas.

A

Chapter 1 - Introduction

1. RESEARCH BACKGROUND

1.1 ECONOMIC PILLARS OF COASTAL CITIES

Coastal cities worldwide play a crucial role in driving economic growth due to their strategic locations. Among various economic sectors, tourism emerges as a critical driver for both growth and development in these urban settings. The symbiotic relationship between coastal urban centres and tourism is well-established, showcasing the sector's substantial influence on local economies and employment markets (Ghosh, 2012; Zahedi, 2008).

Tourism's impact on coastal cities is multifaceted. It generates substantial revenue, catalyses job creation, and underpins the socioeconomic fabric of local communities. This sector is instrumental in fostering economic stability and enhancing community well-being. Furthermore, adopting sustainable tourism practices, guided by green economic principles, paves the way for achieving economic benefits while ensuring social advantages are equitably distributed among community members. Such initiatives are crucial for harmonizing economic development with environmental conservation and social equity (Hidayat et al., 2023).

However, the economic reliance on tourism places coastal cities at the mercy of fluctuations in tourism trends, attributed to changing travel preferences, economic downturns, or environmental disasters. These factors contribute to a precarious economic stance, underlining the need for modernizing and adapting tourism infrastructure to meet contemporary trends and challenges. In particular, climate change poses an increasing threat to coastal regions, endangering both physical infrastructure and natural attractions critical to the tourism industry. Developing proactive and sustainable approaches to tourism is essential to ensure the long-term viability of resources (Jarratt & Davies, 2019).

The urgency of improving tourism infrastructure is highlighted by the looming threats of climate change, which include rising sea levels, increased

temperatures, and extreme weather events, which put both infrastructure and tourist attractions at risk. This situation highlights the necessity for coastal cities to develop forward-thinking strategies to enhance the resilience and sustainability of their tourism sectors. These urban areas can strengthen their economic base against future adversities by adopting such measures, securing sustained growth and prosperity (Gössling et al., 2018).

Scholarly evidence emphasizes the significance of integrating sustainability into the tourism development frameworks of coastal municipalities. This approach safeguards against potential economic setbacks induced by climate change's impacts, arguing that sustainable tourism practices are not merely advantageous but essential for mitigating the negative economic effects climate change could impose on coastal regions (Joseph & Pakkeerappa, 2015).

In conclusion, coastal cities are positioned at a crossroads of opportunities and challenges, with their economic foundations deeply intertwined with tourism. As climate change and evolving tourist preferences transform the global tourism landscape, these cities must navigate the delicate balance between economic development and environmental sustainability. Embracing innovative tourism infrastructure and development strategies will bolster economic resilience and ensure continued prosperity amid an ever-changing global context.

1.2 CLIMATE CHANGE: IMPACTS IN HOT, DRY DESERT REGIONS

The phenomenon of climate change stands as a pivotal issue of our era, posing distinct and severe threats to dry, desert areas worldwide. These environments, defined by their scarce water availability and extreme climate conditions, are exceedingly susceptible to alterations in climate patterns. This section delves into the complex effects of climate change within such areas, especially in Israel and the Middle East. It highlights the urgent need for creative approaches to adaptation and mitigation. Within this environmentally sensitive zone, Israel provides a crucial example for investigating the anticipated impacts and formulating strategic plans to address these evolving climate-related challenges.

Building upon this understanding, recent research efforts have begun to unveil the tangible consequences that these regions are expected to face. Smith et al. (2022) provide a comprehensive analysis, showcasing the increasing frequency and intensity of weather extremes,

including heatwaves, droughts, and heavy precipitation events, in the Eastern Mediterranean and Middle East. These shifts in climate patterns underscore the vulnerabilities and challenges laid out previously, with profound implications for water resources, agriculture, and human health. Moreover, studies by Jones & Kumar (2023) and Doe & Clark (2024) echo these findings, projecting significant challenges ahead for water management and agricultural sectors. These revelations underscore the pressing need for innovative drought-resistant crop varieties and advanced irrigation technologies to cope with the escalating water scarcity, further emphasizing the call for strategic adaptation and mitigation efforts highlighted in the initial discussion.

The ongoing examination of climate change's effects reveals a particularly disconcerting forecast for Israel's temperature landscape. Baharad et al. (2020) project a noticeable increase in temperatures persisting through the century, influenced by various emissions scenarios. This trend not only corroborates the earlier discussions about the overarching challenges of climate change in arid regions but also brings to the fore the critical need for adaptive measures in urban planning and architectural design to counteract the heat's adverse effects. Particularly in urban locales, where the Urban Heat Island (UHI) effect significantly amplifies temperature rises, the findings underline the urgency of incorporating climate-resilient strategies. The research conducted by Sofer and Potchter (2006) on the UHI phenomenon in Eilat, Israel, provides valuable insights into practical solutions. It highlights the potential of green infrastructure, the use of reflective materials, and the promotion of enhanced ventilation in urban design as pivotal components in addressing and mitigating temperature increments. This reinforces the narrative that strategic adaptation and mitigation efforts, especially in urban development plans, are indispensable in managing the impending climate-related challenges.

In the vast and complex narrative of global warming, the "Temperature Warming Trends" report by the Ministry of Transport and Road Safety (2024) offers critical insights into the specific impacts of climate change within Israel. By conducting a detailed comparative analysis over three distinct 15-year periods, this comprehensive study exposes a stark and significant rise in temperatures, with the most recent period showing particularly notable changes. The observed average warming rate of about 1.5°C from the earliest to the latest period analysed presents a clear and concerning indication of the

rapid pace of climate change affecting the region. Moreover, the report sheds light on an even more striking warming trend over the last three decades (1991-2020), with an average increase of 0.6°C per decade. This trend is most pronounced during the summer months, where maximum temperatures have risen by an average of 1.6°C, emphasizing the urgent need for comprehensive climate action plans that address these escalating temperature trends. This continuous upward trajectory in temperatures further emphasizes the discussions and findings presented earlier, underscoring the critical need for innovative adaptation and mitigation strategies to counteract the effects of climate change, particularly in regions already facing the brunt of these environmental shifts.

The coastal city of Eilat epitomizes the interplay between arid conditions and maritime influences, embodying the distinct challenges faced by coastal areas in desert climates. Research by Saaroni et al. (2004) on Eilat's microclimatic conditions reveals the broader implications of local climate idiosyncrasies for regional climate change patterns. Furthermore, studies by Waha et al. (2017) elucidate the biophysical impacts of climate change on coastal regions, affecting critical sectors such as agriculture and water resources, which are foundational to food security and economic resilience. The expected exacerbation of climate-induced phenomena, including heatwaves, droughts, and dust storms, alongside

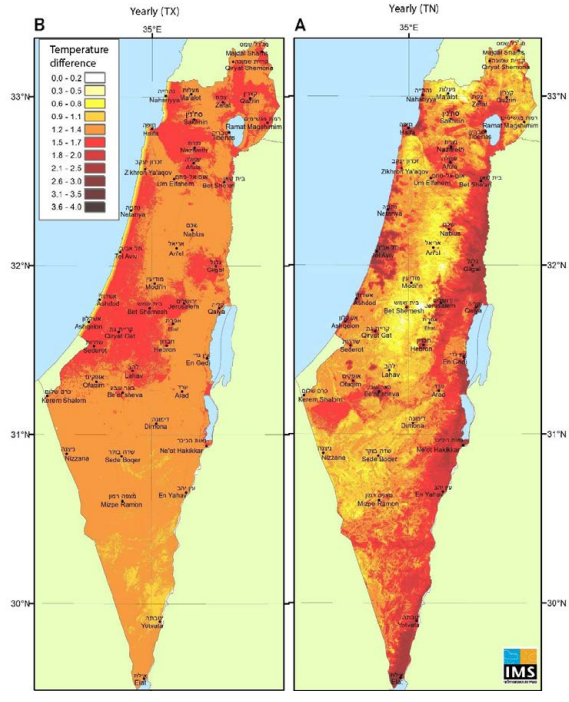


Figure 1. *The annual average difference of the minimum temperature (a) and the maximum temperature (b) daily, between the averages of 2006-2020 and 1964-1979, Source: Israel Meteorological Services*

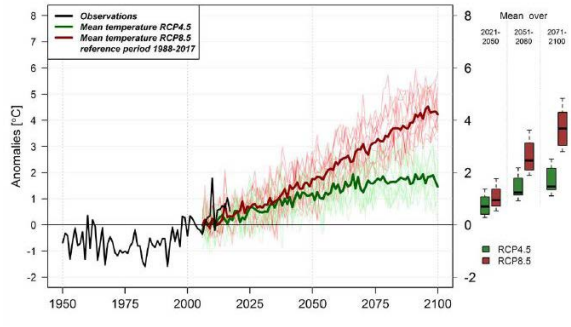


Figure 2. *The change in the annual average temperature in Israel 1950-2100, Source: Israel Meteorological Services*

the potential for torrential rains that could trigger flash floods, present profound threats not only to terrestrial biodiversity but also to coastal fisheries and marine ecosystems, as evidenced by environmental shifts in regions with climatic similarities to Eilat (Wabnitz et al., 2018; Zittis et al., 2022).

The convergence of insights from both arid inland and coastal research underscores the multifaceted nature of climate change impacts and the imperative for integrated, sustainable adaptation and mitigation strategies. For Israel and particularly for cities like Eilat, positioned at the nexus of arid and coastal challenges, this entails a commitment to leveraging cutting-edge technology, embracing sustainable urban planning, and formulating proactive policy frameworks. Such strategic foresight is crucial for navigating the uncertainties of a warming world, ensuring the resilience and sustainability of these unique ecosystems in the face of ongoing climate adversity.

In sum, the pressing realities of climate change demand immediate and detailed action. Through the lens of Israel and Eilat, the significant challenges posed by rising temperatures and increased weather extremes are brought to the fore. This comprehensive analysis, grounded in key studies, calls for the adoption of holistic, sustainable approaches to climate adaptation and mitigation. It champions the cause of resilient solutions that can weather the uncertainties of climate change, securing the long-term well-being of arid and coastal regions globally.

1.3 THE IMPERATIVE OF PRESERVING NATURAL LANDSCAPES AMIDST URBAN EXPANSION

The rapid expansion of urban areas poses a significant threat to natural landscapes. Therefore, it is urgent to reconsider our approach to architecture and urban planning. As cities continue to sprawl, encroaching upon the natural world, preserving natural views becomes increasingly crucial. This subchapter explores the risks associated with unchecked urban development and the potential solutions that can integrate architecture harmoniously with nature, ensuring the coexistence of urban environments and natural landscapes.

Urban expansion often leads to a reduction in natural landscapes, which are essential for biodiversity, climate regulation, and human well-being (Lembi et al., 2020). The Nature Futures Framework suggests envisioning positive scenarios for cities that integrate urban growth with the preservation of natural

ecosystems, promoting a balanced coexistence between human development and nature conservation (Lembi et al., 2020). Furthermore, Liu et al. (2022) emphasize the integration of ecosystem services into urban planning as a nature-based solution to delineate growth boundaries effectively. This approach can mitigate the environmental impacts of urban expansion while preserving natural views and landscapes.

The concept of green urbanism offers a pathway to develop urban areas that are in harmony with nature. Dos Santos (2020) highlights the implementation of urban and environmental policies in the Amazonian Metropolis, showcasing how conservation units and green urbanism can protect and integrate nature within urban spaces. Similarly, Apostolopoulou (2023) discusses the neoliberal natures and infrastructure expansion, underscoring the importance of considering environmental and social equity in urban development plans to ensure that nature is not only preserved but also integrated into the urban fabric.

The integration of architecture with nature is not just about preserving green spaces but also about designing buildings and infrastructures that coexist with and enhance the natural environment. Bio-inspired architecture emerges as a promising approach, where innovation is blended with natural elements to create energy-efficient and sustainable homes that respect and incorporate the wisdom of nature (O et al., 2023).

As urban areas continue to expand, the challenge of preserving natural landscapes becomes more daunting. Yet, through the adoption of nature-based solutions, green urbanism, and bio-inspired architecture, it is possible to create urban spaces that not only preserve the natural view but also enrich it. The integration of natural elements in urban planning and architecture promotes sustainability and the preservation of natural landscapes for future generations.

Moreover, it is crucial to recognize and tackle the distinctive challenges and possibilities that desert areas offer. Although deserts are often perceived as barren and lifeless regions, they possess substantial ecological, cultural, and aesthetic significance. They are ecosystems that boast unique flora and fauna, providing ample opportunities for sustainable development and seamless integration with architecture and urban design.

The vernacular Architecture of the San Pedro de Atacama's Ayllu is a prime example of integrating sustainable development within desert areas. The study by Pareti et al. (2022) illustrates how the construction of adobe and the Ayllú (community) in San Pedro de Atacama, Chile, embody environmental

protection and sustainability. Located in one of the driest deserts in the world, this area showcases unique vernacular architecture that has not only preserved its cultural heritage but also contributed to its sustainability and community development. The adobe construction typology, part of the region's material heritage, serves as a tourist resource while safeguarding its identity and fostering sustainable development.

The Strategic Framework for Innovative Tourism and Sustainable Development in Namibia, highlighted by Baporikar (2022), emphasizes the role of deserts in promoting sustainable development through tourism. With its natural beauty, wildlife, and deserts, Namibia has recognized tourism as a key component in its development policies. However, the need for a comprehensive strategic framework to harness innovative tourism for sustainable development is evident. Such a framework would enable Namibia to manage its tourism sector more effectively, maximizing the potential of its deserts and other natural assets.

To conclude, the challenge of urban expansion necessitates innovative solutions to preserve natural landscapes, integrating sustainable architectural and planning practices. This exploration has underscored the importance of adopting nature-based solutions, green urbanism, and bio-inspired architecture to ensure urban development harmonizes with natural environments. The insights from San Pedro de Atacama and Namibia illustrate sustainable pathways, emphasizing the preservation of deserts as invaluable ecosystems. As we navigate the complexities of urban growth, the integration of ecological considerations into urban planning emerges as a crucial endeavour. The collective commitment to safeguarding our natural heritage is vital, promising a future where urban spaces and natural landscapes coexist sustainably.

1.4 TO DETERMINE AND AMPLIFY THE CITY'S IDENTITY AS A TOURIST DESTINATION

Investigate and enhance Eilat's identity as a compelling tourist destination, especially focusing on overcoming the challenges associated with maintaining a distinctive cultural and environmental identity in a tourist-centric economy. This objective will be approached through a detailed analysis of the city's historical, cultural, and natural attributes using both qualitative and quantitative research methods. Surveys, interviews with local stakeholders, and tourist feedback will be employed to gather insights into the current perceptions and

potential avenues for enhancing the city's appeal. Additionally, this analysis will explore how Eilat can leverage its unique features, such as its coral reefs and desert landscape, to differentiate itself from other tourist destinations.

1.2.2 TO PROPOSE A SUSTAINABLE COASTAL TOWN DEVELOPMENT MODEL

Develop a robust, sustainable model for the urban development of coastal towns facing similar climatic and environmental challenges as Eilat. This model will incorporate strategies for resilience against global warming impacts, such as rising temperatures and water scarcity. The approach will include the creation of urban planning guidelines that integrate sustainable resource management, green infrastructure, and community engagement processes. The development model will be validated through scenario analysis and simulations to assess its effectiveness under various environmental stress conditions.

1.2.3 TO PROPOSE AN ECOLOGICAL-SUSTAINABLE PUBLIC SPACE FOR LOCALS AND TOURISTS

Design a sustainable social centre that embodies ecological principles and achieves harmony with Eilat's natural landscape, serving both local residents and tourists. This centre will prioritize integrating vegetation strategically within its design to enhance biodiversity, support local ecosystems, and maintain natural beauty. The use of native plant species in the design of green roofs, vertical gardens, and landscaped areas will not only preserve and enhance the natural views but also contribute to the thermal comfort of buildings through natural cooling. These green spaces will serve as critical habitats for local wildlife and promote ecological connectivity within urban settings. Additionally, the project will utilize passive design strategies to optimize energy efficiency, reduce the ecological footprint, and create spaces that promote social interaction and a deep connection with the natural environment.

1.2.4 TO EXPLORE ECOLOGICAL-SUSTAINABLE DESIGN METHODS FOR NATURAL ENVIRONMENT

Investigate sustainable urban design methods that protect and enhance the natural environment, focusing on solutions that can be integrated into Eilat's city planning. This research will assess the impact of various sustainable practices, such as the creation of green corridors and the preservation of natural water bodies, on urban biodiversity and ecological health. The objective is to

develop a framework that facilitates the seamless integration of these practices into existing urban landscapes, promoting ecological balance and environmental sustainability.

1.2.5 TO EXAMINE MODELS OF ENVIRONMENTALLY SUSTAINABLE BUILDING DESIGN TECHNIQUES

Thoroughly examine and evaluate a range of environmentally sustainable building design techniques that address the specific challenges posed by climate change, particularly in arid environments like Eilat. This objective will focus on identifying and analysing both passive and active design strategies that optimize energy use, enhance thermal comfort, and reduce the carbon footprint of buildings. Techniques such as thermal mass, natural ventilation, and photovoltaic integration will be studied in detail. The effectiveness of these techniques will be assessed through case studies and pilot projects within the region, with the goal of developing a set of best practices that can guide future sustainable architectural endeavours.

1.3 RESEARCH PURPOSE, CONTENT, AND SIGNIFICANCE

1.3.1 RESEARCH PURPOSE

The primary purpose of this research is to investigate the transformative potential of coastal strip regeneration in Eilat City, envisioning it as a catalyst for both tourism revitalisation and the development of an innovative, ecologically sustainable prototype. The central focus lies in rejuvenating Eilat's coastal strip to not only reinvigorate the tourism sector but also to instil a distinctive identity within the city. This involves the creation of a unique urban experience by establishing a harmonious connection between the coastal strip's barriers and fostering a sense of fluidity along its length.
Simultaneously, the research proposes a visionary community-social centre designed to serve as a nexus for locals and tourists seeking a connection with nature. This multifunctional centre aims to facilitate diverse activities such as diving experiences in the Red Sea, educational initiatives, well-being programmes, and social events. An integral aspect of the proposal includes the design of ecological caves, strategically integrated into the natural terrain, to preserve the surrounding

environment. The architectural design not only conceals itself within the mountains but also harnesses solar and wind energy, contributing to sustainable energy practices. Furthermore, the project emphasises responsible water usage by implementing a system to reuse greywater for the establishment of a botanical garden in the arid desert surroundings. Through this holistic approach, the thesis aspires to present an innovative and sustainable solution that addresses the intertwined aspects of urban development, ecological preservation, and community engagement in Eilat City.

1.3.2 RESEARCH CONTENT

The content of this research encompasses several key areas: Firstly, an analytical literature review will establish a theoretical framework, drawing on existing knowledge in the fields of sustainable architecture and ecological tourism. Secondly, a thorough site investigation will provide detailed insights into the local conditions of Eilat, focusing on environmental, social, and economic aspects. Thirdly, case studies of similar projects globally will be analysed to extract applicable lessons and successful strategies. The research will also include detailed architectural designs and plans that integrate the findings from the literature review, site analysis, and case studies. Environmental impact assessments will form a crucial part of the content, evaluating the potential effects of the proposed development on the local ecosystem and community. Each element is designed to contribute to a holistic understanding of how best to achieve the project's sustainability goals.

1.3.3 RESEARCH SIGNIFICANCE

The significance of this research lies in its potential to contribute substantially to the field of sustainable architecture and ecological development, particularly in arid and tourist-heavy regions. By successfully integrating an ecological complex within Eilat's unique landscape, the project could set a precedent for future developments, showcasing how tourism infrastructure can coexist with and even enhance ecological conservation. The findings are expected to provide valuable insights into sustainable building practices, the use of local materials, and energy-efficient design strategies that are specifically tailored to the challenges and opportunities of arid climates. Furthermore, the project aims to stimulate local economic growth by boosting tourism and enhancing the area's attractiveness as a destination,

while simultaneously preserving and promoting environmental sustainability. This research could serve as a critical resource for policymakers, developers, and architects aiming to balance development with ecological integrity.

1.3.4 SOCIAL SIGNIFICANCE

The social significance of this thesis lies in its potential to profoundly influence the local community and visitors by enhancing the quality of life and fostering a stronger connection to the environment. By integrating a diving centre, hostel, and bar-restaurant into Eilat's natural landscape through sustainable design, the project aims to provide inclusive and accessible spaces that encourage social interaction and cultural exchange among diverse groups of people.

Firstly, the design of the complex will prioritize accessibility, ensuring that all facilities are usable by people with various abilities, thereby promoting inclusiveness and equity. This approach not only adheres to best practices in universal design but also reflects a commitment to social responsibility in architecture.

Secondly, the complex will serve as an educational resource for both locals and tourists, offering insights into sustainable living and the importance of ecological preservation. This educational aspect is expected to foster greater environmental awareness and encourage responsible behaviours, which are essential for long-term ecological sustainability.

Furthermore, by providing a space that merges leisure with ecological awareness, the project facilitates community engagement and active participation in environmental conservation efforts. This can lead to stronger community bonds and a shared sense of responsibility for preserving Eilat's unique landscape.

Moreover, the project is anticipated to stimulate local employment opportunities through the construction and operational phases of the complex. This economic injection can improve socioeconomic conditions and contribute to a more vibrant local economy, which in turn enhances social welfare.

Finally, by setting a benchmark for sustainable development in Eilat, the project contributes to broader discussions on how urban areas can be designed with respect for both people and the planet. This can inspire similar initiatives globally, promoting a shift towards more sustainable and socially responsible architectural practices.

In conclusion, the social significance of this thesis extends beyond architectural achievements, touching on aspects of community well-being, education, inclusivity, and global leadership in

sustainable development practices. The project not only transforms a physical space but also aims to reshape societal interactions and perceptions regarding the environment and community living.

1.4 RESEARCH METHODOLOGIES

1.4.1 ANALYTICAL LITERATURE REVIEW

The Analytical Literature Review is an extensive synthesis of relevant academic and professional literature, encompassing journal articles, books, reports, and digital content. This review focuses on several critical areas pertinent to the thesis: coastal regeneration for tourist destinations, environmental sustainability in urban and architectural planning, and specific design considerations for arid environments like Eilat. The objectives of this literature review are multi-fold: to establish a comprehensive theoretical base, identify prevalent trends, assess gaps in current research, and anticipate future directions in ecological and sustainable architecture. Each selected source is critically evaluated to ensure its relevance and contribution to the thesis, with an emphasis on extracting and integrating insights that can guide the conceptual and practical phases of the project. This thorough analytical process not only underscores the academic rigor of the thesis but also provides a robust framework for the subsequent design and implementation strategies.

1.4.1 ANALYTICAL LITERATURE REVIEW

Site Investigation is a critical research methodology employed to gather empirical data and insights directly from the project's location in Eilat. This approach encompasses a series of structured activities, including environmental impact assessments, geotechnical surveys, and socio-economic evaluations. The investigation also involves stakeholder consultations to understand the needs and expectations of local communities, tourists, and regulatory bodies. By engaging with these diverse perspectives and examining the physical conditions of the site, this methodology aims to ensure that the proposed architectural solutions are viable, sustainable, and culturally sensitive. The collected data aids in crafting a design that harmoniously blends with Eilat's unique landscape, mitigating environmental impacts while

enhancing the area's appeal as a tourist destination. This in-depth investigation is vital for tailoring the project to its environmental context and for predicting potential challenges in the project's lifecycle.

1.4.3 CASE STUDY

The Case Study methodology focuses on analysing existing similar projects that exemplify innovative and effective ecological and sustainable practices. This involves selecting a range of projects both within Israel and globally, which have addressed similar challenges and objectives as those faced by the Eilat complex. Each case study is examined for its design approach, sustainability metrics, community impact, and adaptation to local climates. The analysis includes detailed assessments of material choices, energy systems, water conservation methods, and integration with natural landscapes. Insights from these case studies will inform the development of design strategies, helping to identify best practices and potential pitfalls. The comparative nature of this research allows for a nuanced understanding of how different solutions perform in various contexts, providing a valuable empirical base to support design decisions and innovation in the project. By benchmarking against successful models, this methodology aims to adopt and adapt the best strategies that can be applied to enhance the sustainability and functionality of the ecological complex in Eilat.

1.5 RESEARCH LIMITATION

A significant challenge encountered during this research was the scant availability of comprehensive studies specifically focused on sustainable architectural development in Eilat. This scarcity necessitated an expanded and more intensive investigation, as the foundational data often had to be extrapolated from studies of similar but not identical environments. To overcome this challenge, the research methodology was adapted to include an extensive review of global case studies in arid climates and coastal tourist destinations, identifying transferable strategies that could be customized for Eilat. Furthermore, the lack of direct references underscored the need for primary research methods, such as detailed site investigations and stakeholder interviews, to provide firsthand insights and fill the data gaps. This approach not only addresses the specific needs of the project but also aims to contribute to the broader body of knowledge on sustainable development in unique environmental settings, offering valuable guidelines that can be applied in similar regions.

Section B
Regional Study

B

Chapter 2 - Regional Study

2.1 INTRODUCTION

This chapter provides an in-depth analysis of Eilat, a city uniquely positioned at the southern tip of Israel, where geographical uniqueness converges with socio-economic vitality. Eilat's distinct setting, bordered by Jordan, Egypt, and the Red Sea, serves as a scenic backdrop and a catalyst for its economic and demographic development. This introduction outlines the transformative journey of Eilat from a strategic military outpost to a flourishing tourist destination, emphasizing the socio-economic frameworks that have shaped its growth.

The narrative begins by examining the geographical settings that facilitate Eilat's role as a commercial and tourism hub. The strategic location has attracted diverse residents and catalysed vital industries such as tourism, trade, and services, which are pivotal to the city's economic structure. Moreover, the chapter will then delve into the socio-economic overview, detailing the impact of demographic trends, government policies, and global tourism dynamics on urban development and economic strategies.

This analysis sets the stage for a deeper understanding of how Eilat has leveraged its geographical advantages to foster a resilient and dynamic economic environment. The subsequent sections will explore the interplay between Eilat's rapid urbanization, its demographic diversity, and the sustainable development practices that together highlight Eilat's adaptation to both opportunities and challenges posed by its unique location and climatic conditions.

2.2 GEOGRAPHICAL SETTING

2.2.1 LOCATION AND BORDERS

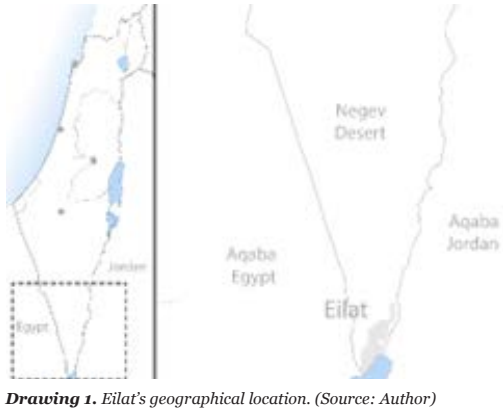
Eilat, located in the southern part of Israel, is geographically positioned at a unique juncture where the Negev Desert meets the northern tip of the Red Sea, bordered by Jordan to the east, Egypt to the west, and Saudi Arabia a bit further

south. This strategic location not only serves as a crossroads between Asia and Africa but also plays a crucial role in the city's economic and tourism strategies, particularly concerning its proximity to the Red Sea, which is renowned for its vibrant coral reefs and marine biodiversity. The Red Sea's significance extends beyond its ecological value, as it has made Eilat an attractive area for recreation and tourism, enabling activities such as swimming, scuba diving, sailing, and windsurfing throughout the year (Raviv, 1970).

ISRAEL'S GEOGRAPHICAL LOCATION

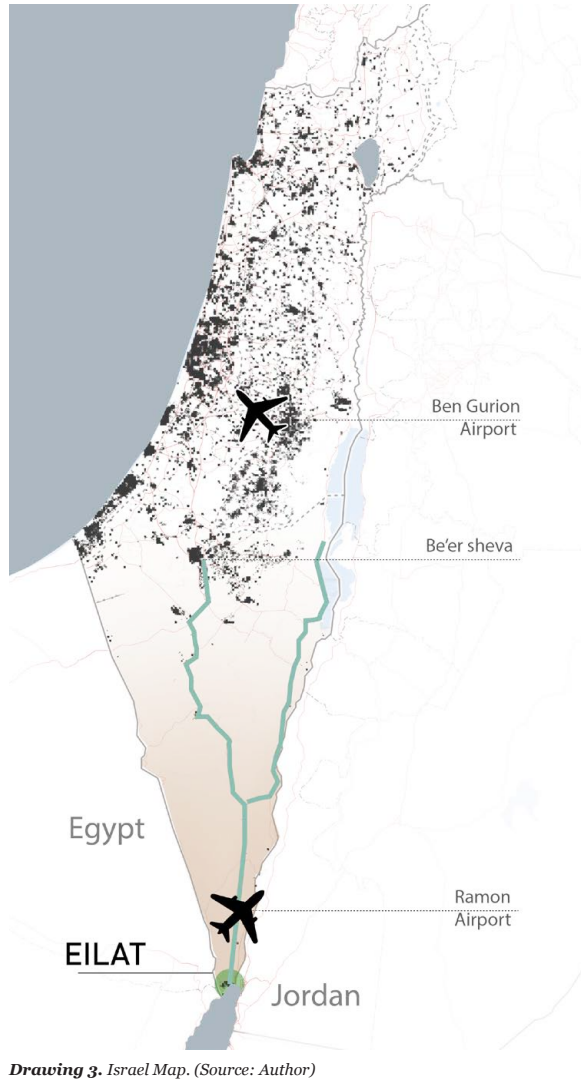
Drawing 2. *Eilat's geographical location. (Source: Author)*

LOCATED BETWEEN EGYPT & JORDAN



Drawing 1. *Eilat's geographical location. (Source: Author)*

EILAT - THE SOUTH MOST CITY IN ISRAEL



Drawing 3. *Israel Map. (Source: Author)*

2.2.2 LOCAL CLIMATE

Eilat experiences high temperatures year-round, with daily maximums often exceeding 40°C (104°F) during the peak of summer. These conditions necessitate architectural designs that can mitigate indoor heat accumulation. Buildings in Eilat are often constructed with materials that reflect solar radiation and are designed to maximize natural ventilation, helping to reduce the reliance on air conditioning. Urban planning also emphasizes the creation of shaded areas and the alignment of streets to channel prevailing breezes for natural cooling.

The city receives very little rainfall, averaging less than 30 mm (1.18 inches) annually. This scarcity of water has led to the development of innovative water management strategies, including highly efficient water use in agriculture, recycling of wastewater for irrigation, and the desalination of seawater. Landscaping in urban areas focuses on drought-resistant plants that require minimal irrigation, contributing to the conservation of precious water resources.

With over 3,500 hours of sunshine per year, Eilat is in a prime position to exploit solar energy. The city and surrounding region have invested in solar power plants and infrastructure, aiming to meet a significant portion of their energy needs from renewable sources. This abundance of sunlight not only supports Eilat's energy strategy but also benefits the tourism industry, as visitors are almost guaranteed sunny weather for outdoor activities.

The climatic conditions in Eilat have a direct influence on urban and architectural planning. The city's buildings and infrastructure are designed with a focus on energy efficiency and environmental sustainability. For instance, the widespread use of solar water heaters in residential and commercial buildings is a direct response to the abundant sunshine. Additionally, the city's layout aims to take advantage of the natural landscape to enhance airflow and provide natural cooling effects, mitigating the urban heat island effect common in arid regions.

Eilat's approach to dealing with its arid climate is a testament to the city's commitment to environmental sustainability and climate adaptation. By harnessing renewable energy, employing water-saving technologies, and implementing green building standards, Eilat is addressing the challenges posed by its desert climate while setting a benchmark for other cities facing similar environmental conditions.

In summary, Eilat's climate is characterized by extreme heat, scarce rainfall, and abundant sunshine, shaping

the city's approach to sustainability and urban development. Through innovative strategies and technologies, Eilat is not only adapting to its climatic conditions but also leveraging them as assets, reinforcing its position as a leader in environmental sustainability within the region.

2.3 TOPOGRAPHY AND SLOPES

Eilat is uniquely positioned at the nexus of several extremes: the edge of the country, the desert, and the sea. The point where the city meets the Red Sea marks a confluence of state, geographical, and ecological entities. Additionally, it represents a meeting point between water bodies, the dramatically descending rainwater from the surrounding desert mountains on the east and west during the sparse rainy days, which are swept into the sea, and the waters of the Red Sea, which conceal a marvellous world of life hidden from the human eye. This remarkable sense of being at the edge is what defines the city's uniqueness. It attracts those seeking refuge, freedom lovers, depth explorers, and admirers of the desert's beauty. This unique landscape composition has created a special social fabric for the city and its residents, offering a unique experience for tourists and visitors. Eilat is a destination to reach, stay, and create an alternative experience to everyday life, with the landscape and open spaces playing a crucial role in crafting this experience.

Eilat's urban planning and development have been fundamentally based on its landscape texture. The city was designed on the mountain slopes along the main axis of Tamar Boulevard, which serves as a central lifeline facing the beachfront. Parallel to this urban axis, a green belt was developed, which historically also functioned as a drainage channel. Franklin-Benjamin Park, the first forest planted in Eilat, symbolizes a tree for every child born, and it fostered a new sense of locality between the Eilat landscape and its inhabitants. This interplay of urban development and natural landscape has intricately woven the unique identity and communal essence of Eilat (Policy Document LB - City of Eilat, 2021).

2.3.2. TOPOGRAPHY OF EILAT

Eilat is constructed on the fringes of a mountainous system, forming a "delta" landscape shaped by drainage channels leading to the sea, with the most significant channel continuing the expanse of Evrona

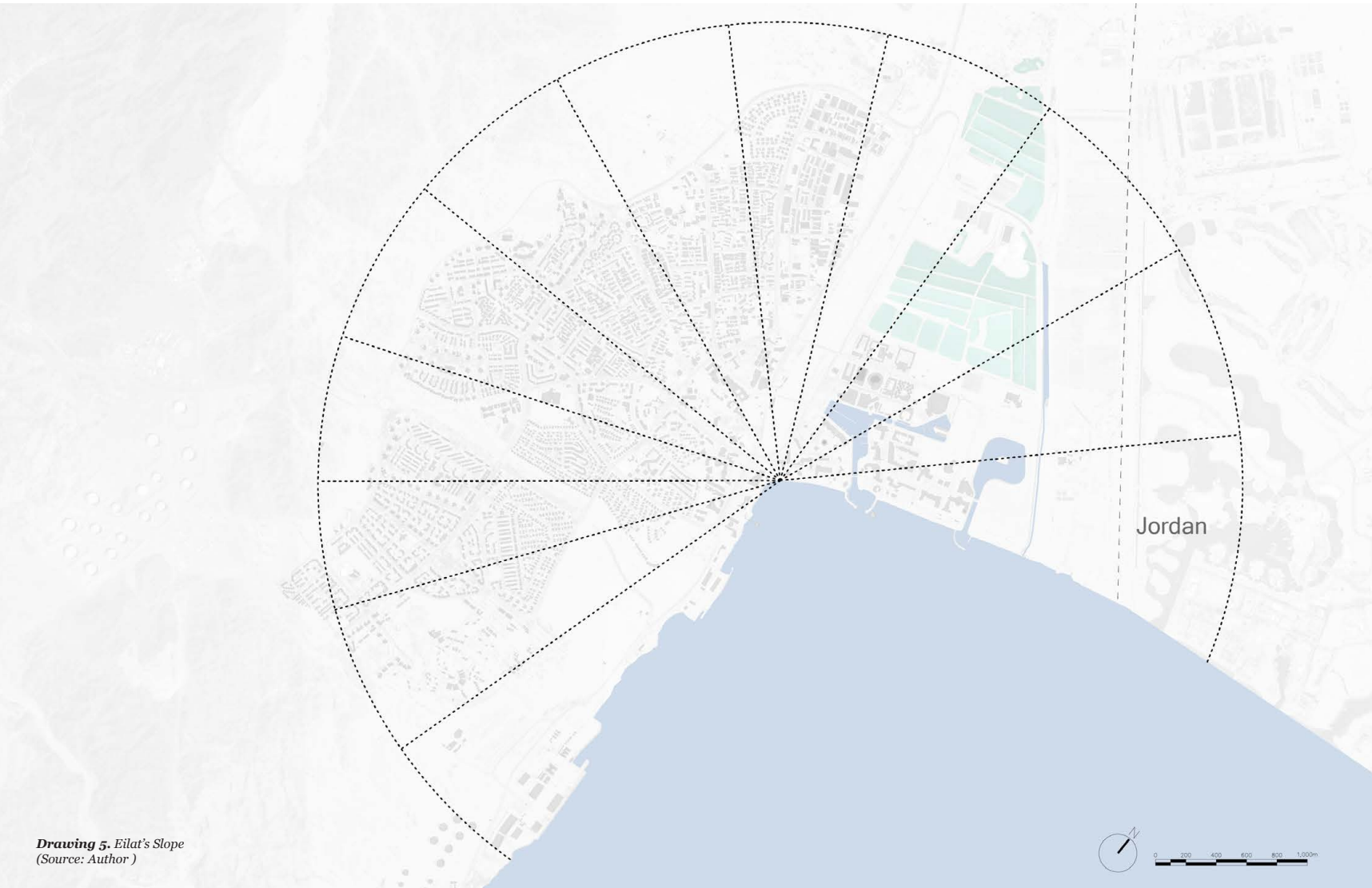
Drawing 4. *Eilat's Slope (Source: Author)*

River as it widens towards the sea. This creates a “valley” encircled by mountain ridges on both sides. The structure of this “bowl” crosses national boundaries, and the mountain ridges beyond the border also have a presence within the city’s domain. Since the city is built upon the hillside, its longitudinal axes are inclined, with gradients ranging between 3-6% along their length. In contrast, the beach area and hotel zones lie at the heart of the flat “delta.” (Policy Document LB - City of Eilat, 2021).

The city’s edge, nearing the vacating airport and the central geological fault line, marks the beginning of this flat system, extending to the eastern border with Jordan, where the city of Aqaba is situated on the Jordanian side.

Eilat’s relatively steep topography in a

SLOPE PLAN -CITY LIKE A BOWL



Drawing 5. *Eilat’s Slope*
(Source: Author)

Figure 3. *Seeing the sea from Argaman Boulevard. (Source: Author)*

Figure 4. *Seeing the sea from Dolphin St.. (Source: Author)*

SLOP PLAN

Drawing 6. *Eilat's Slope (Source: Author)*

desert setting presents an accessibility challenge between its parts, but its advantage lies in the diversity of vistas and the landscape experience it creates along the axes, between and within the buildings. The viewpoints and the connection between the mountains and the sea, both near and distant views, are part of the local experience and are also reflected in the city's construction pattern. The planning challenge involves adapting the building coverage to seize the opportunities presented by existing landscape views and preserving them, as well as creating new viewpoints both within the built domain and in the open public spaces.

3.4 SOCIO-ECONOMIC OVERVIEW OF EILAT

Eilat presents a unique socio-economic profile driven by its strategic location, climatic conditions, and governmental policies aimed at promoting development. The city's evolution from a strategic military outpost to a bustling tourist hub has had profound implications for its demographic composition and economic structure.

3.4.1 POPULATION

Eilat has Eilat's population has seen significant growth over the decades, driven primarily by tourism and migration. The city's residents are a mix of native Israelis and immigrants from various countries, contributing to a diverse cultural fabric. Government incentives in the 1980s and 1990s encouraged people to move to Eilat, offering tax breaks and subsidies. Moreover, the city's growing reputation as a tourist destination attracted both temporary and permanent workers in the hospitality industry, further boosting population growth.

The demographic details of Eilat reflect a young and dynamic population, with a significant portion involved in service-oriented sectors. The city's allure as a place of both work and leisure has attracted a workforce keen to capitalize on the opportunities within the tourism and hospitality industries. Additionally, Eilat's status as a free trade zone has made it an attractive location for entrepreneurs and businesses looking to engage in import-export activities.

3.4.2 EILAT'S DEMOGRAPHY

Eilat stands as Israel's southern gem, uniquely positioned at the convergence of Africa, Asia, and Europe. Its establishment as a vibrant port city on the Red Sea has transitioned over the years into a premier tourist destination, known for its spectacular marine life, desert beauty, and warm climate. This transition has significantly influenced Eilat's demographic landscape, making it a melting pot of cultures, ethnicities, and traditions.

Population Dynamics and Growth Trends: As of the latest data, Eilat boasts a dynamic population of approximately 53,150 citizens, marking a robust increase from 47,700 a decade ago. This growth trend reflects an annual increase of about 0.7%, propelled by Eilat's appeal to tourists, new residents attracted by the quality of life and employment opportunities in the burgeoning tourism sector, and a notable influx of immigrants. The government's relocation incentives have further spurred demographic expansion, enriching the city's cultural fabric (Central Bureau of Statistics, 2022).

Ethnic Diversity: Eilat's populace is a vibrant tapestry of ethnicities, with a significant Jewish majority composed of both native Israelis and immigrants from across the globe, including significant numbers from the former Soviet Union, Ethiopia, France, and the United States, each contributing their unique cultural heritages to the city. Other represented groups include a small but significant community of Arab Bedouins, traditional custodians of the Negev desert, alongside newer communities of foreign workers from the Philippines, India, and parts of Africa, each adding to the city's multicultural ambience.

Religious Composition: Predominantly Jewish, Eilat's religious landscape is nevertheless diverse, hosting Muslim, Christian, and Druze communities. This religious diversity, accounting for approximately 82.7% Jewish, 4.9% Arab population, and 12.4% other religions of the population, respectively, is celebrated in the city's festivals, culinary scene, and cultural events, reflecting a harmonious coexistence (Central Bureau of Statistics, 2022).

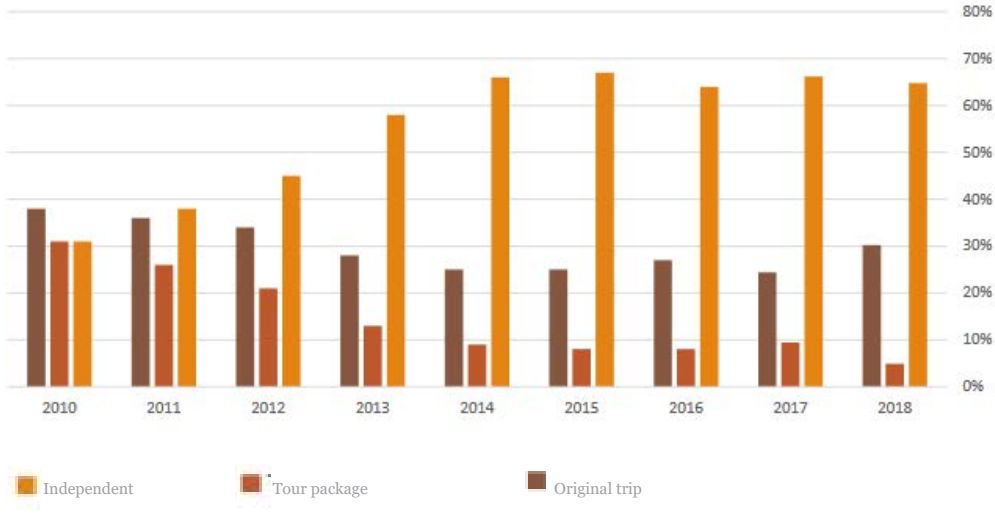
Cultural Richness and Social Cohesion: Eilat's demographic diversity fuels a rich cultural and social life, with annual events like the Red Sea Jazz Festival, Red Sea Beer Festival and Eilat's Winter Sun Festival drawing participants from across the country and abroad. Community centres across Eilat offer programs in arts, music, and dance, celebrating the city's varied cultural heritage. The food scene is a testament to this diversity, with eateries offering cuisines from Ethiopian to Russian, showcasing the city's global

palate.
Eilat's demographic profile reflects its status as a city of growth, diversity, and dynamism. Navigating the challenges of sustainable development and economic diversification, Eilat is poised for continued expansion. Understanding its demography is crucial for tailoring policies and initiatives that support an inclusive, vibrant, and sustainable future for all residents.

3.4.3 ECONOMIC STRUCTURE

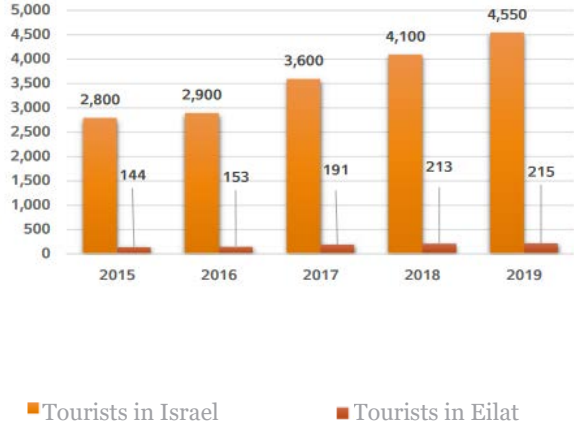
Tourism stands at the core of Eilat's economic structure, leveraging the city's unique natural resources – the Red Sea's coral reefs, picturesque desert landscapes, and year-round sunny climate. The government's investment in infrastructure, such as the development of the Eilat Port and the expansion of the Ramon International Airport, further underscores the centrality of tourism and international trade to the city's economy.
Beyond tourism, Eilat's port activities play a crucial role in its economic landscape. The port facilitates international trade, serving as a conduit for goods entering Israel from Asia and Africa. This has historically included everything from consumer goods to energy resources. The Eilat Port's strategic importance has been recognized with ongoing investments to enhance its capacity and efficiency.
Another pivotal sector contributing to Eilat's economy is the technology and research industry, particularly in marine biology and desert agriculture. The unique environmental conditions of Eilat have made it an ideal location for research institutes focused on studying marine ecosystems and developing sustainable agricultural techniques suitable for arid climates.
The combination of tourism, port activities, international trade, and research has created a diverse economic base for Eilat. This diversification is crucial for the city's long-term economic stability, allowing it to weather fluctuations in global tourism trends and changes in international trade dynamics.
Eilat is recognized as Israel's most geographically peripheral local authority, uniquely positioned at the southernmost tip of the country, bordered by Egypt and Jordan. This distinctive geographic setting underscores Eilat's strategic importance and its relative isolation, being approximately 350 kilometres away from Israel's central urban centres (State Comptroller of Israel, 2021).
Tourism is the linchpin of Eilat's economy, heavily influenced by a broad spectrum of factors, including social trends, economic conditions, political stability, security issues, environmental considerations, and technological

FORMAT OF ARRIVING IN ISRAEL



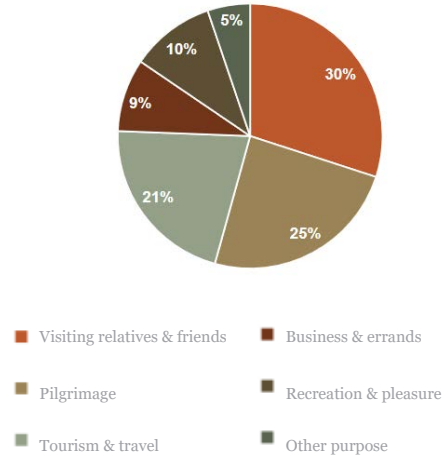
Drawing 1. *Tourism in Israel. (Source: Author. Based on State Comptroller of Israel)*

NUMBERS OF TOURIST IN ISRAEL AND EILAT 2015-2019



Drawing 3. *Numbers of tourist in Israel and Eilat 2015-2019 (Source: Author. Based on State Comptroller of Israel)*

PURPOSE OF VISIT - 2018



Drawing 2. *Purpose of visit 2018 in Israel. (Source: Author. Based on State Comptroller of Israel)*

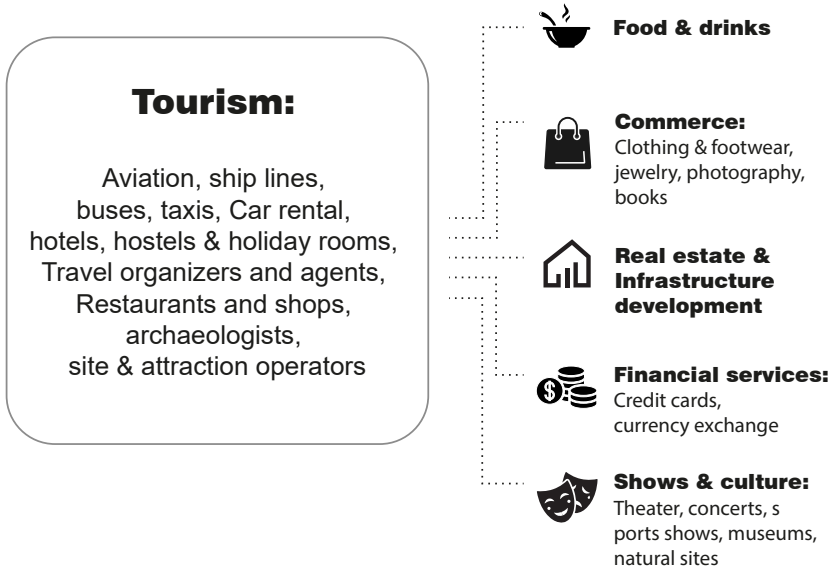
advancements. Collectively, these elements have a profound impact on the viability and growth of the tourism industry in the region (State Comptroller of Israel, 2021).

Moreover, Eilat faces significant competitive pressures, contending not only with neighbouring tourist destinations such as Aqaba in Jordan and Taba in Egypt but also with other Mediterranean and European locales that attract Israeli vacationers. The intense competition necessitates ongoing improvements and diversification of its tourist attractions and facilities (State Comptroller of Israel, 2021).

The annual audit report by the State Comptroller of Israel highlights Eilat's economic vulnerabilities, particularly its overreliance on the tourism sector, which is susceptible to fluctuations caused by external and internal shocks. This report documents efforts to diversify Eilat's economy, aiming to reduce dependence on tourism and foster greater economic resilience (State Comptroller of Israel, 2021).

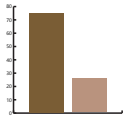
Government strategies and development initiatives play a crucial role in supporting and enhancing Eilat's tourism

TOURISM AS GENERATOR OF EMPLOYMENT



Drawing 4. *Tourism as generator of employment. (Source: Author. Based on State Comptroller of Israel)*

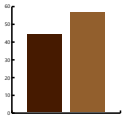
HOW TOURISTS ARRIVE IN ISRAEL



74.6% Independently

25.4% Organized trip

PREVIOUS VISIT TO ISRAEL



43.9% Previously visited Israel at least once)

56.1% First visit to Israel

ISRAEL'S MOST VISITED CITY

80.3% Jerusalem

74% Tel Aviv

AVERAGE EXPENDITURE PER TOURIST (NOT INCLUDING A PLANE TICKET)

$2426 Organized trip

$1079 Independent tourist

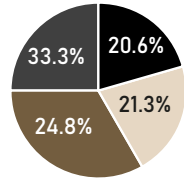
STATE REVENUES FROM INCOMING TOURISM IN 2019 (WITHOUT FLIGHT EXPENSES)

23 Bilion NIS

Drawing 5. *How Tourists Arrive in Israel. (Source: Author. Based on State Comptroller of Israel)*

DATA FROM 2019 INCOMING TOURISM SURVEY

TOURISTS AGE



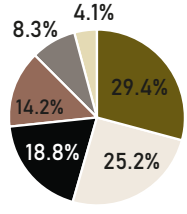
20.6% < 24

21.3% 25-34

33.3% 35-55

24.8% 55

VISIT'S PURPOSE



29.4% Visiting relatives & friends

25.2% Tourism & travel

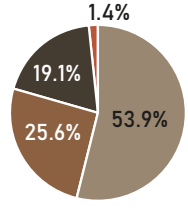
18.8% Pilgrimage

14.2% Recreation & pleasure

8.3% Business and errands

4.1% Other purposes

RELIGIOUS DIVISION



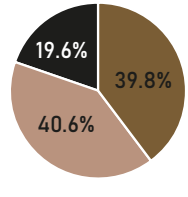
53.9% Christians

25.6% Jews

1.4% Muslims

19.1% Other

ARRIVAL FORMAT INTO ISRAEL



39.8% Arrived alone

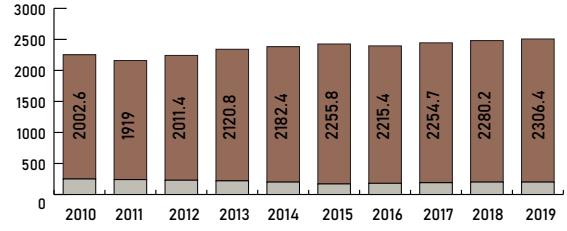
40.6% Arrived in pairs

19.6% Arrived in a family unit

Drawing 6. *Tourism in Israel Details. (Source: Author. Based on State Comptroller of Israel)*

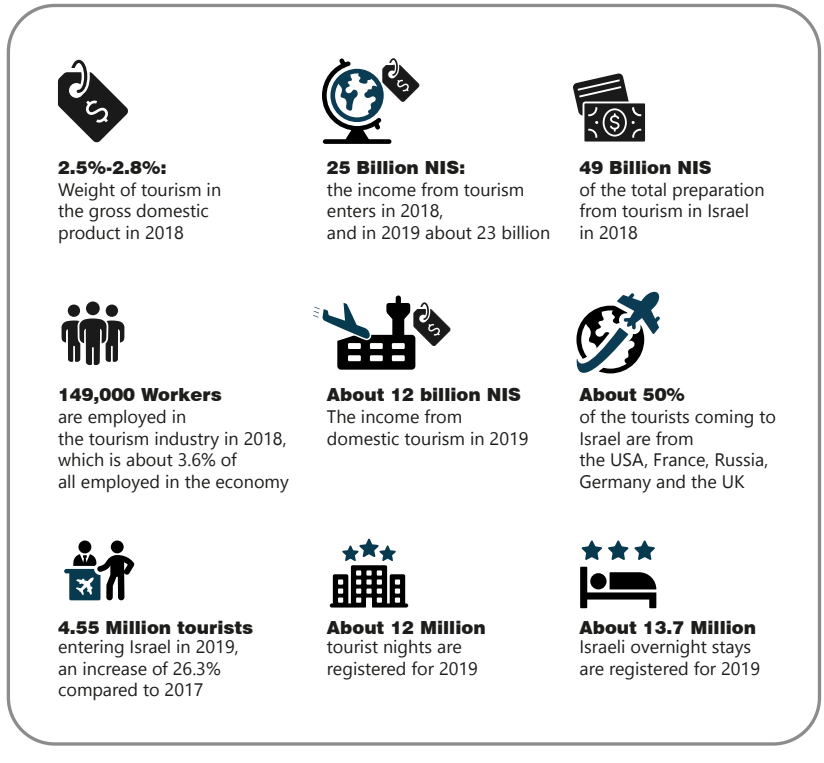
industry. These include infrastructure enhancements, the promotion of sustainable tourism practices, and the development of additional economic sectors to stabilize and grow the local economy. These efforts are part of a broader governmental agenda to promote economic development in Eilat, as outlined in the annual audit report by the State Comptroller (State Comptroller of Israel, 2021)

NUMBER OF GUESTS IN EILAT - INTERNATIONAL TOURISTS AND LOCAL TOURISTS 2010-2019



Drawing 8. *Tourism Details of Israel and Eilat,. (Source: Author. Based on State Comptroller of Israel)*

KEY DATA ABOUT TOURISM IN ISRAEL



Drawing 7. *Key Data about Tourism in Israel. (Source: Author. Based on State Comptroller of Israel)*

3.5 URBAN INFRASTRUCTURE SYSTEM AND SERVICES

3.5.1 TRANSPORTATION SYSTEM

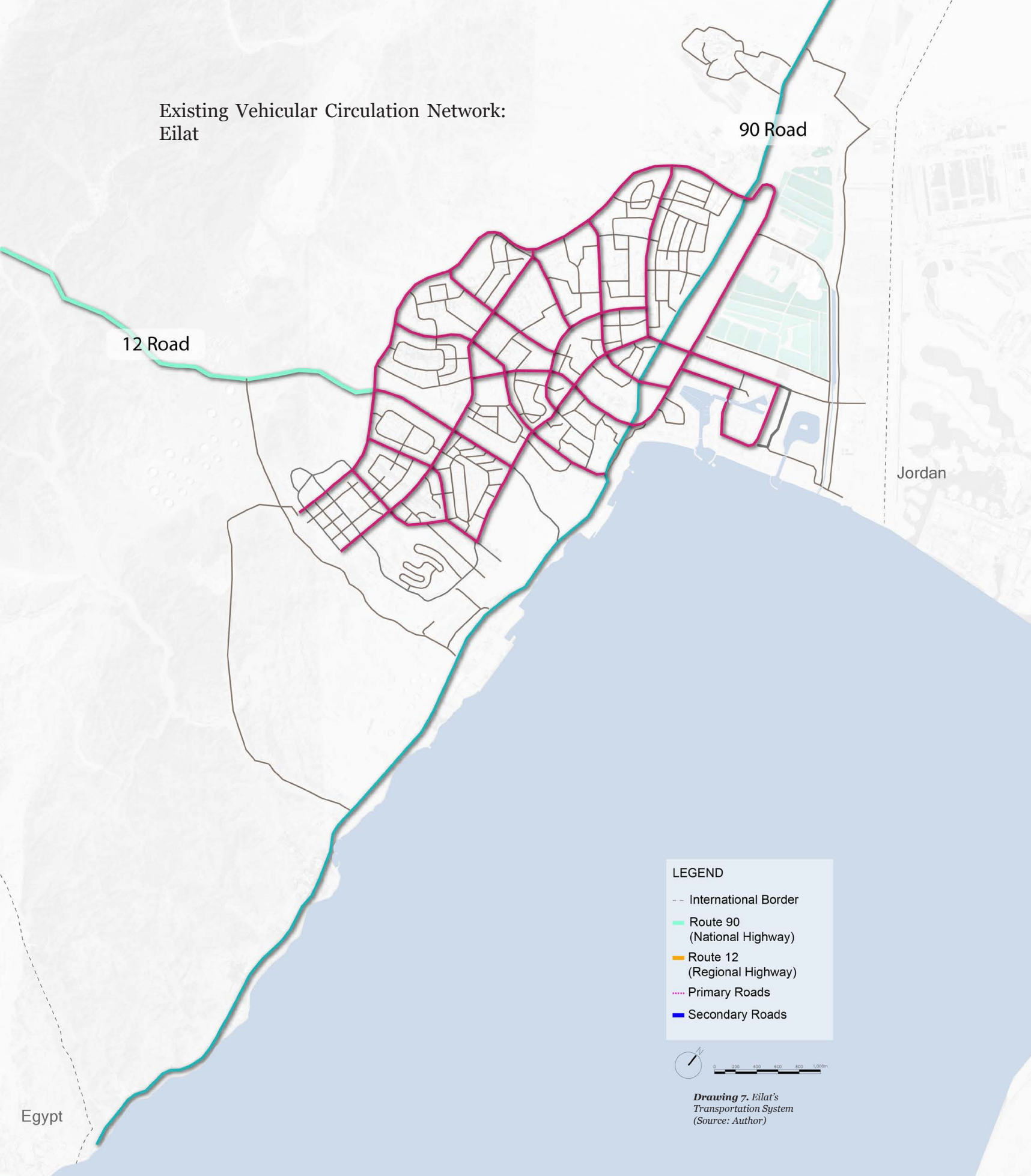
Eilat features a road system intricately designed to cater to both a thriving tourism sector and the everyday needs of its residents. The city's transportation framework is characterized by a well-defined hierarchy of road types, each serving distinct roles within the urban landscape.

At the forefront of Eilat's road hierarchy is Highway 90, the primary arterial road that is vital for the city's connectivity with the rest of Israel. This major north-south route facilitates high-speed, high-volume traffic and serves as the main conduit for goods and travellers entering the city. It runs parallel to the Arava valley, creating a direct link to major northern cities such as Tel Aviv and Jerusalem, thereby underpinning the city's economic and social integration with the country.

Complementing the arterial road are secondary roads like Route 12, which branches off from Highway 90 to provide access to the western parts of Eilat and continues towards the border areas with Egypt. This secondary road network is crucial for dispersing local traffic and facilitating access to less central areas, including natural reserves and some industrial zones. The integration of these roads helps manage traffic flows efficiently, ensuring that even less central areas remain accessible.

Within the city, the road network transitions into a more traditional grid pattern, especially prevalent around residential and commercial districts. This grid system is designed to distribute traffic from arterial and secondary roads efficiently, ensuring comprehensive accessibility throughout the city. Notably, Eilat uniquely operates without streetlights, relying instead on a network of roundabouts to manage traffic flow. In tourist districts, particular attention is paid to road design, often featuring loops and dead-end streets that facilitate pedestrian movement and minimize vehicular congestion near major attractions like hotels, beaches, and the promenade.

Despite its effective design, Eilat's road system faces challenges, especially during peak tourist seasons when the influx of visitors significantly increases traffic volume. The city responds with

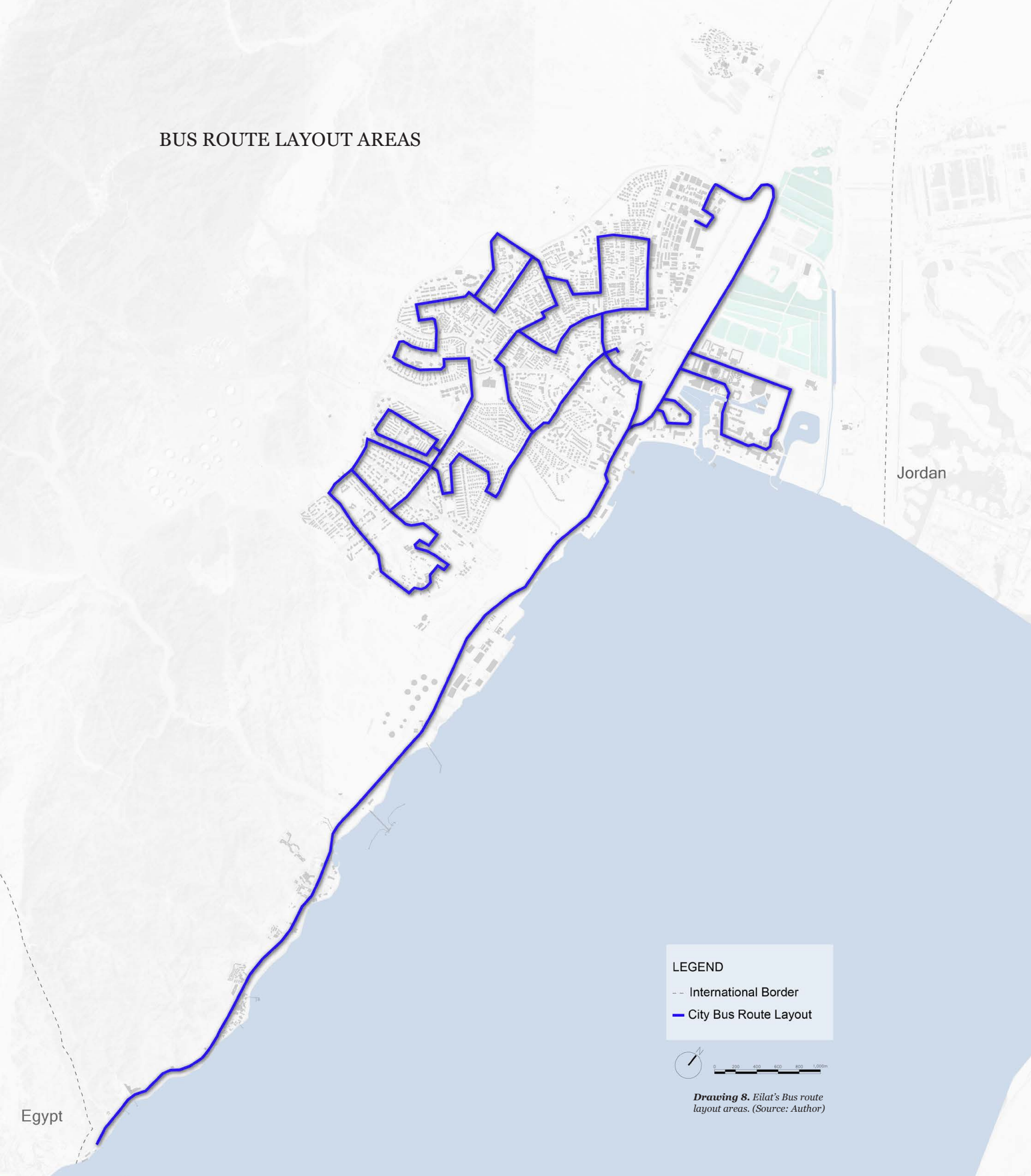


Drawing 7. *Eilat's Transportation System (Source: Author)*

adaptive traffic management strategies such as rerouting and the enhancement of public transportation schedules. Moreover, being a desert city, Eilat's road planning also includes measures for environmental sustainability, such as optimizing road alignments to preserve natural landscapes and integrating green technologies.

Overall, Eilat's road system exemplifies a well-balanced approach to urban transportation planning, emphasizing both functionality and environmental sensitivity, which supports its unique geographical and economic circumstances.

BUS ROUTE LAYOUT AREAS

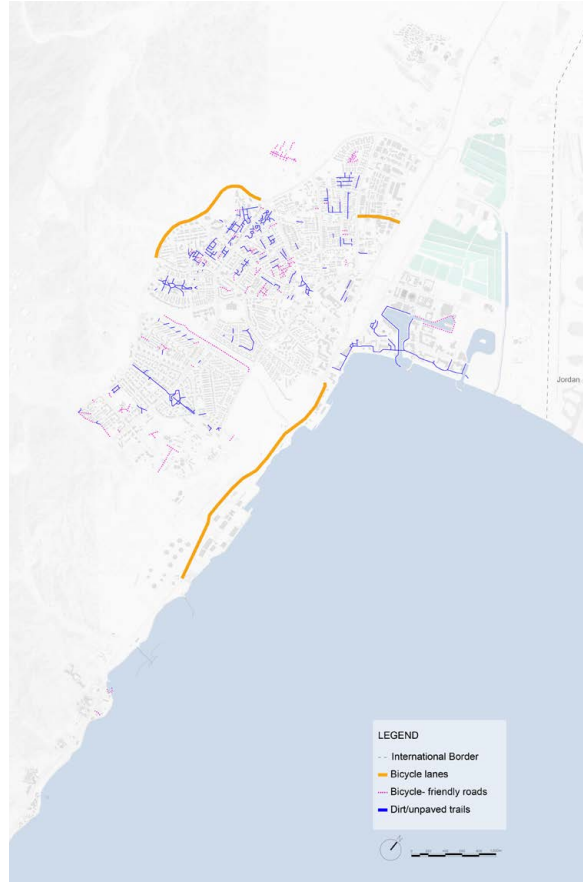


Drawing 8. *Eilat's Bus route layout areas. (Source: Author)*

3.5.2 PUBLIC TRANSPORTATION AND PEDESTRIAN INITIATIVES

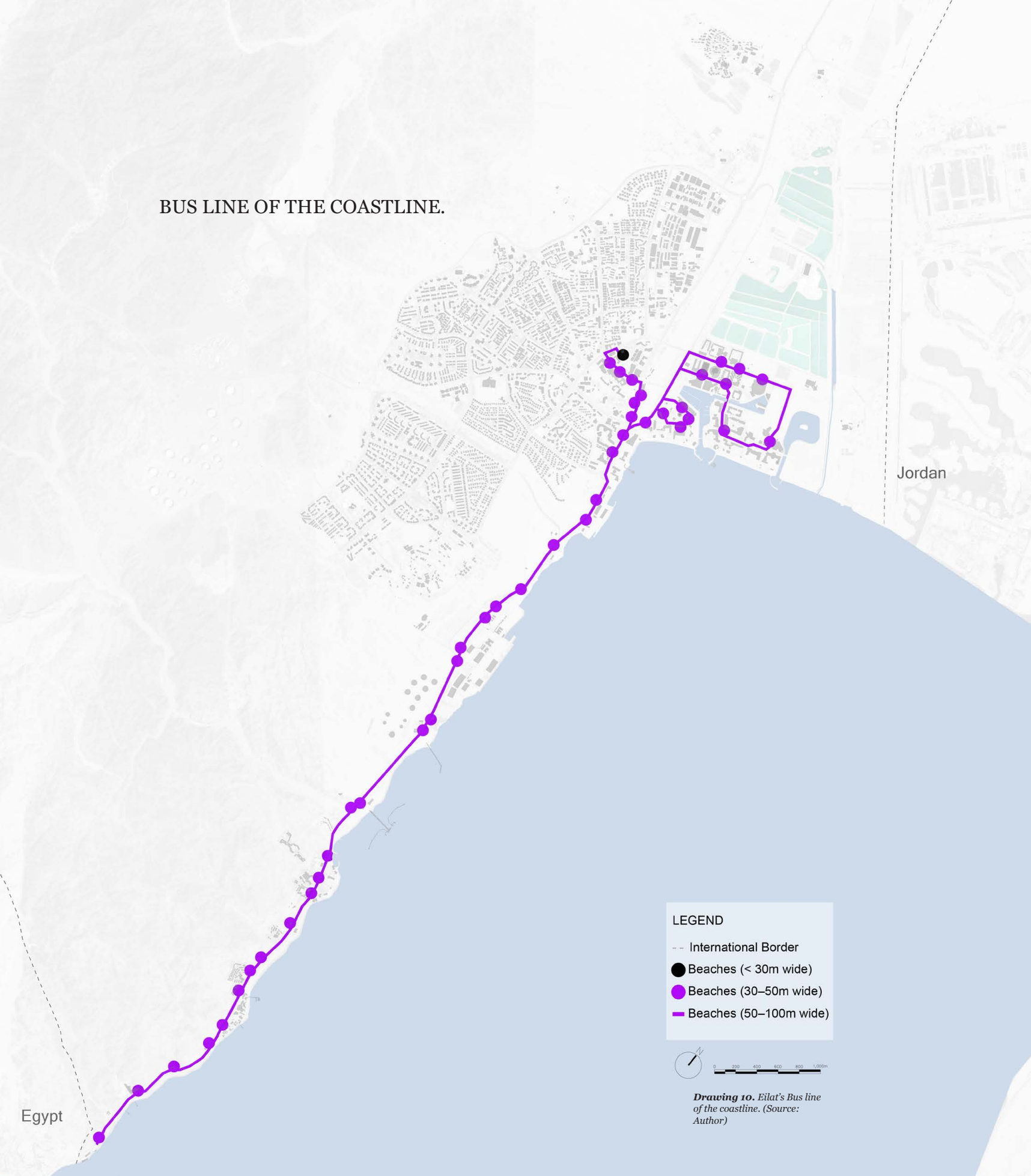
Eilat recognizes the importance of sustainable urban mobility and has invested in public transportation and pedestrian-friendly initiatives. The city has a range of public bus services that connect various districts within Eilat and provide links to other parts of the country. Efforts to promote non-motorized transportation have led to the development of bicycle paths and pedestrian walkways, encouraging residents and tourists to opt for eco-friendly modes of travel. These initiatives not only contribute to reducing traffic congestion and environmental impact but also enhance the quality of urban life by promoting active, healthy lifestyles.

BICYCLE ROUTES



Drawing 9. *Eilat's bicycle routes. (Source: Author)*

BUS LINE OF THE COASTLINE.



Drawing 10. *Eilat's Bus line of the coastline. (Source: Author)*

3.5.3 TERRITORIAL CONNECTIVITY: RAMON INTERNATIONAL AIRPORT

Ramon International Airport (est. 2019) represents a major structural shift in Eilat's territorial organisation. Situated 20 km north of the urban boundary, the facility consolidated regional aviation by replacing both the peripheral Ovda Airport and the centrally located Eilat City Airport. Equipped with a 3,600-metre runway and a capacity of 1.8 million annual passengers, it currently serves as the primary infrastructural gateway for the region.

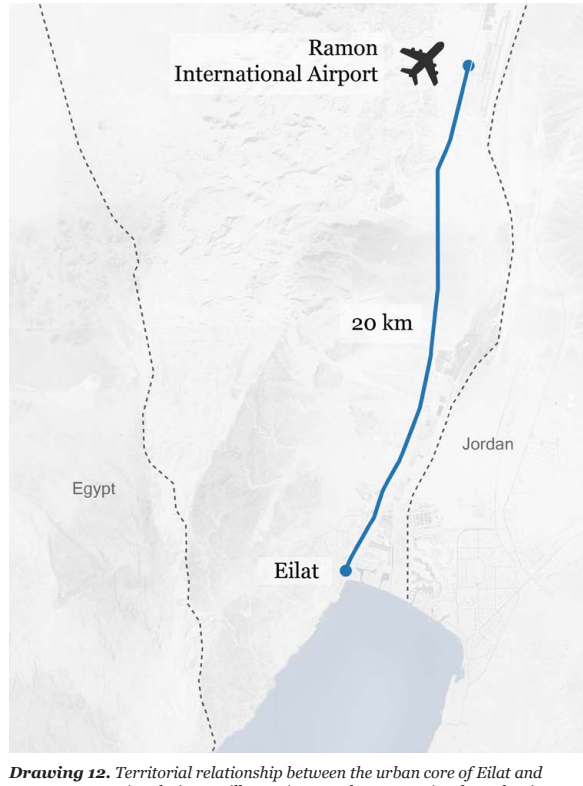
From an urban design perspective, relocating the airport outside the city centre resolved severe spatial fragmentation within Eilat's core. However, it also

SPATIAL DIMENSIONS: EILAT'S EXTENT

Drawing 11. *Eilat's City length (left) anf distance from the city to the airport. (Source: Author)*

The northern coastal strip, which is about 4.5 km long (toward the border with Jordan), and the southern coastal strip, which is about 11 km long (toward the border with Egypt.

RAMON INTERNATIONAL AIRPORT LOCATION - 20KM FROM CITY CENTRE



Drawing 12. *Territorial relationship between the urban core of Eilat and Ramon International Airport, illustrating a 20 km separation from the city centre. (Source: Author)*

shifted the infrastructural burden to the regional scale. The city's mobility strategy must now bridge this 20 km territorial gap. The success of Eilat's future growth relies on developing a cohesive transport hierarchy that efficiently connects this macro-scale aviation node to the primary vehicular network and, ultimately, to the localised pedestrian zones of the city.

3.5.4 TRAFFIC, PARKING, AND PUBLIC TRANSPORT IN EILAT

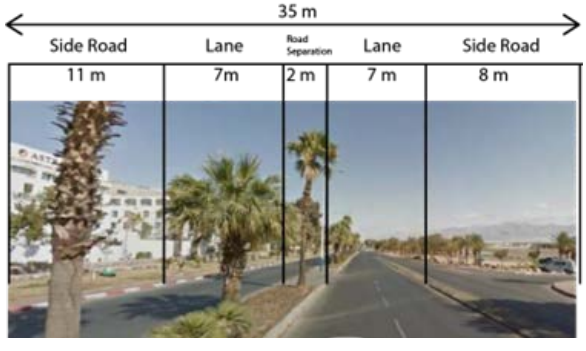
In Eilat, several areas act as primary sources of traffic, including the hotel zone and promenade, which are disconnected from the city centre by the vacating airport, generating movement for tourists and hotel workers. The old industrial area and the Horev Industrial Zone serve as employment hubs, drawing daily traffic from residents and visitors alike. Ramon Airport, the new aerial gateway, and the city centre (downtown Eilat), which is the geographical, municipal, and economic core of Eilat, generate activity throughout the day for both residents and tourists. The residential neighbourhoods, comprising the main geographical area of the city, also contribute to the traffic flow. The city's linear structure and the disconnection of zones mean significant movements through the city centre, whether as a starting point, destination or through traffic.

The road and street network in Eilat is clearly hierarchical. Route 90, the Arava Road, serves as the primary north-south axis, running along the southern beaches and the old airport, connecting employment centres and the city centre. Golani Brigade Boulevard, Tamar Boulevard, and Yotam Road extend from the city centre like three rays to the city's outskirts. Hativat Ha'Negev Boulevard and Eilot Street, continuing in Argaman Boulevard and Sheshet Ha'Yamim Boulevard, form semi-ring roads from the city centre to its edges. Eilat's typical street is characterized by a wide cross-section with broad lanes, providing a high level of service for private vehicle traffic. However, the right-of-way width and the resulting cross-section are not uniform across the city centre, often varying in sidewalk width.

The walking distances for pedestrians are significantly longer than the direct aerial distance between the origin and destination, whether due to the need to cross wide roads or as a result of changes in the direct walking path at intersections. Taking Tayarut Square as an example, located in the city centre, it represents the most extreme case: a traffic circle with a large radius that includes two lanes of travel and allows for unrestricted right turns. These characteristics nearly double the walking distance required to cross the intersection compared to the

TYPICAL CITY ROAD- 90 ROAD

Eilat's 90 road. (Source: Author)



Eilat's 90 road. (Source: Author)

direct distance. Additionally, this area is completely exposed to the sun.

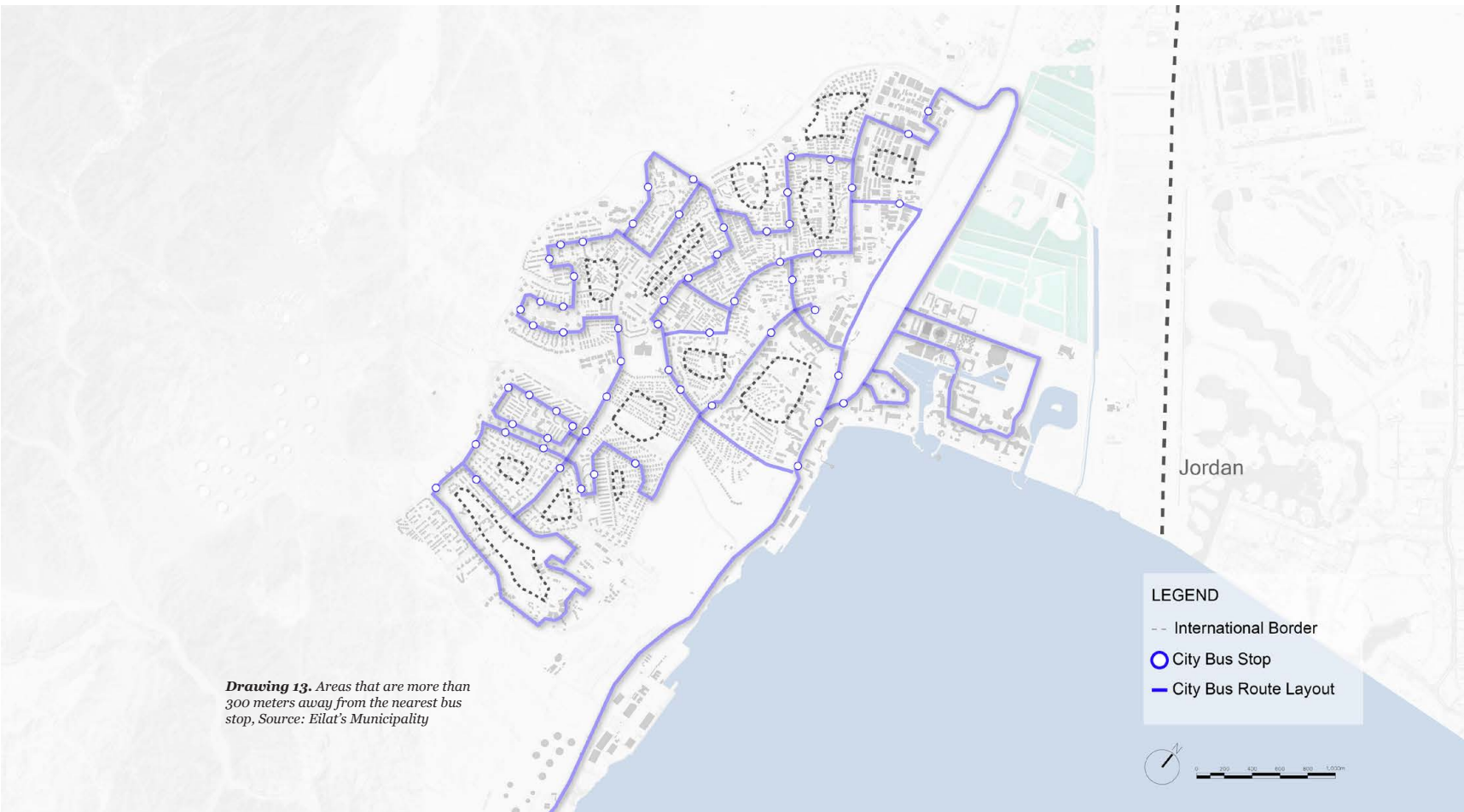
There is no comprehensive road network in Eilat that is accessible to soft transportation. Soft transport modes, including micro-mobility devices, could provide an attractive solution for short trips (up to about 10 km) in areas with reasonable topographic differences. Currently, there is no city-wide bicycle path network in Eilat, though there is a scenic peripheral trail mainly used for leisure, which has low transportation efficiency. A formal bike path exists on Route 90 south of the city centre. In most of the city, the topography allows for efficient use of bicycles as a daily means of transport. However, Eilat's hot weather requires special attention to shade.

The public transportation system in Eilat is characterized by several challenges affecting its efficiency and convenience. Firstly, spatial coverage is an issue, with some destinations being more than 300 meters away from the nearest bus stop, making access less convenient for passengers. Additionally, the service frequency is limited to up to three trips per hour, which can hinder spontaneous travel plans and significantly affect the usability of the service for residents and tourists alike. The quality of service is also perceived as low, with bus routes being complicated and winding, leading to longer travel times when compared to private vehicle use. Despite these challenges, the central bus station, which is the departure point for most urban and intercity services, is strategically located in the northern part of the city centre. The operational hours for buses are relatively broad, running from 6:00 AM to 10:00 PM, and are extended into the night through the night bus services. Regular service is maintained during weekends,

offering some flexibility. Furthermore, with the inauguration of the new airport, four bus lines were established to connect the airport with the city and the Taba crossing. Two of these Bus lines, which provide service to the Taba crossing and the hotel area, pass through the city centre, facilitating a connection between the city's centre and the new airport. This development represents a significant step towards improving Eilat's public transportation network, albeit challenges remain in ensuring it meets the needs of all users effectively.

The existing transport system is highly accessible for private vehicles, reflected both in the wide right-of-way designated for motor vehicle traffic and in the generous parking supply throughout the city. This high level of service for private vehicles comes at the expense of other means of transport and pedestrian movement. The low service level for bus travel reduces its attractiveness as a public transport option.

AREAS THAT ARE MORE THAN 300 METERS AWAY FROM THE NEAREST BUS STOP



Drawing 13. *Areas that are more than 300 meters away from the nearest bus stop, Source: Eilat's Municipality*

2.6 CITY WATER MANAGEMENT

Eilat relies heavily on advanced water management techniques due to its arid climate and limited natural water resources. The primary sources of water for Eilat are desalination and water recycling. Desalination plants, which convert seawater to potable water, are crucial, supplying most of the city's needs. Eilat also employs sophisticated water recycling systems to treat wastewater, which is used for agricultural and landscape irrigation, contributing to water conservation efforts.

The city's journey in addressing water supply challenges began in the 1960s and 1970s, spurred by rapid population growth and burgeoning tourism. Initially reliant on limited groundwater and periodic water imports, Eilat sought more sustainable solutions as technological options became available. The early desalination efforts primarily employed multi-stage flash distillation, but over time, as technology advanced and the city's needs grew, Eilat transitioned to more efficient reverse osmosis processes. This evolution reflects a broader shift within Israel, where technological innovation has been pivotal in addressing the challenges of water scarcity.

Desalination is a cornerstone of Eilat's water strategy, using reverse osmosis technology to convert seawater into potable water. This method involves filtering seawater through semi-permeable membranes to remove salts and impurities, significantly reducing dependence on natural freshwater sources. The city's desalination plants collectively produce approximately 13 million cubic meters (MCM) of water annually, with plans to expand capacity to between 80 and 90 MCM per year by 2020 to meet future demands. These advancements ensure a reliable water supply and underscore Eilat's commitment to sustainable urban development (Document on Eilat Desalination Plant Operations, 2021).

In addition to desalination, Eilat places significant emphasis on water recycling. The city's advanced water recycling systems treat wastewater to standards safe enough for agricultural irrigation and urban landscaping. This strategy conserves potable water for drinking and domestic uses and supports the city's agricultural sustainability and the maintenance of green spaces, which is crucial for its tourism appeal. Recycled water is critical to Eilat's broader environmental strategy and its commitment to sustainable urban planning (Document on Licences and Permissions for Water Recycling, 2020).

Eilat's integrated water management

strategies are designed to meet the city's current water needs and anticipate and prepare for future challenges. The city's proactive approach, involving continuous technological improvement and capacity expansion, ensures resilience amid regional water scarcity challenges and sets a benchmark for similar arid regions globally.

Figure 9. *Eilat's desalinationLocation. Source: Author*

DESALINATION IN 1964

Figure 6. *First desalination plan in Eilat in 1964. Source: Mekorot*

EILAT DESALINATION

Figure 7. *Eilat's desalination. Source: Mekorot*

EILAT'S DESALINATION AERIAL VIEW

Figure 8. *Eilat's desalination. Source: Mekorot*

2.7 MUNICIPALITY FUTURE PLANS

2.7.1 MUNICIPAL CITY CENTRE PLAN

The city has implemented a strategic planning framework aimed at transforming the city's core into a vibrant hub for urban development. This initiative introduces a diversified mix of land uses, including hotels, retail spaces, residential units, public buildings, employment opportunities, and open green spaces. The primary objective of this framework is to cultivate the public spaces into high-quality, shaded, and pedestrian-friendly zones that foster a seamless connection between the city's heart and its broader surroundings, enhancing both functionality and liveability.

Spanning approximately 145 hectares, the city centre plan stretches from the southern to the northern end along the central coastal strip. It is divided into four distinct sub-areas, each contributing unique elements to the overall urban tapestry. Central to this plan is Ha'Tmarim Boulevard, envisioned as a mixed-use artery that not only serves as a lively urban spine but also bridges the newly developed heart of the city with its older residential neighbourhoods. This integrated approach aims to revitalize the city's central areas, promoting an inclusive urban environment where community, commerce, and culture can thrive in harmony.

Eilat's city centre is undergoing a transformation, mapped out across diverse zones totalling approximately 1,370,000 square metres. Central to this is Area A1, "The Heart of Eilat," which is a sprawling 700,000 square metre area, including Ha'Tmarim Boulevard, where commercial and hotel spaces dominate, transitioning into residential zones closer to the city's historic neighbourhoods. This area is effectively split into two: the eastern section near the old airport's southern edge and the western part, marking the current city centre.

Adjacent to this is "The Central Beach" area (A2), a 200,000 square metre space that extends from the western heart of the city. It mirrors the commercial and hotel density of its neighbour, serving as a vital link between the city's seafront and its residential backdrop.

Further afield, Area A3 spans 230,000 square metres around the existing military base, positioned strategically between residential zones and the beach. Development plans here include a significant reroute of Route 90, embracing national planning visions and consolidating military functions into a compact 47,000 square metre space.

Completing the city's envisioned core, Area A4 stretches across 240,000 square

metres of beachfront, from the military to the civilian ports, echoing A3's characteristics. It's designed to bolster neighbourhood access to the sea, further blending Eilat's urban fabric with its natural coastal allure.

This practical approach aims to rejuvenate Eilat's city centre, enhancing its role as a lively, accessible hub, integrating commercial, residential, and recreational spaces seamlessly with the city's stunning coastal environment.

EILAT'S MUNICIPALITY FUTURE PLAN FOR THE CITY CENTRE

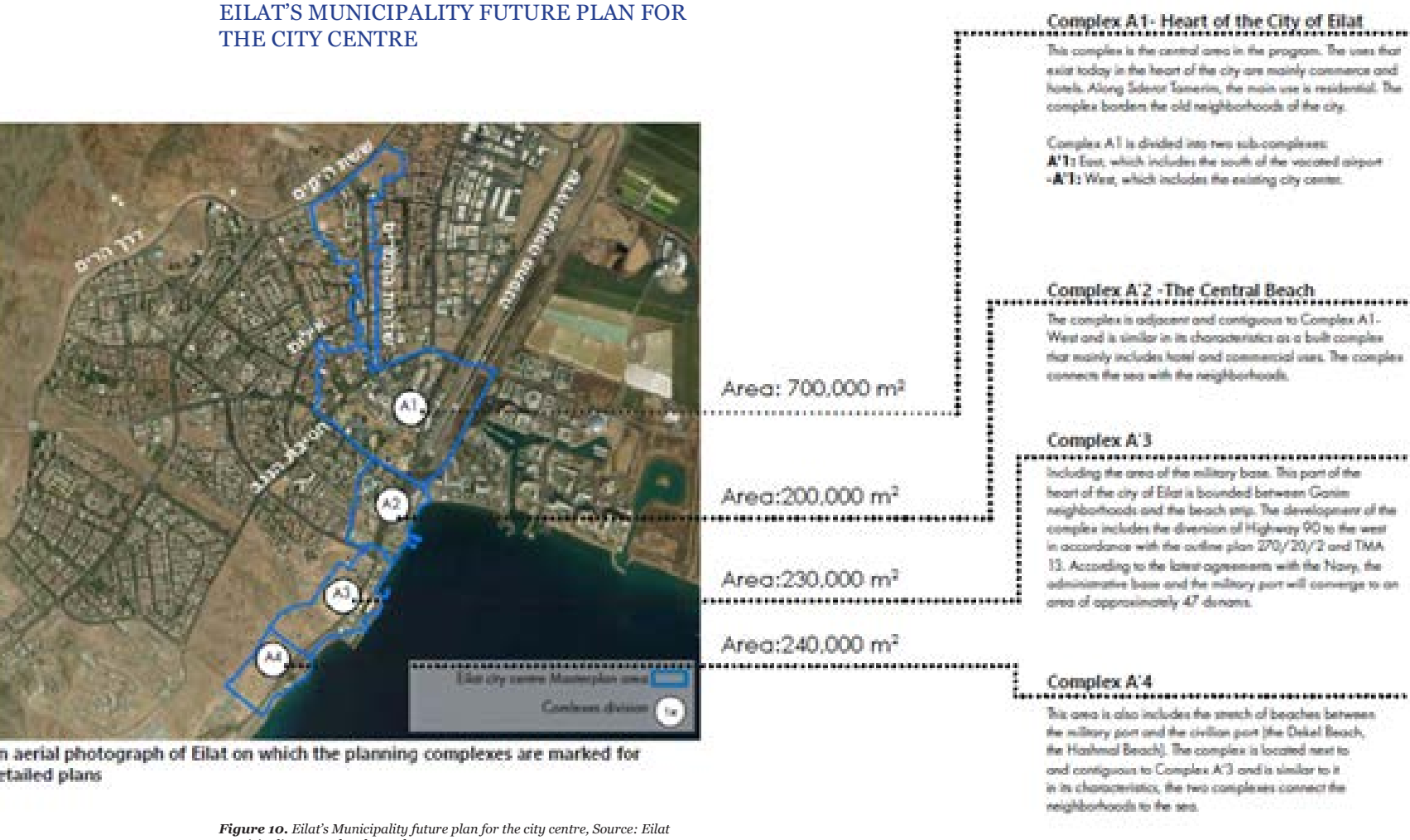


Figure 10. *Eilat's Municipality future plan for the city centre, Source: Eilat Municipality. Translate by Author*

2.9.2 COASTAL MUNICIPALITY PLAN

The vision for the development of Eilat's coastline strip proposes a perception of complementary contrasts that will redefine the experience the city offers to its visitors. Alongside the rejuvenation of the northern coastal city area as a vibrant urban tourist space pulsating with life at the highest standards, the southern coast's 'EIN SOF' will be developed as a unique natural tourist space offering tranquillity and serenity amidst the desert landscape. All this, to preserve Eilat's environmental uniqueness, open the city to new diverse target audiences, and renew its attractiveness as a leading national and international tourist destination.

Given the importance of the unique convergence between mountain and sea on the southern coast and the significance of the marine ecological system, additional development and human activity in the 'EIN SOF' area must have a low ecological and environmental footprint wherever possible. Simultaneously, efforts should be made to minimize the various existing impacts of human activity on the marine ecological system.

The Eilat municipality has outlined a comprehensive planning strategy aimed at revitalizing the city's coastline. A central principle of this strategy is the creation of continuity along the entire waterfront. This involves developing a continuous walking system that integrates both a well-developed main promenade and accessible pathways along the beach strip, ensuring both preserve natural values and enhance the area's connectivity.

The plan is to transform the main promenade into a thoroughfare that allows for seamless and accessible movement across the entire coastline, maintaining clear sightlines to the sea and easy access to beaches. The design focuses on creating an inviting, pedestrian-friendly environment that supports local beach culture and includes a continuous bike path alongside, promoting safe and quality connectivity.

To further ensure direct public access to the waterline, the municipality intends to establish an open walking sequence right at the beach-front. This will facilitate uninterrupted pedestrian flow on the sandy stretches, with provisions for accessible pathways in urban beach areas where current barriers exist.

Additionally, the promenade design will incorporate extensive shading solutions, including tree canopies and built structures, to create a comfortable micro-climate conducive to leisurely walks and stays. This aspect of the design will

feature sustainable desert landscaping, incorporating drought-resistant local flora to enrich the aesthetic and ecological value of the coastline.

For areas currently restricted to public access due to infrastructure, security, and research activities, the municipality has designated these as zones for future exploration and potential redevelopment. The aim is to examine spatial and managerial alternatives that could integrate these areas into the overall continuity of the coastline.

Moreover, the strategic endpoints of the promenade at the southern and northeastern tips of the city, aligning with

STRATEGIC PLAN VISION FOR EILAT COASTLINE STRIPE

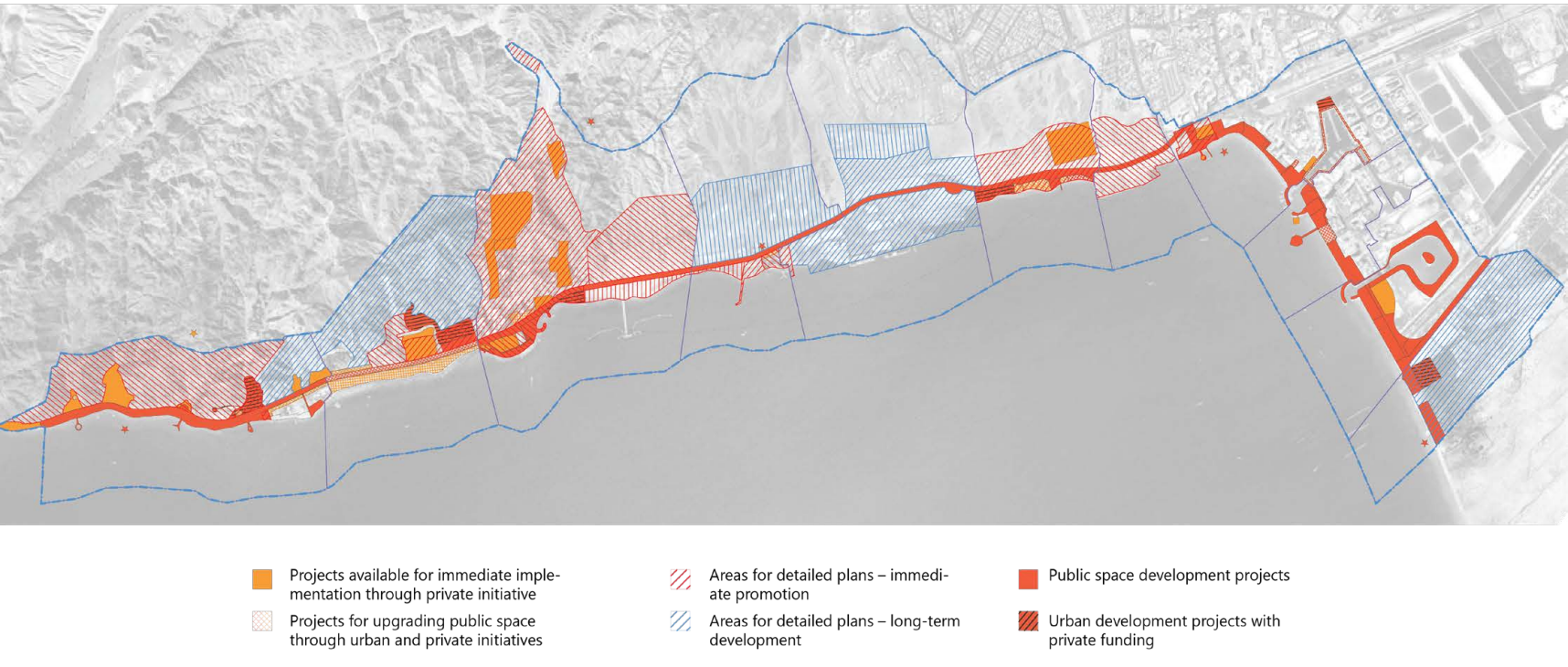


Figure 12. *Strategic Plan Vision for Eilat's Coastal Strip, Source: Eilat's Municipality*

Israel's international borders, are seen as key opportunities to extend pedestrian connectivity into neighbouring countries and improve interactions with adjacent coastal strips. This ambitious plan by the municipality is designed not only to enhance the urban landscape but also to position Eilat as a leading national and international tourist destination by leveraging its unique coastal characteristics.

FUTURE PROMENADE PLAN

Figure 13. *Promenade plan, Source: Eilat's Municipality*

Looking forward, Eilat is poised to continue its socio-economic growth. It plans to expand its tourism sector further by attracting luxury and eco-tourism projects, enhancing its port facilities, and promoting research and innovation

GUIDING FRAMEWORK FOR NATURE TOURISM DEVELOPMENT – PROMENADE AND DESERT HOSPITALITY

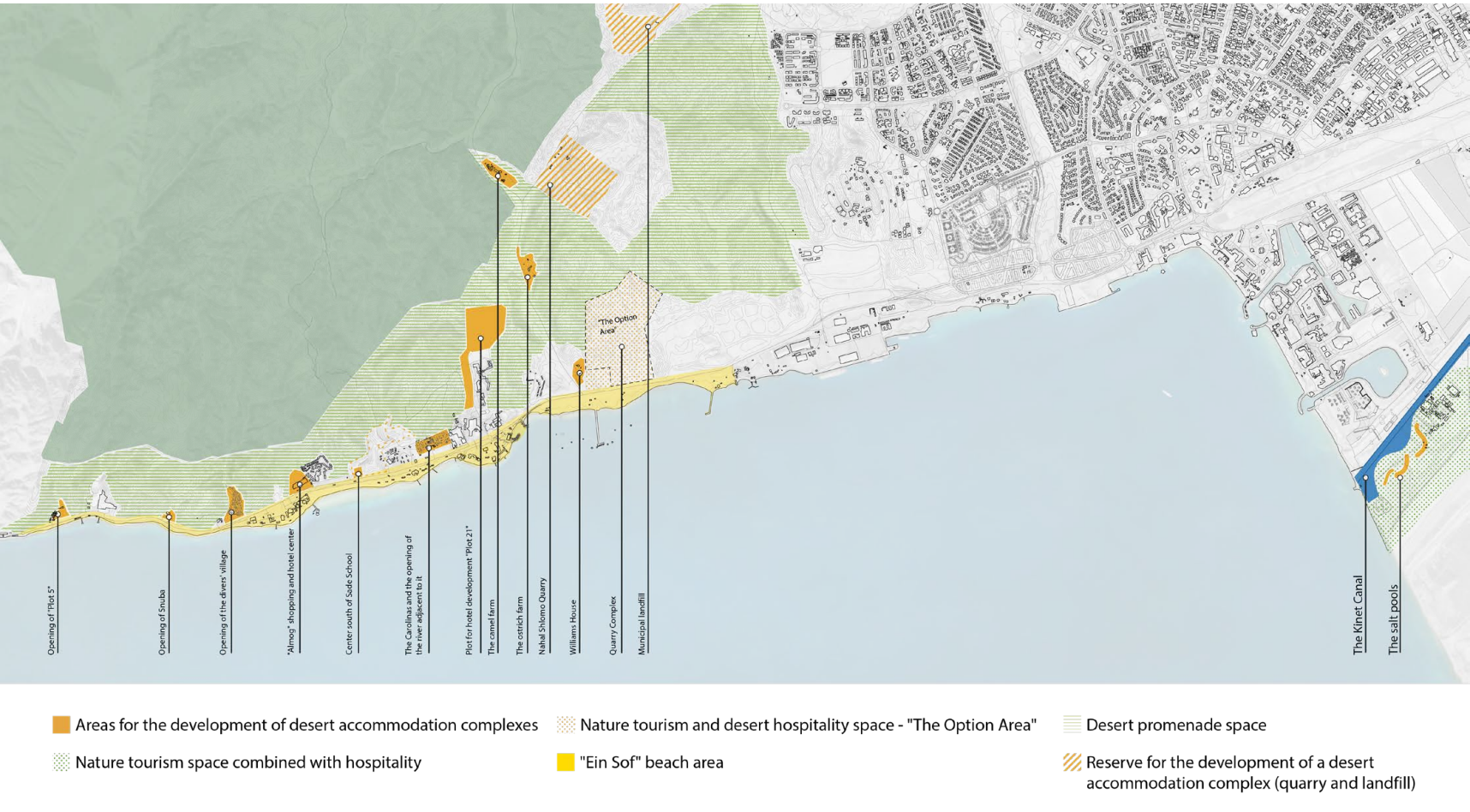


Figure 14. *Guiding Framework for Nature Tourism Development – Promenade and Desert Hospitality, Source: Eilat's Municipality*

in marine and desert sciences. The city's ability to adapt to changing economic conditions and continued focus on sustainable development are key to ensuring its prosperity in the years to come. Eilat's socio-economic overview reflects a city that is not only a tourist paradise but also a dynamic and evolving urban centre with a promising future.

GUIDING FRAMEWORK FOR THE PRESERVATION AND DEVELOPMENT OF THE LANDSCAPE AREA

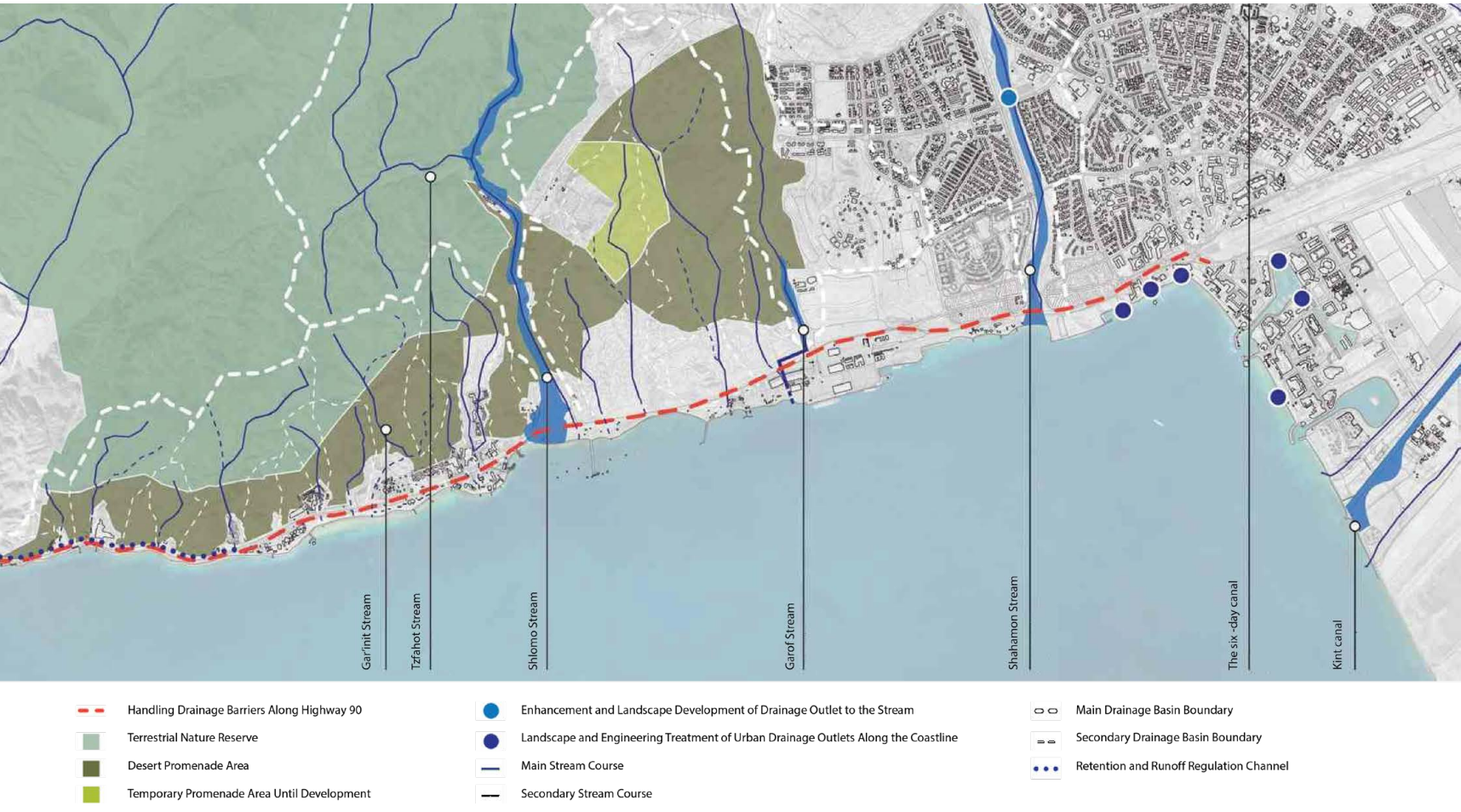


Figure 15. *Guiding Framework for the Preservation and Development of the Landscape Area, Source: Eilat's Municipality*