

MELAKA

Shaping a Compact, Efficient,
and Harmonious Urban Form



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1818 H Street NW
Washington DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org

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Cover photo: Malacca eye on the banks of Melaka river. Credit: [snidamarwani](#).

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Sustainability Outlook Diagnostic
Supporting Report 4 Conference Edition

MELAKA

**Shaping a Compact, Efficient, and Harmonious
Urban Form**

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Supporting Report 4: Shaping a Compact, Efficient, and Harmonious Urban Form consists of the following three related sections: (a) Shaping Melaka's Urban Form; (b) Harmonizing Melaka's Urban Fabric; and (c) Leveraging Data for Integrated Planning.

Shaping Melaka's Urban Form

Introduction

Melaka is a rapidly growing 21st century city in transition, increasing its population by 40 percent in the last 15 years. The state reached 902,881 people in 2015 – which is expected to increase by 70 percent in the next 20 years (State of Melaka 2018). This increasing population has also turned from rural to urban as urban employment increased from 43 percent in 2000 to 92 percent in 2014. Rapid growth in population has fueled demand for new urban development, improved infrastructure and better services and facilities. Melaka has the vision to become a green city focused on addressing the important climate change and green growth agenda.

The economic performance of Melaka over the last 10 years has been impressive. Gross Domestic Product (GDP) grew at an average annual rate of 6.65 percent. Melaka recorded a GDP growth of 8.1 percent in 2017, the second highest in Malaysia. Its progress in reducing poverty has also been remarkable, with the proportion of households living in poverty decreasing to less than 2 percent. These advances have made Melaka a global success. Looking ahead, Melaka's goal is to transform from a middle-income economy into a high-income economy, while ensuring that growth is sustainable and inclusive.

Shaping efficiently its future urbanization is an essential enabling dimension of this vision for Melaka. Evidence linking efficient spatial planning and higher economic density with agglomeration economies, higher productivity and overall economic growth is well established. To achieve its economic goal of becoming a service economy, Melaka must create proximity and facilitate the flow of knowledge that fosters innovation. The spatial shape of Melaka must make it a center of productivity, human capital and greater access to markets.

Yet Melaka can grow in different ways. Cities can grow in different ways that will affect their competitiveness and livability.¹ They can be successful at increasing economic efficiency through agglomeration, creating opportunities, providing services for residents and enhancing public spaces to create vibrant and attractive places to live, without overburdening public finance by excessive infrastructure costs. But excessive provision of land for development and insufficient investment in public transport can adversely result in sprawl, traffic congestion, and low economic productivity. For the last 10 years, Melaka has been growing at much lower densities than most Asian cities. Yet the State Structure Plan 2035 envisions the need for an excessive provision of developable land. This entails risks of inefficient urban form, fragmentation, loss of economic agglomeration, infrastructure-cost increases, and environmental damage that could ultimately lead to an increase in CO₂ emissions and energy consumption.

Adopting an integrated approach to land use and urban planning between geographical scales and economic sectors is critical to the orderly development of a sustainable city. As Melaka looks towards the future, integrated urban planning will play a key role as a driver of efficiency for economic growth. Melaka State needs a comprehensive and coordinated strategy and action plan for urbanization to enhance its competitiveness, both in terms of economic activity and livability. This would strengthen its ability to become a center of innovation and strong economic clustering, as well as an attractive place for people, businesses and jobs, and contribute to achieving the long-term economic development goals outlined in the Melaka State Structure Plan 2035. Melaka needs to plan for compact and dense development. This could lead to increased land values in strategic locations, which in turn could be captured to finance public transportation infrastructure, improvements to the public realm, and affordable housing.

¹ Malaysia's development strategy has recognized the role of cities as the nexus for economic growth and for attracting mobile talent, jobs, and capital. Policies to operationalize this vision of growth have been included in the New Economic Model, which is driven by 'innovative processes and cutting-edge technology, supported by a healthy level of investment and talent, for high value-added goods and services'.

Box 1 SWOT Diagram

The quadrants below summarize the SWOT analysis for Melaka's land use and urban form considerations. Further elaboration is shown in Annex B.

<p>Strengths</p> <ul style="list-style-type: none"> • Long-term vision and strategic plan, with budgeted priority actions • Multiple agencies and civil society participatory processes • Goals and indicators to monitor progress • Fast population and employment growth • Anticipated doubling of GDP/capita and multiplication by 5 of GDP catapulting Melaka in middle-high income cities 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Coordination and timing challenges between local and federal agencies and plans • Weak integration of planning dimensions (e.g. land use and transportation) • Insufficient specialized staff • High land consumption and much lower densities than Asian counterparts • Urban form fragmentation • Very low economic density and low economic agglomeration
<p>Opportunities</p> <ul style="list-style-type: none"> • Improvements in capacity, coordination and urban service delivery • Efficient use of the present developed land through infill growth • Creation of a growth boundary to protect agriculture land and ecosystems and limit land expansion • Polycentric compact growth • Integration of transport and land use with TOD planning 	<p>Threats</p> <ul style="list-style-type: none"> • Excessive amount of land classified as developable in Structure Plan 2035, leading to potential lower densities • Higher costs of low density for citizens and public finance (infrastructure costs) and reduced economic productivity • Negative impacts of low density on congestion and transportation emissions

This section of the supporting report elaborates the following key message regarding Melaka's land use and urban form:

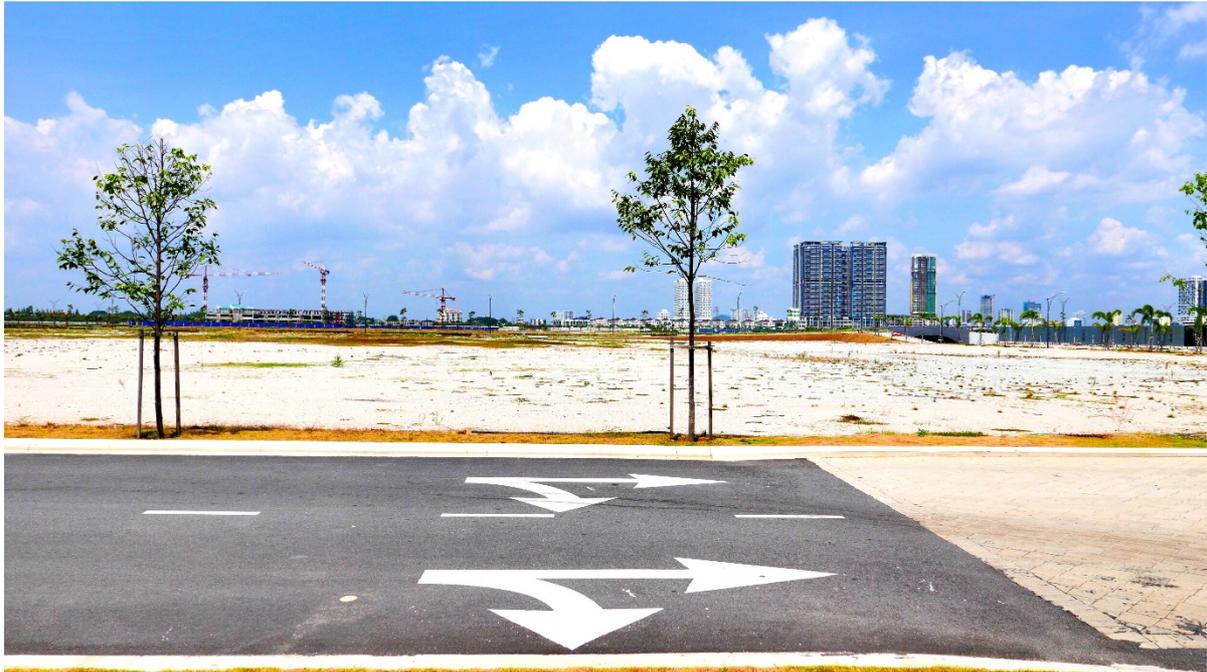
4-1 Reduce the oversupply of developable land.

The following key actions are recommended for Melaka:

4-A Incentivize higher density, mixed use, green, and compact developments with flexible land use regulations; and

4-B Shape a compact polycentric urban form and develop well-connected nodes.

Image 1 Vacant lot of reclaimed land at Encore Melaka



Source: "Road to nowhere, Encore Melaka, Malaysia" © Mark Tindale

Key Message 4-1: Reduce the oversupply of developable land

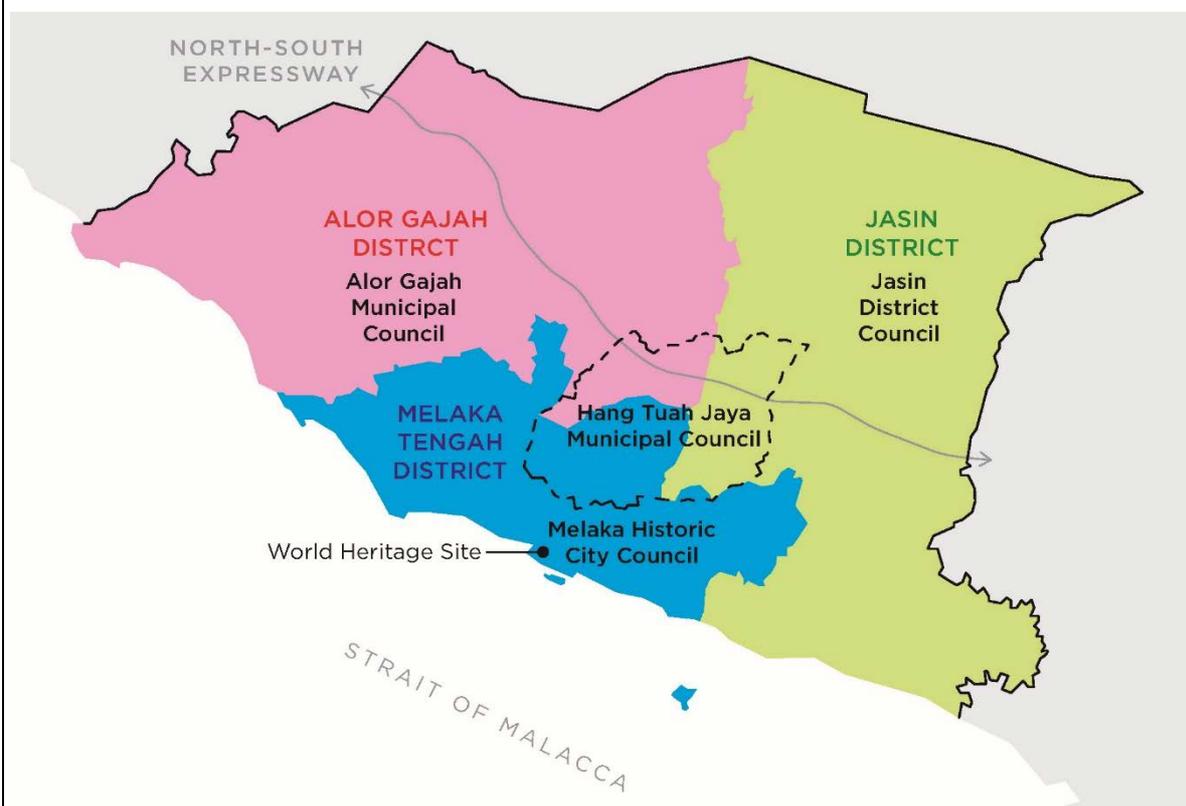
Melaka Spatial Dynamics Analysis

The spatial analysis in this section is conducted on land use and spatial structure, examining how urban land is allocated among different uses (residential, agricultural, industrial, commercial, etc.), and how land use patterns and different densities (economic, population, jobs) changed over time and across Melaka State's three districts. Information regarding the districts is found in box 2.

Box 2 Regional and Local Authorities in Melaka State

Melaka State comprises the three districts of Melaka Tengah, Jasin, and Alor Gajah and is administered by four local authorities. A map of the districts and municipalities is shown in figure 1.

Figure 1 Melaka State Administrative Divisions



Source: Adapted from State of Melaka 2018.

Melaka's economic growth and land expanse offer great advantages, but over time urban development has not fully optimized the opportunity. With an area of 1,663 km² – more than double the size of Singapore, yet having a population only one sixth of Singapore – residents benefit from 10 times more land and related natural resources per capita than Singaporeans. However, if not planned efficiently, this resource may turn into a liability. As a city-state, Singapore's resource constraints – land, water, energy – have long motivated Singaporeans to find better ways to plan and design their city, and to optimize the use of resources to support their needs. However, quite the opposite, poorly planned urban expansion that results in low densities and segmented land use increases the cost of extending infrastructure to outlying areas and can worsen traffic congestion and air pollution.

The analysis identifies the following major constraints to Melaka's economic competitiveness: 1) low economic density; and 2) high transport costs.

Economic density is a major contributing factor to productivity in cities. Global experience suggests that economic density², measured by the number of jobs per square kilometer or gross domestic product (GDP) per square kilometer, leads to agglomeration economies and increases in productivity. Density reduces transport costs, facilitating and reducing the cost of transporting goods and people. Density reduces communication costs by enabling frequent face-to-face interactions that are important for the exchange of ideas and the creation of trust, which promotes innovation and productivity. Density promotes the transfer of knowledge between workers and between firms. Economic density is essential for the transition to a knowledge-based service economy and tends to occur when cities move to a more mature phase of development. Service economies generally have higher economic densities than industrial economies for the following reasons: savings in services require less land per employee³; given external economies, business services have greater potential for agglomeration, with businesses serving each other⁴.

Increasing economic density is essential to strengthen Melaka State's economy and help Melaka transformation from a middle-income state to a high-income state. Melaka's economic density is relatively low compared to other cities in East and Southeast Asia. This limits the benefits of agglomeration and prevents transformation into a service economy. An inefficient urban form leads to high transportation costs and negative environmental impacts. The sprawling urban form and car-dependent connectivity of Melaka State can affect quality of life, affordability and environmental sustainability.

Low density and fragmented urban expansion increase transportation costs. Although specific data have not been available for Melaka, it is possible to use other Malaysian cities as an indirect indicator of transport costs. According to a World Bank study, transport costs in six Malaysian cities are high compared to other East Asian cities. The share of transport costs in household spending in Kuala Lumpur is 59 percent higher than in Hong Kong and Tokyo, and the share of transport costs in household income in Kuala Lumpur is 50 percent higher than in Hong Kong and Tokyo (Baker and Lee 2015). This is due to flat population density gradients as a function of city center distance. Urban sprawl and the very low share of public transport in urban transport mean that Melaka faces longer travel times for public transport than for private transport, as well as congested roads and highways. As a result, the use of public transport is very low and the corresponding high use of private vehicles aggravates the problem. The modal share of public transport in Melaka is only 1 percent, compared to 62 percent in Shanghai and Singapore. Traffic congestion is also a serious problem in reducing economic productivity and contributing to greenhouse gas emissions. Temperature records over the last 40 years have already shown that temperature anomalies in Malaysian cities have increased faster than the global average (Baker and Lee 2015).

² Economic density, defined as GDP in purchasing power parities per km², rises with the level of development. The densest places in the world are in the richest countries. In 2005, Dublin, London, Paris, Singapore, and Vienna ranked at the top, with more than USD 200 million in gross product per km².

³ Banks, insurance companies, hospitals and schools can operate easily in high-rise buildings with high density.

⁴ Every bank needs advertising. every advertising agency needs a bank account. The potential for codependency and agglomeration is therefore intrinsic to services.

Box 3 Three Complementary Metrics for Urban Land and Densities

The following spatial analyses are based on Melaka Structure Plan, on various international sources and on estimates of artificial land cover by remote sensing using satellite images and GIS layers. The population density of a built-up area does not reflect how dispersed the urban fabric is. This means that an urban area with “leapfrog” development, in which several clusters of development are separated by expanses of unbuilt land would show the same density as one in which the same development was contiguous. These differences are better captured by other metrics, such as the saturation index, which is at a maximum when the urban extent contains no open space at all and at a minimum when it contains only open space. In order to provide detailed insights on land use dynamics, three complementary metrics for urban land are used. The saturation index for Melaka, calculated as the ratio of the built-up area to the urban extent, is 0.66, reflecting higher levels of fragmentation outside the central city.

Developed land (excluding railways and roadways) has been calculated from Melaka State Structure Plan⁵, and comprises residential, commercial, industrial, institutional, open space and recreation, transport facilities and utilities (excluding roadways and railways)⁶. It is 234 km² and covered about 14 percent of Melaka State in 2013.

Built-up area corresponds to: saturated architecture land and land dedicated to transportation (roads and rail). It was 332 km² and covered about 20 percent of Melaka State in 2013.

Urban extent. The addition of built-up area with captured and fringe open land is what is called urban extent. Its expansion reduces agglomeration and directly impacts transportation and infrastructure costs. Urban extent is 450 km² and covers 27 percent of Melaka State. This leads to three complementary definitions of density:

Formulas:

Developed land (excluding roads and rail) density =
(number of people or jobs or GDP)/Developed land (excluding roads and rail) area

Built-up area density = (number of people or jobs or GDP)/ built-up area

Urban extent density = (number of people or jobs or GDP)/ urban extent area

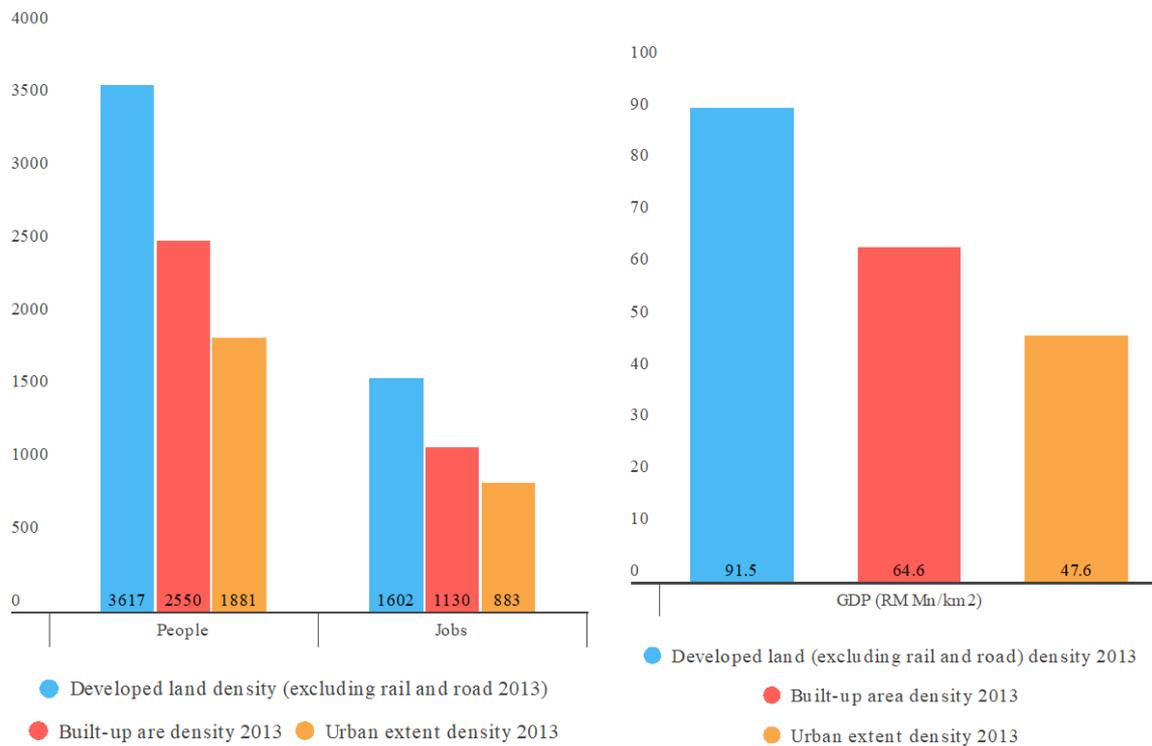
Melaka’s density is less than half the average of those of South East Asian cities. The average built-up area population density for all urban areas with populations greater than 100,000 in East Asia was around 5,800 people per km² in 2010⁷ (Baker and Lee 2015). The equivalent figure for Melaka was less than half in 2013, at 2,550 people/km² for built-up area and 1,885 people/km² for urban extent. Employment density was also low at 1,130 jobs/km² on built-up area in 2013. The National Physical Plan (NPP-2) for 2020 Melaka envisioned an additional population 2008-2020 of 122,700 people, and an estimated urban land at 341 km², implying 401 m² of land for each new inhabitant.

⁵ In Melaka State Structure Plan 2035, it is called ‘saturated architecture land’.

⁶ International practice generally calls built-up area the addition of developed land (excluding railways and roadways) and transport land, while Melaka Structure Plan uses the term of built-up area for developed land at the exclusion of road and transportation land.

⁷ If China is excluded, average density for the region is even higher: 5,800 in 2000 and 6,600 in 2010 (World Bank 2010).

Figure 2 Melaka People, Jobs (left), and GDP (right) Densities on developed land (excluding rail and roadways), on built-up area, and on urban extent in 2013



Source: Urban Morphology and Complex Systems Institute. Data source: State of Melaka 2018.

Table 1 Developed land (excluding rail and roadways) has grown at an average rate of 1.9 percent per year lower than population increase (+ 2.7 percent per year)

Year	Developed Land (excluding rail and road) (km ²)	Population	Population density on developed Land (excluding rail and road)	Additional developed land per new inhabitant 2000 – 2013 (m ²)	Employment	Job density on developed Land (excluding rail and road)	Additional developed land per new job 2000 – 2013 (m ²)
2000	184.61	605,239	3,278		253,600	1,373	
2013	234.35	846,509	3,609	207	375,000	1,602	410
Average annual growth	+ 1.9 %	+2.7 %	+ 0.7 %		+ 3.1 %	+ 1.2 %	

Source: State of Melaka 2018.

Economic agglomeration, measured through GDP density, is low but has increased by 38 percent mainly accruing to the gains in productivity of the shift from rural to urban employment.

Table 2 GDP density remains low but has increased by 38 percent between 2000 and 2013

Year	Developed land (excluding rail and road) area (km ²)	GDP ⁸ (RM Bn)	GDP/km ² (RM Mn /km ²)	Additional developed land per each RM Bn GDP
2000	184.61	12.2	66.3	
2013	234.35	21.45	91.53 (+ 38 %)	5.4 km ²

The urban areas of the State of Melaka present a monocentric development characterized by the presence of one dominant center. Melaka State Structure Plan 2035 divides Melaka State into 40 human settlements in a 4-fold hierarchy comprising 1 central city, 3 main cities, 9 local cities and 27 smaller cities. Melaka State is dominated by the historic Melaka City where jobs, trade, services, tourism and government institutions are concentrated. It concentrates the functions of main trading center, major tourist center, service center, state and municipal finance, business, and administrative center. This center provides services to secondary and tertiary cities. Among the three main cities, Ayer Keroh is expected to join the highest hierarchy of the Melaka State acting as partial regional center. It will concentrate central administration and state services and become a local development center, tourist and business center and the state main transport hub. Intensification of development of infrastructure, facilities, housing, industrial and tourism would generate population growth projected to exceed 150,000 by 2035. Alor Gajah and Jasin are also expected to be main cities and become administrative and business centers. Local cities, such as Batu Berendam, Bukit Baru, Malim Jaya Klebang, Besar Paya Rumpit, Sungai Udang, Cheng Mandaue, and Merlimau, are medium-sized with a population of 10,000 to 20,000. The 27 smaller cities have a strategic location for driving growth in the municipal area and the potential to be a hub for special functions.

However, this hierarchical structure faces two challenges: the nodes are not functionally integrated; low density sprawl may erase the hierarchy of human settlements.

- 1. Nodes of urban development in Melaka State are not integrated into a hierarchical network.** Only the main cities, the major local settlements, and a few town centers considered as catalysts are linked by federal routes while the highway and the future HSR line do not connect Melaka State's human settlements. The lack of functional links between different centers impedes the efficient physical movement of goods, people and services. Moreover, the federal routes do not connect the settlements into a hierarchical system – that is a regional system where major secondary settlements would be interconnected and connected to the primary city, and where minor tertiary settlements would be connected to the closest major secondary settlement.
- 2. Low density sprawl and planning of development zones may erase the present hierarchy of human settlements and conflate them into a low density wide homogeneous urban area.** The map of key development zones in Melaka State Structure Plan 2035 shows a continuous development with total land for potential future development of 848 km² representing a built-up area of about 51 percent of Melaka State covering the entire coastal fringe, conflating the main cities and the secondary and tertiary cities between them into a continuous urbanized territory completed by urbanization along federal roads.

⁸ Interpolated from time series.

Figure 3 Melaka State Hierarchy of Human Settlements



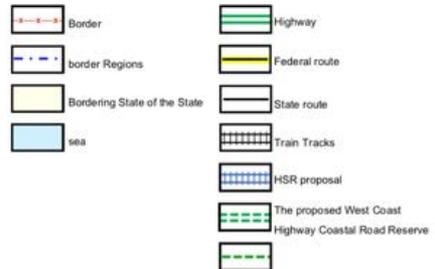
Source: Review of Melaka RSN 2035 (2016)

GUIDANCE:

settlement hierarchy



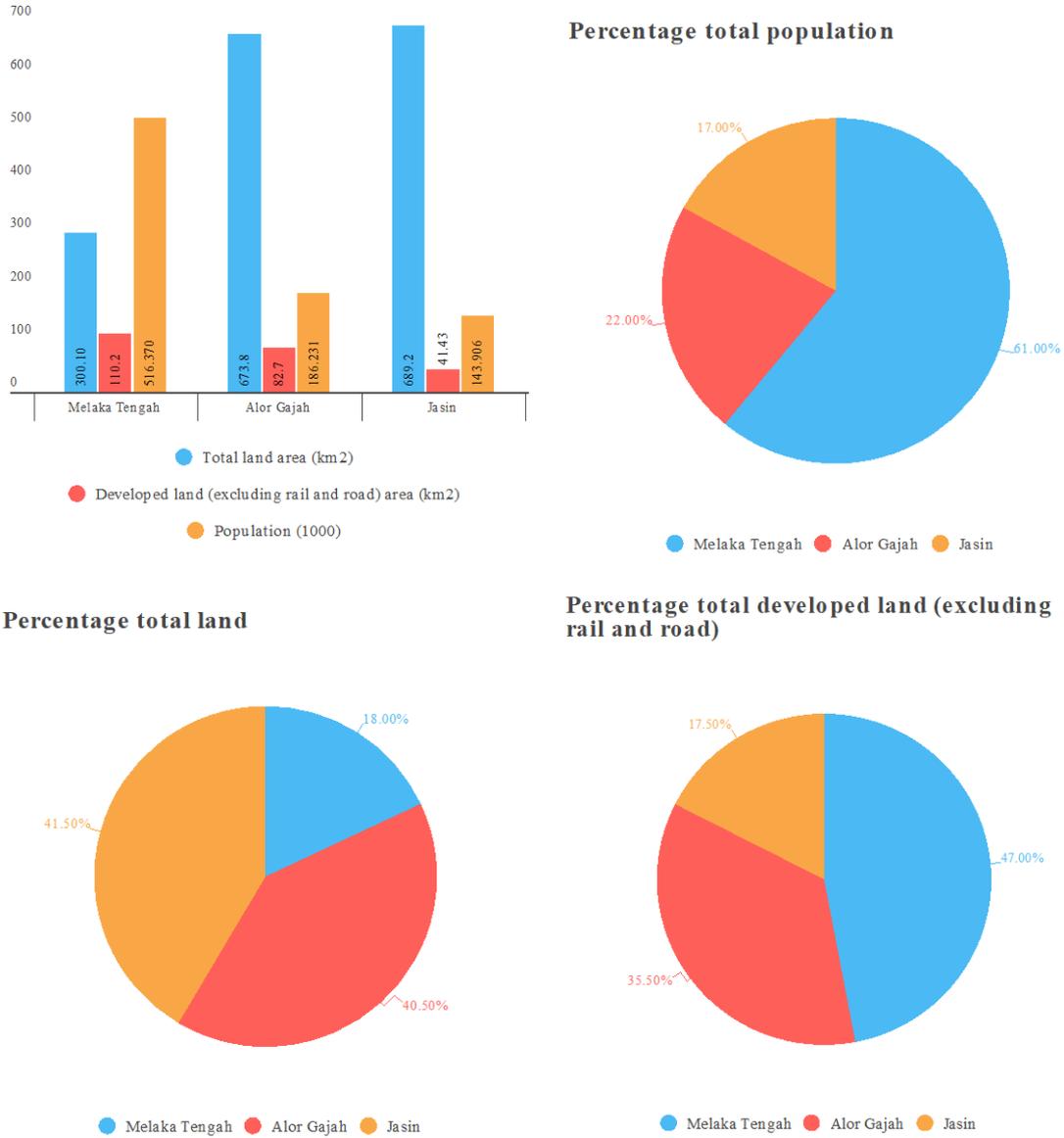
Other indicators:



Source: State of Melaka 2018.

Spatial analysis reveals strong imbalances between Melaka State districts. Agglomeration has happened by concentration of people and jobs in the central district, which presents higher densities than the more rural peripheral districts. In 2013, Melaka Tengah district concentrates, 61 percent of the state population and almost half of the state developed land area (excluding rail and road), with an average density of 4,685 people/km², more than double the density in weakly urbanized Alor Gajah.

Figure 4 Melaka disaggregation of population and land by district



Source: Urban Morphology and Complex Systems Institute. Data source: State of Melaka 2018.

Table 3 Percentage developed land (excluding rail and road) and population density by district

District	Total land area	Developed land (excluding rail and road) area (2013)	Percentage developed land (excluding rail and road) area /total land area	Population 2013	Population density (on developed land excluding rail and road) 2013
Melaka Tengah	300.10 km ²	110.2 km ²	36.7%	516,370	4,685
Alor Gajah	673.80 km ²	82.7 km ²	12.2%	186,231	2,251
Jasin	689.20 km ²	41.43 km ²	6%	143,906	3,473

Key drivers of urban sprawl in Melaka State are road transportation and housing demand growth exceeding housing supply, which has resulted in a large proportion of housing being located in non-optimal areas. Transportation in Melaka state is mainly road transportation which fosters car dependency and sprawl. Road transportation does not foster concentration of housing and encourages instead dispersal. Between 2010 and 2015, housing stock in Melaka increased by 6.7 percent. Melaka Tengah district housing stock has increased by 11,492 units in 5 years in order to fulfill the demand followed by Alor Gajah district by 2,867 housing units while the provision of houses in Jasin district also increased by 1,770 units. This increase in housing development has hugely influenced urban sprawl in the areas of Melaka City and Ayer Keroh. Compared to the other districts, Melaka Tengah has seen the highest increase (7.8 percent) of its housing stock and presents in 2015 the highest housing density with 31 units per ha of residential land compared to 14 units per ha in Alor Gajah and 15 in Jasin⁹. While Melaka Tengah comprises one third of unplanned settlements, the proportion raises to 90 percent in Alor Gajah and 93 percent in Jasin. Single storey housing dominates the planned housing stock with overall 37.6 percent of the housing stock, which contributes to a low-density urban form.

Table 4 Housing Stock in Melaka, 2010 and 2015

District	Year		Growth of Housing Stock between the Year of 2010-2015
	2010	2015	
	Total of Housing Unit (s)		
Alor Gajah	52,127	54,994	2,867
Jasin	36,416	38,186	1,770
Melaka Tengah	146,387	157,879	11,492
Total	234,930	251,059	16,129

Source: Department of Statistics Malaysia, 2010 and Kajian Semula Rancangan Struktur Negeri Melaka 2035, 2015.

⁹ The differences in density are even higher when calculating the housing density on the administrative land of each district with 5.2 units per ha in Melaka Tengah, 0.8 units per ha in Alor Gajah, and 0.55 units per ha in Jasin.

Table 5 Planned and Unplanned Settlements in Melaka, 2015

District	Types of Housing Units		Total
	Planned Settlement	Unplanned Settlement	
Alor Gajah	29,058	25,936	54,994
Jasin	19,743	18,443	38,186
Melaka Tengah	118,914	38,965	157,879
Total	167,715	83,344	251,059

Source: Department of Statistics Malaysia, 2010 and Kajian Semula Rancangan Struktur Negeri Melaka 2035, 2015.

The prevalence of unplanned settlements and of one story housing results in an overall low population density (475 people per km² on the administrative land in 2010) with significant differences between districts: 1,616 people per km² in Melaka Tengah; 258 people per km² in Alor Gajah; and 191 people per km² in Jasin. These densities are very low compared to other Asian cities and low densities on the built areas offer opportunities for infill and densification that make unnecessary the provision of land expansion for further population growth. Moreover, some housing areas do not have complete basic social amenities and facilities such as transportation, safety and maintenance. Malaysia National Housing Policy proposes that housing developments should also incorporate the provision of social amenities, basic facilities and providing a conducive environment. The National Housing Policy also recommends that neighborhood- based programs for curbing social issues, public safety and conserving the environment should be enhanced.

Table 6 Categorization and number of Planned Settlement in Melaka, 2015

Types of Planned Settlements	District			Total
	Alor Gajah	Jasin	Melaka Tengah	
Single Storey Terraced	11,588	5,977	38,236	55,389
2-3 Storey Terraced	2,247	558	26,358	29,163
Single Storey Semi-Detached	1,200	858	5,766	7,824
2-3 Storey Semi-Detached	312	34	3,396	3,743
Detached	2,506	3,211	9,829	15,546
Town House	0	62	1,250	1,312
Cluster	0	36	152	188
Low Cost House (Terraced)	9,834	9,007	12,599	31,440
Low Cost Flat	556	0	5,273	5,829
Flat	153	0	6,312	6,465
Service Apartment	0	0	345	345
Condominium/ Apartment	662	0	9,398	10,060
Total	29,058	19,743	118,914	167,715

Source: Property Stock Report and Jabatan Penilaian dan Perkhidmatan Harta, 2015.

Box 4 An unplanned and inefficient urban form can increase the cost of living, especially for non-tradable goods such as housing

Malaysia has a "severely unaffordable" housing market, with housing even more inaccessible to its residents than in Singapore, Japan and the United States (Baker and Lee 2015)¹⁰. The median price of real estate in Malaysia is 5.5 times higher than the median annual income; this is higher than that of Singapore at 5.1. Housing in the United States and Japan is classified as "moderately unaffordable" (Baker and Lee 2015).

Compared to other Malaysian cities, Melaka is the state with the most affordable housing. According to Khazanah Research Institute (KRI 2015), Melaka is the only state in Malaysia that achieved a median income multiple of 3.0 in 2014, indicating that housing in Melaka is affordable to its population.

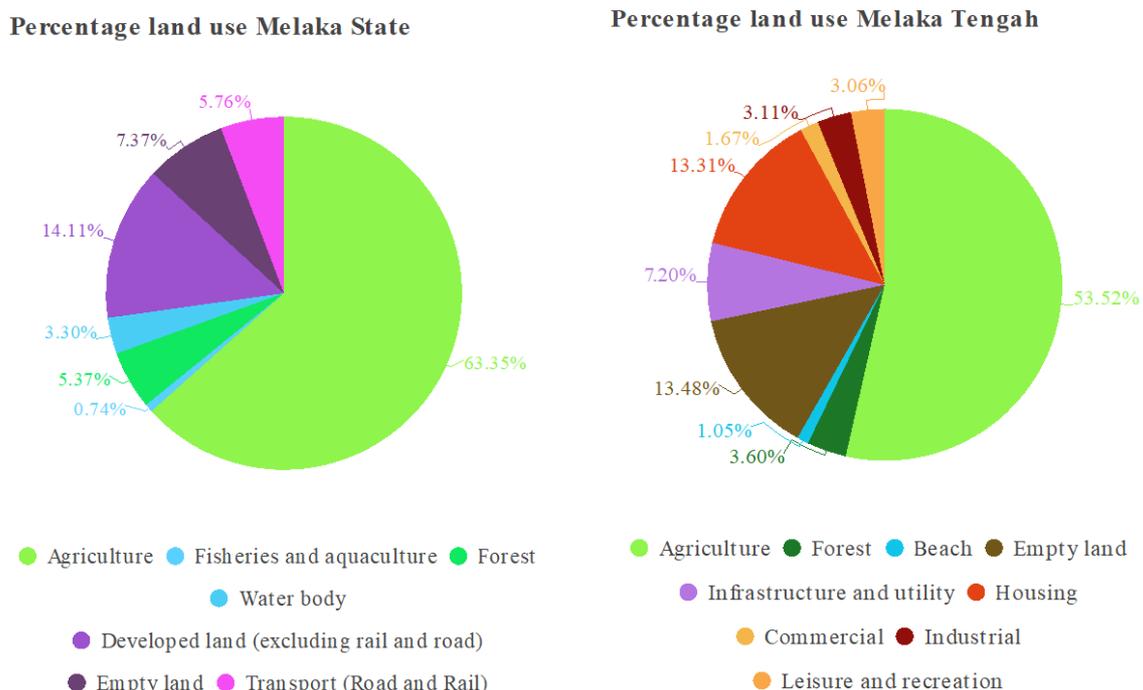
However, affordability levels are different in Melaka's three districts, reflecting issues of housing provision and urban form. The district of Alor Gajah recorded a seriously unaffordable Housing Affordability Index (HAI) in 2012 at 4.8, but became moderately unaffordable at 3.4 in 2014. For Melaka Tengah District, although the HAI remained moderately unaffordable, the median multiple decreased from 3.6 in 2012 to 3.1 in 2014. However, for Jasin District, the HAI went from moderately unaffordable at 3.8 in 2012 to seriously unaffordable at 4.1 in 2014. At the state level, the KRI (2015) study shows that the HAI has improved from an unaffordable level in 2012 to a affordable in 2014¹¹. This disaggregation of affordability by district reflects issues of housing provision and urban form. Jasin district has presented between 2010 and 2015 the lowest increase of its housing stock (4.8 percent compared to 7.8 percent for Melaka Tengah) and has a density of housing per ha of residential land only half that of Melaka Tengah. Jasin district has also 90 percent of its housing in unplanned developments compared to one third in Melaka Tengah. The less planned and less dense urban form of Jasin district have contributed to exacerbate housing affordability issues.

Urban sprawl negative economic and environmental impacts are exacerbated by Melaka fragmented urban form. Spatial analysis of current land use reveals that Melaka's vast territory is fragmented with residential development coexisting with small industrial areas and vacant land. This fragmented form captures patches of empty space within or at the fringes of urbanized land. Land fragmentation lowers the city's urban extent density, increases the distance between locations in the city, and disturbs more open space. The low density and high fragmentation of Melaka results in long commutes for work, and ultimately affects transport costs which are high compared with other East Asian cities. However, the empty land also represents an opportunity, as the empty land in Melaka Tengah represents roughly the same amount as residential land, which is an opportunity for doubling residential land on brownfield without reducing the amount of agricultural and forest land. At State level, built-up area represents 14.11 percent and about half as much (7.37 percent) is empty land which is intermingled with urbanized land. Although this reduces density and economic agglomeration, this could be seen an opportunity for further infill to solve these issues. The amount of empty land in Melaka State is 122 km², of which one third is in Melaka Tengah; which appears more fragmented than the overall state in spite of its higher proportion of built up land.

¹⁰ Demographia rates housing as severely unaffordable if it is 5.1 times median annual income. 4.1-5.0x is seriously unaffordable; 3.1-4.0x is moderately unaffordable; less than 3.0x is affordable.

¹¹ There was a substantial increase in the annual median income for both Alor Gajah and Jasin. This helped to lower the median income multiple ratio for these districts, resulting in improved Housing Affordability Index (HAI). A similar situation also occurred at state level where the percentage increase in annual median income was larger than the percentage increase in median house price, resulting in improved HAI. In Jasin, the percentage increase of income is lower than that of house price, which led to worsening HAI.

Figure 5 Distribution of land use by type in Melaka State (left) and Percentage of land use by type in Melaka Tengah (right)



Source: State of Melaka 2018 (left) and Urban Morphology and Complex Systems Institute, based on GIS data analysis (right).

If land expansion is not phased at the same rhythm as actual population, jobs, and GDP growth, there is significant risk of land oversupply with associated infrastructure costs that may not be financed by the fiscal resources coming from the expected fast economic growth. The following analyses will examine the anticipated dynamics of land expansion with regard to population, jobs, housing demand, and GDP growth.

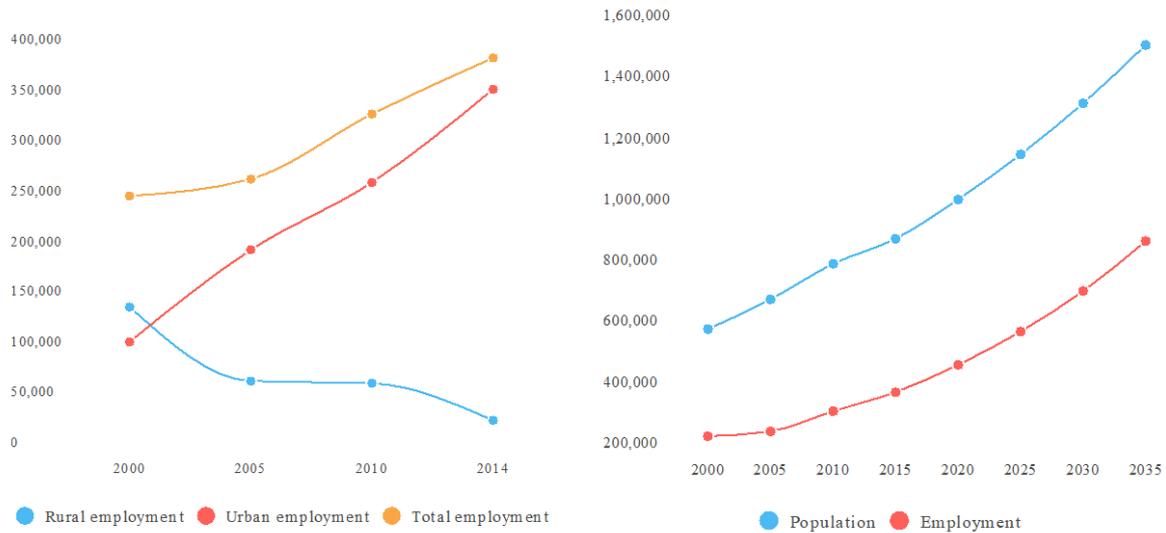
Moving forward, Melaka will experience an important demographic growth. Melaka’s population is expected to grow faster than the national level, and this, along with a high level of urbanization, will create new productivity challenges to sustain growth. Melaka is expected to increase its population by 70.4 percent between 2015 and 2035 (State of Melaka 2018), where it is forecasted to grow twice as fast as the Malaysia average and three times faster than Penang State. The prospective annual growth rate to 2035 is 2.7 percent, compared to 0.88 percent in Penang State and to 1.25 percent for Malaysia as a whole. Furthermore, since 2000, urban employed labor force has increased at an average annual rate of 8.9 percent to reach 362,600 in 2014, while rural employed labor force has decreased at a rate of 10.3 percent per year on average to reach 31,600 in 2014. Melaka rate of urbanization has currently reached 86.5 percent.

Table 7 Population Growth in Melaka State

Year	2000	2010	2015	2020	2025	2030	2035
Population	605,239	821,110	902,881	1,031,649	1,178,781	1,346,896	1,538,989
Growth Rate	2.7%						
Density administrative land(people/km ²)	364	476	543	620	709	810	925

Source: State of Melaka 2018.

Figure 6 Melaka Rural and Urban Employment



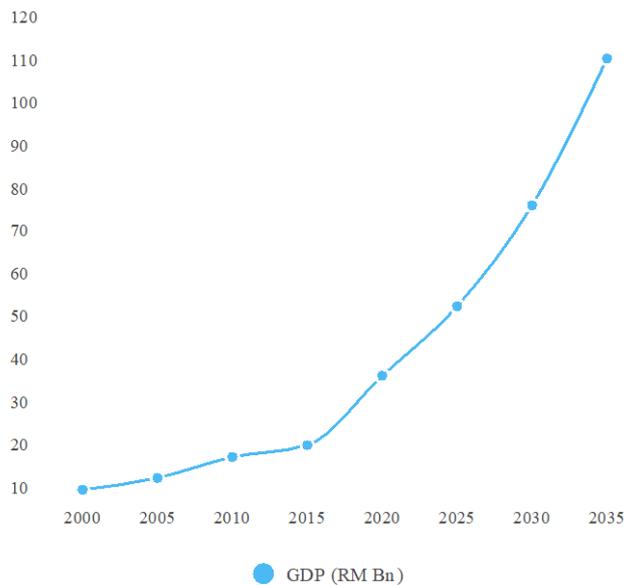
Left: Melaka rural and urban employment from 2000 to 2014. Right: Melaka population and employment growth rate (past and anticipated trends). Source: Urban Morphology and Complex Systems Institute. Data source: State of Melaka 2018.

Table 8 Labor Force and Employment

Year	2000	2005	2010	2015	2020	2025	2030	2035	KPPT
Labor Force ('000)	256.9	274.5	338.6	402.8	492.2	602.2	736.0	899.8	4.10
Employed ('000)	253.6	271.1	335	400.8	490.0	599.0	732.3	895.2	4.10

Sources: Department of Statistics Malaysia, Official Portal, 1982-2014. www.statistics.gov.my/labourforcenessurveytimeseriesdata, and State of Melaka 2018.

Figure 7 Melaka GDP Observed and Anticipated Growth



Source: Urban Morphology and Complex Systems Institute. Data source: State of Melaka 2018.

Table 9 **Melaka's Projected GDP Growth Years 2005 to 2035**

Year	2005	2006	2007	2008	2009	2010	2015	2020	2025	2030	2035
Melaka GDP Constant Price (Billion RM)	15.05	16.33	17.42	18.25	18.47	19.69	22.65	38.78	54.99	78.50	112.83

Note: For years 2005 - 2009, the calculated GDP was based according to Constant Price in year 2005. For years 2010 - 2014, the calculated GDP was based according to Constant Price in year of 2010. *Source:* State Economic Planning Unit 2010-2013.

Projection of housing needs to 2035 will strongly affect urban form and integration of the urban poor. Housing needs are forecasted to represent an increase of 73 percent of the housing stock in 2035 compared to 2015.

Projections of land use need for housing increase is based on higher density for low-cost housing than for other housing types. Assumption on density for low-cost housing is defined as 98 units/hectare; assumption on housing density other than low cost housing is defined as 24 units/hectare; 30 percent of the total housing units are assumed as low-cost housing. However, low-cost housing represents today only 37,269 units, that-is 22 percent of planned housing and 15 percent of the total housing stock. Reaching a percentage of 30 percent of low-cost housing for the newly built housing would represent building 48,000 additional low-cost housing, that is increasing the present stock by 130 percent. Moreover, assumptions on land use needs for additional housing in Melaka Sate planning are based upon an average density of 45.8 units per ha¹², which represents 50 percent more than present densities on residential land in central Melaka and 3 times more than in Alor Gajah and Jasin.

Reaching the planning targets for residential land use will require a strong development of dense low-cost housing and regulatory frameworks for planned densification and sustainable neighborhood planning compared to present prevalence of unplanned developments. Moreover, a World Bank study (Baker and Lee 2015) has underlined that the majority of urban poor and low-income families in Malaysia live in social housing: high-rise buildings for new construction and five-storey flats with no lift for older buildings. Regardless of the type of apartment, the issues raised by residents were similar and included: affordability issues, lack of appropriate community space, poor maintenance and limited public transportation. Malaysia National Housing Policy recognizes that some housing areas do not have complete basic social amenities and facilities such as transportation, safety and maintenance. The National Housing Policy proposes that housing developments should also incorporate the provision of social amenities, basic facilities and providing a conducive environment. The National Housing Policy also recommends that neighborhood-based programs for curbing social issues, public safety and conserving the environment should be enhanced.

¹² When combining low-cost and non-low-cost housing in their respective planned proportions.

Table 10 Number of Housing Needs based on Increases in Households and Normal Replacement, 2015-2035

District	Year				
	2011-2015	2016-2020	2021-2025	2026-2030	2031-2035
Alor Gajah	46,139	55,307	62,559	70,907	80,501
Jasin	36,432	43,467	49,213	55,823	63,416
Melaka Tengah	136,093	159,382	181,147	206,108	234,711
Total	218,664	258,156	292,920	332,839	378,628

Source: Kajian Rancangan Struktur Negeri Melaka, 2015.

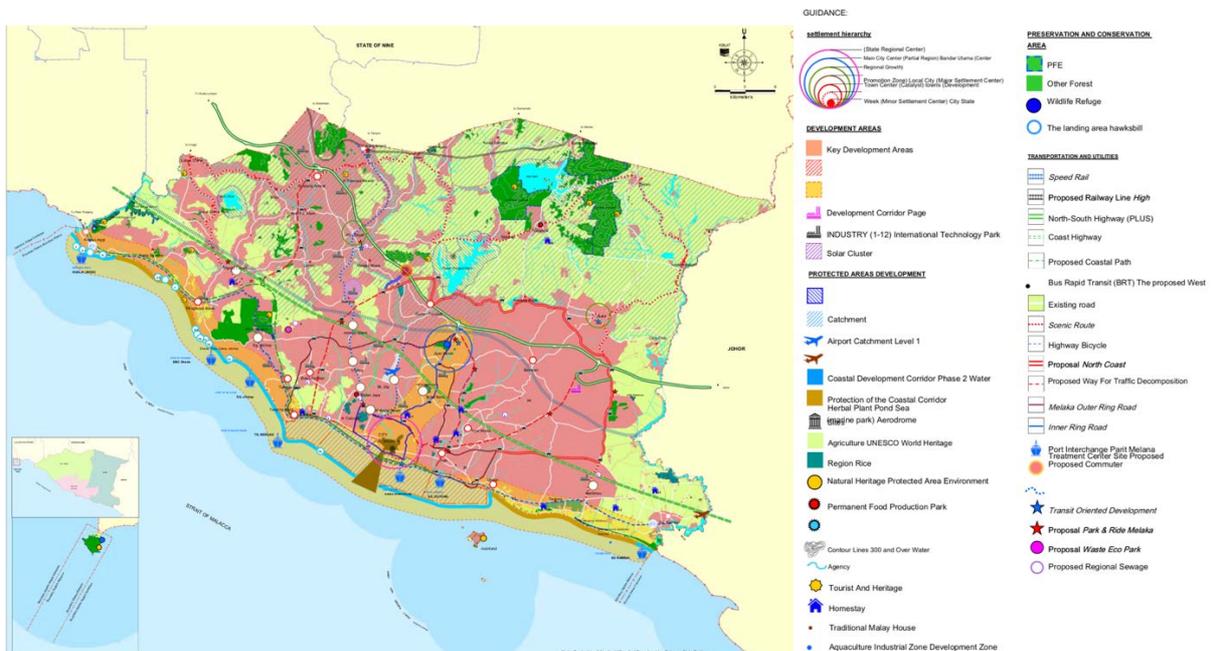
Table 11 Projection of Land Use for Housing Needs in Melaka, 2015-2035

District	Year			
	2016-2020	2021-2025	2026-2030	2031-2035
	Area (Ha)			
Alor Gajah	-	80.0	665.0	1,340.0
Jasin	85.0	500.0	950.0	1,500.0
Melaka Tengah	-	310.0	2,055.0	4,060.0
Total	85.0	890.0	3,670.0	6,900.0

Source: Kajian Rancangan Struktur Negeri Melaka, 2015.

Oversupply of developable land in State Structure Plan 2035 might be a major liability for economic efficiency, infrastructure costs, and for climate change. Moreover, the Strategic Development Proposal envisions a wide potential area for economic development. Excessive land expansion would decrease residential and economic density, leading to longer commute, which have a negative impact on local and global environment, increasing per capita transportation energy consumption and per capita greenhouse gas (GHG) emissions (Kahn 2006).

Figure 8 Melaka State Structure Plan 2035. Spatial Development Strategic Plan.



Source: State of Melaka 2018.

Figure 9 Melaka State Structure Plan 2035. Strategic Economic Development Proposal

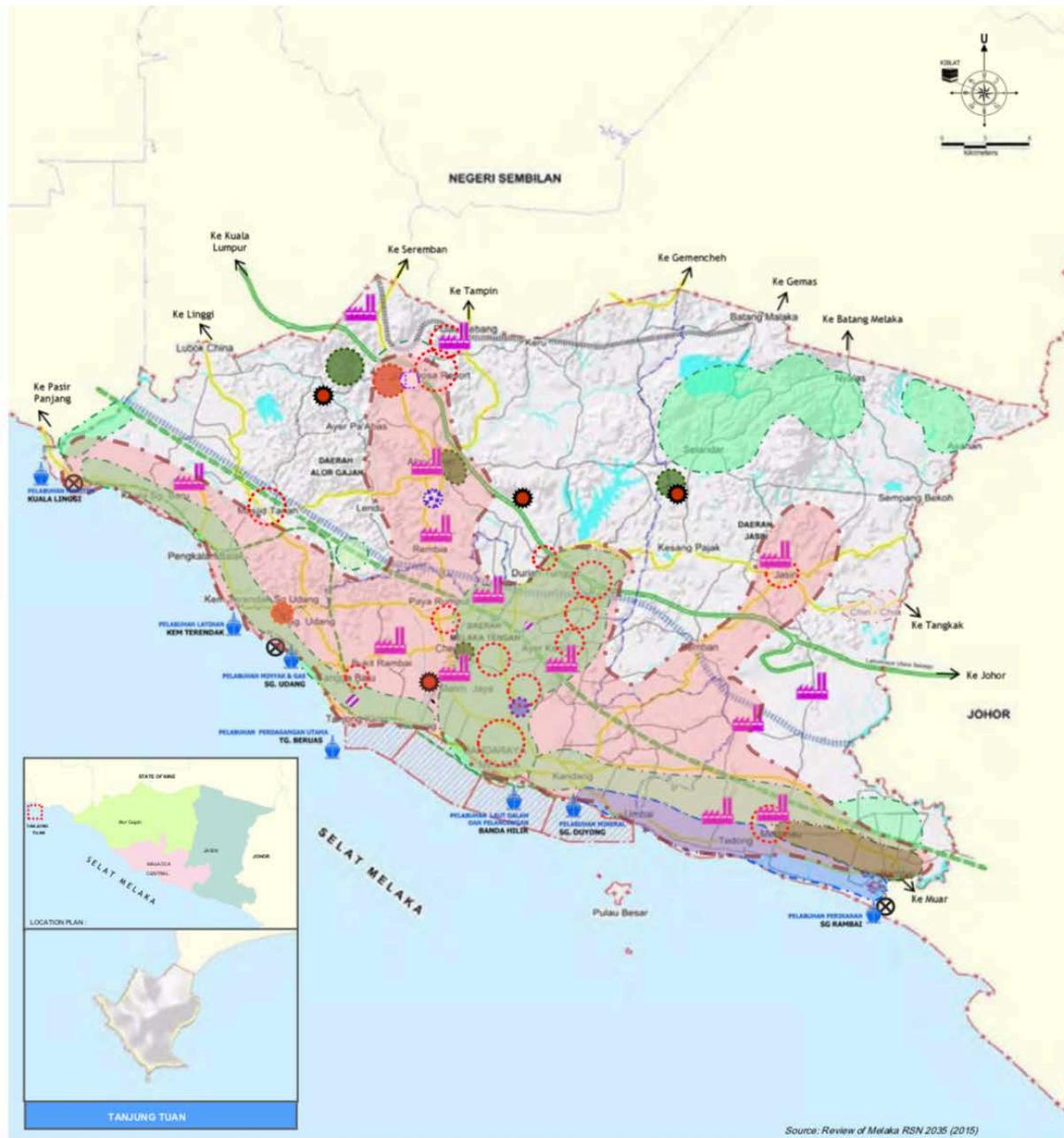


FIGURE 6.1.1: STRATEGIC ECONOMIC DEVELOPMENT PROPOSAL

GUIDANCE:

- City Economic & Trade Zone
- Tourism Zone
- Fisheries & Aquaculture Zone
- Agriculture and Agro-Based Zone
- Potential Zone / Focus on Economic Development
- High Technology Industry Cluster
- Petrochemical Industry Cluster

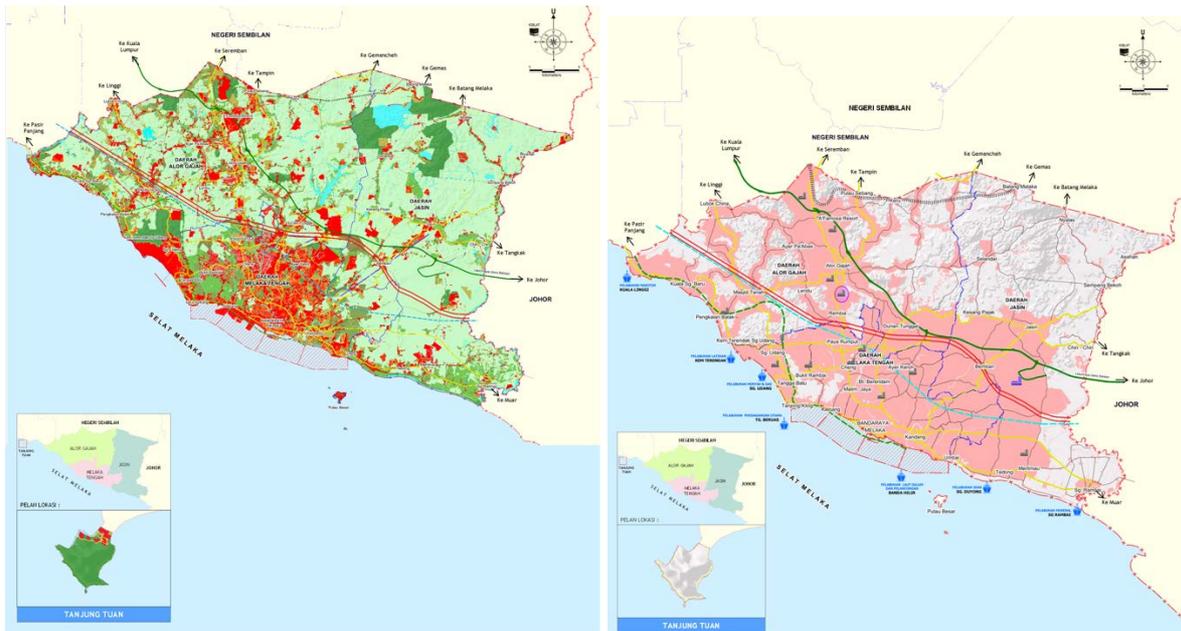
- Solar Industry Cluster
- Automotive & Aerospace Cluster
- (Special) Marine Products, Food, Miscellaneous) Industry Cluster
- Other Cluster (engineering, carpentry,

Other indicators:

- Border
- border Regions
- Bordering State of the State
- sea
- Highway
- Federal route
- State route
- Train Tracks
- HSR proposal
- The proposed West Coast Highway Coastal Road Reserve

Source: State of Melaka 2018.

Figure 10 Melaka's Current and Potential Future Built-up Areas



Source: State of Melaka 2018.

Note: Melaka's 2013 developed land excluding rail and road (in red in the map on left) and amount of land for potential future development that is indicated in Melaka's State Structure Plan 2035 (in pink in the map on the right). Source: State of Melaka 2018.

Vast land expansion for potential development is envisioned in Melaka Structure Plan 2035. The plan gives two consistent indications for future urban land expansion:

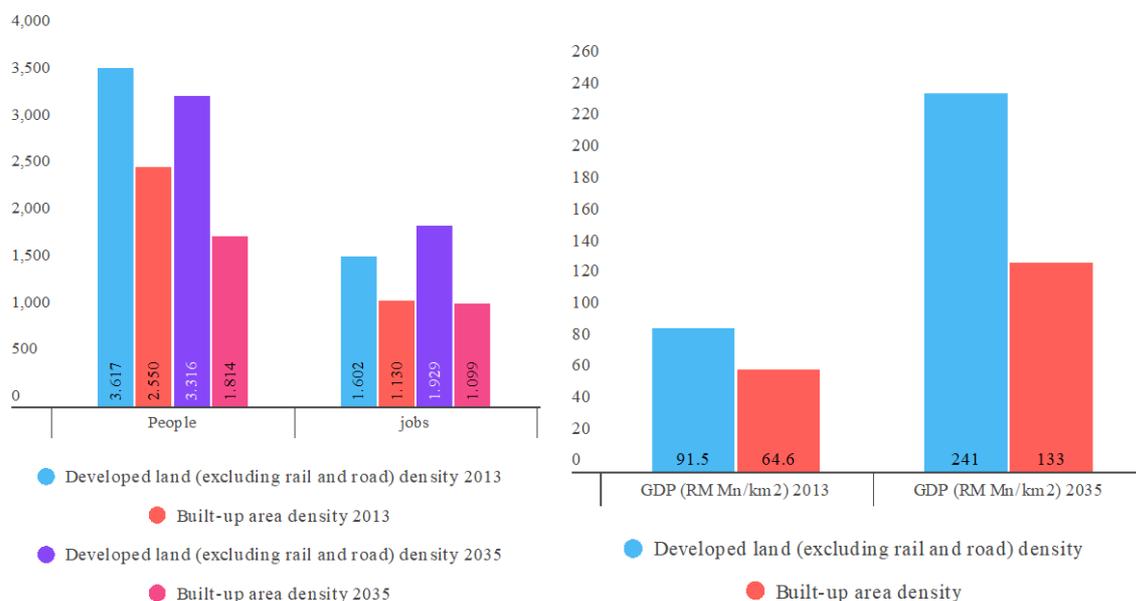
1. Total developed land excluding rail and roads¹³ of 464 km², representing 27.9 percent of the overall state land area by 2035; this would lead to an urban footprint of 650 km², and an urban extent of 895 km² representing about 54 percent of Melaka State if the present ratios for infrastructure and the same levels of fragmentation are maintained.
2. Total land for potential future development of 848 km² representing about 51 percent of Melaka State.

Envisioning urbanizing more than half of Melaka State is a major liability for infrastructure costs and urban finance if predictions about GDP and jobs growth are not realized. Melaka State Structure Plan 2035 envisions adding 230 km² to the developed land excluding rail and roads (+ 98 percent); adding 318 km² to the urban footprint (+ 96 percent), and 445 km² to the urban extent (+ 99 percent), that is doubling urban land expansion for an increase of 70 percent of population. Implementation of Structure Plan 2035 would lead to further decrease of an already low population density. Infrastructure and transport costs may rise considerably without financing from an increased economic growth. The Structure plan is not a zoning plan and the proposed developments may occur in a piecemeal fashion according to future project proposals permitted for construction¹⁴. Furthermore, fully developing the total land for potential future development in Melaka would mean urbanizing entirely an area 10 times that of Hong Kong Island for about the same population.

¹³ Referred as built-up land in State Structure Plan 2035.

¹⁴ Restrictions and requirements are stated according to the types of development.

Figure 11 Changes in Densities Between 2013 and 2035 if State Structure Plan 2035 is Implemented.



Source: Urban Morphology and Complex Systems Institute. Data source: State of Melaka 2018.

Expansion of the urban extent envisioned in Melaka State Structure Plan 2035 leads potentially to a reduction by one-third of protected and agriculture land and may reduce Melaka’s resilience. Despite the decline in agriculture employment, the main land use in 2013 is for agriculture covering an area of 1,052 km² hectares (63 percent). The overall uses for agriculture, fisheries and aquaculture, forest and water bodies, represent almost three-quarters of land uses (72.76 percent). However, in State Structure Plan 2035, the protected areas for water catchment and agriculture are reduced to 49 percent of Melaka State land, that is a one-third reduction compared to 2013. This raises issues of urban resilience both in terms of food security and of disaster risk management in the face of climate change new challenges such as increased prevalence of floods.

Figure 12 Areas of controlled development in green in Melaka State Structure Plan 2035



FIGURE 5.3: AREA OF CONTROLLED

GUIDANCE:

- Area Phase 1
- Water Catchment Area Phase 2
- Coastal Corridor
- Protection of the Coastal Corridor
- World Heritage Sites
- Agriculture
- Rice Planting Area Water Catchment
- Natural Heritage Protection Area Environment

- Tourism and Heritage Area
- Homestay
- Preservation of Traditional Village
- Permanent Food Production Park Contour
- Lines 300 on Water Bodies
- airport
- Aerodrome
- Aquaculture Industrial Zones

Other indicators:

- Border
- border Regions
- Bordering State of the State
- sea
- Kon Visual Preservation
- Highway
- Federal route
- State route
- Train Tracks
- HSR proposal
- The proposed West Coast Highway Coastal Road Reserve

Source: State of Melaka 2018.

Alternative scenarios exist where growth by infill such as what has happened in Singapore would increase the people and economic density instead of reducing it. The previous spatial analysis and analysis of housing needs show that providing 48,000 affordable housing units at higher densities representing 30 percent of the newly built housing stock and increasing the density of the other newly built housing would require 69 km² of land. At present, the ratio of total built footprint¹⁵ in Melaka Tengah to housing land use is 2.13. This means that providing 69 km² of new housing would require altogether 147 km² of land when adding infrastructure and utilities, commercial, industrial, leisure and recreation uses. Thus, most of the land needed exists already into Melaka urban extent where 122 km² are classified as empty land and are an asset for infill growth in already urbanized areas, making the city more dense, compact and accessible.

In conclusion, Melaka is advised to pursue compact growth policies to reduce the amount of developable land and develop an efficient urban form. In order to increase its productivity, to transition to higher level services, and to achieve its ambitious target of 7.1 percent economic growth over the next two decades, Melaka needs to maximize economic gains of higher densities and provide the right enabling conditions for a more compact urban form, including polycentric structures with several interlinked high-density sub-centers planned with a granular land use.

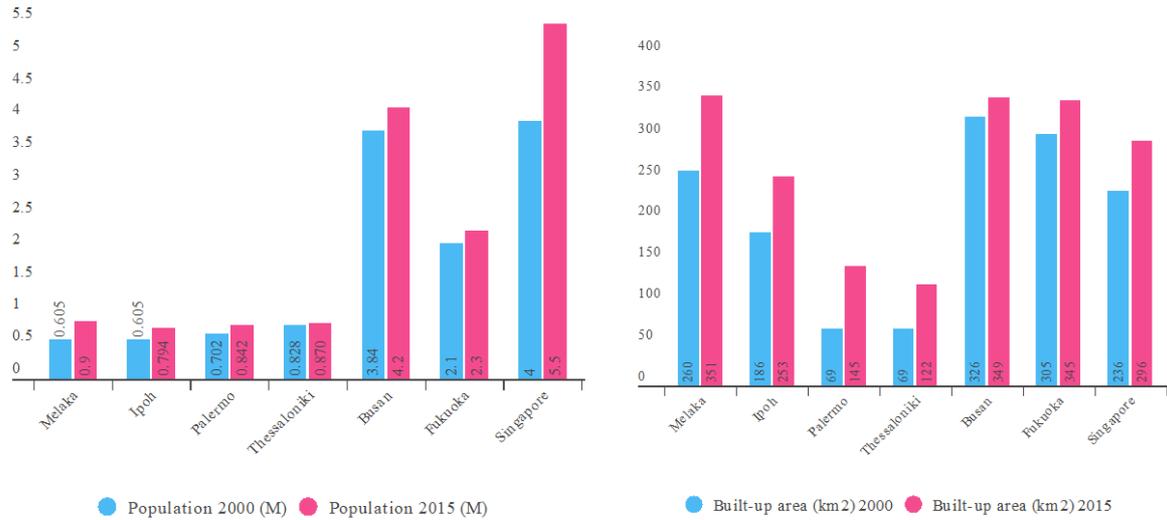
Horizontal Analysis: Melaka densities are significantly lower than those of comparator cities

Between 2000 and 2015, Malaysian and South-East Asian cities have had the fastest growing populations of the cities sample. Among the comparator cities, Melaka has seen the fastest growth rate of its population with an increase of 50percent in 15 years, followed by Singapore (37.5 percent), and Ipoh (33percent). By contrast, Japanese, Korean, and European cities have not this demographic dynamism. During the same period, population increase has been 9.5 percent in Fukuoka and Busan while a declining European city such as Thessaloniki has seen a less than 5percent increase of its population.

Melaka's population density was 7.2 times lower than Singapore, 5.6 times lower than Busan, and 2.6 times lower than Fukuoka in 2015. Busan, which was the densest city in 2000, has seen significant decline in density but remains the second densest in 2015. Originally dense, European cities have seen their centers hollowed and have spread in suburbs, with very high ratios between built-up land growth and population growth. Despite this density decrease, Thessaloniki remains the third denser. Overall, the population density hierarchy has been conserved across the compared cities, and Singapore has increased its already very high density.

¹⁵ Comprising Infrastructure and utility, housing, commercial, industrial, leisure and recreation.

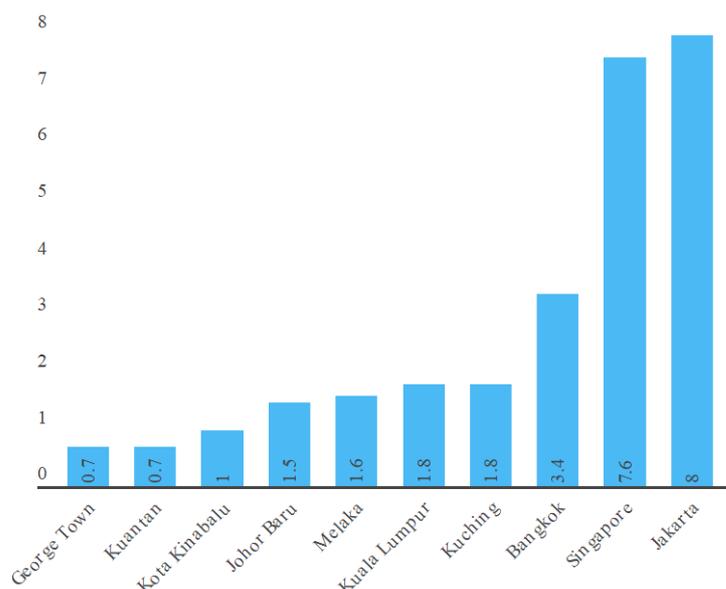
Figure 13 Population dynamics in Melaka and comparator cities between 2000 and 2015 (left) and built-up area dynamics in Melaka and comparator cities between 2000 and 2015 (right).



Source: Urban Morphology and Complex Systems Institute. Data source: State of Melaka 2018 and Angel et al. 2016.

Similarly, the economic and employment density of Melaka and Malaysian cities is relatively low compared to other cities in East and Southeast Asia. Melaka’s low density reflects general patterns in Malaysia, where urban areas are among the least dense in East Asia. For example, the employment density of Seoul, Singapore and Hong Kong is 2.5, 5 and 10 times that of Melaka respectively, while economic density (the gross value-added per km²) of these cities is 10, 32 and 55 times that of Melaka.

The very low economic density severely limits agglomeration benefits in Malaysian cities and impedes their transformation into knowledge-based service economies. While the population density of six Malaysian cities analyzed by the World Bank (Baker and Lee 2015) has grown rapidly in recent years, increase in employment density has lagged. From 2003 to 2010, George Town and Johor Bahru have even witnessed a decline in job density. The population density of these six Malaysian cities is now close to half the average level of Shanghai, Tokyo, and Singapore, while the employment density is only 27 percent of the average level in the three East Asian cities. Correspondingly, the average overall economic production density of the six Malaysian cities is only eight percent of that of Shanghai, Tokyo, and Singapore (Baker and Lee 2015).

Figure 14 Job densities of Malaysian cities and of East Asian cities compared (1,000 jobs/km²)

Source: Urban Morphology and Complex Systems Institute. Data sources: Oxford Economics 2012; World Bank 2015; State of Melaka 2018.

Box 5 Choice Criteria of Comparison Cities

Comparator cities for this section of the supporting report are Ipoh in Perak State for local comparator, Palermo (Italy), Thessaloniki (Greece), and Busan (South Korea) for international comparators, Fukuoka (Japan) and Singapore for aspirational comparators. They have been chosen according to three criteria:

1. **Data availability** with robust and reliable time series of built-up area evolution measured with remote sensing and GIS analysis, including metrics of urban form fragmentation (Angel et al. 2016).

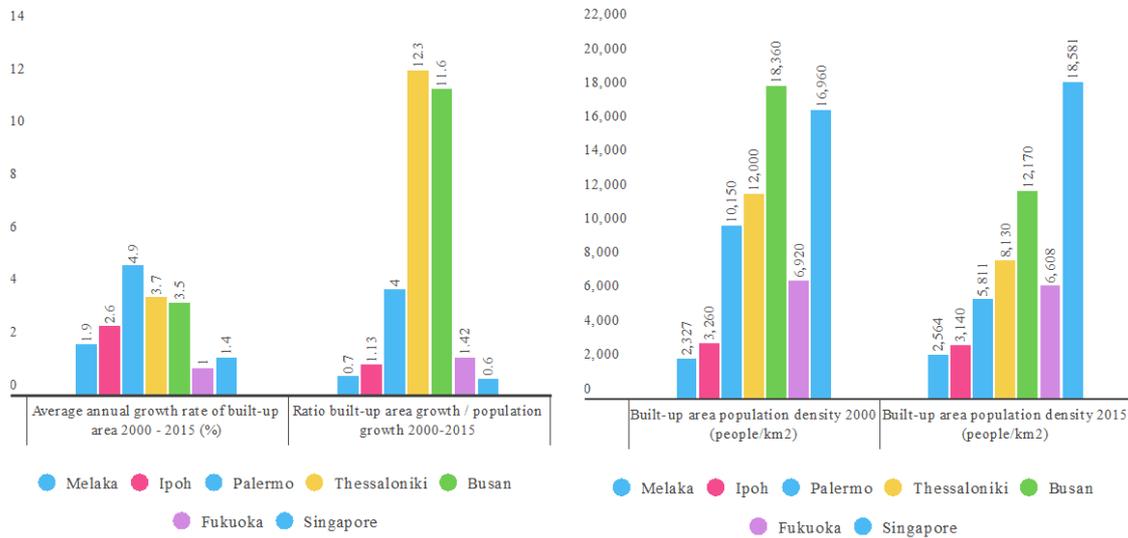
2. **Similarities with Melaka, in particular UNESCO Heritage and port cities.**

- Perak is a Malaysia State capital almost same population and built-up area as Melaka.
- Palermo is a port city and UNESCO Heritage city, about same population size as Melaka, and a center for much of the region's finance, tourism and commerce.
- Thessaloniki is the major economic, industrial and commercial city in Greece, with same population as Melaka, and a major transportation hub for Greece and southeastern Europe, notably through the Port of Thessaloniki.
- Busan is South Korea's second most-populous city after Seoul, and the fifth busiest seaport in the world, with transportation and shipping among the most high-profile aspects of the local economy.
- Fukuoka's population today is close to Melaka 2035 target, with an economy largely focused on the service sector. The port of Hakata also makes the city a key regional transportation hub.

3. **Lessons that can be derived for Melaka 2035.** Structure Plan 2035 envisions that Melaka GDP would be roughly multiplied by 5 and GDP per capita by 2. If this scenario is realized, Melaka urban economy in 2035 would be roughly double that of Palermo and Thessaloniki in 2015, with a similar GDP per capita in 2035 as those cities in 2015. With a roughly similar population size, it would be about half the size the economy of Fukuoka in 2015. GDP per capita would reach 80 percent that of Busan today and 36 percent that of Singapore today. Altogether, the pathways followed by these cities show the challenges and opportunities of different spatial growth both for densities, urban form, and economic agglomeration.

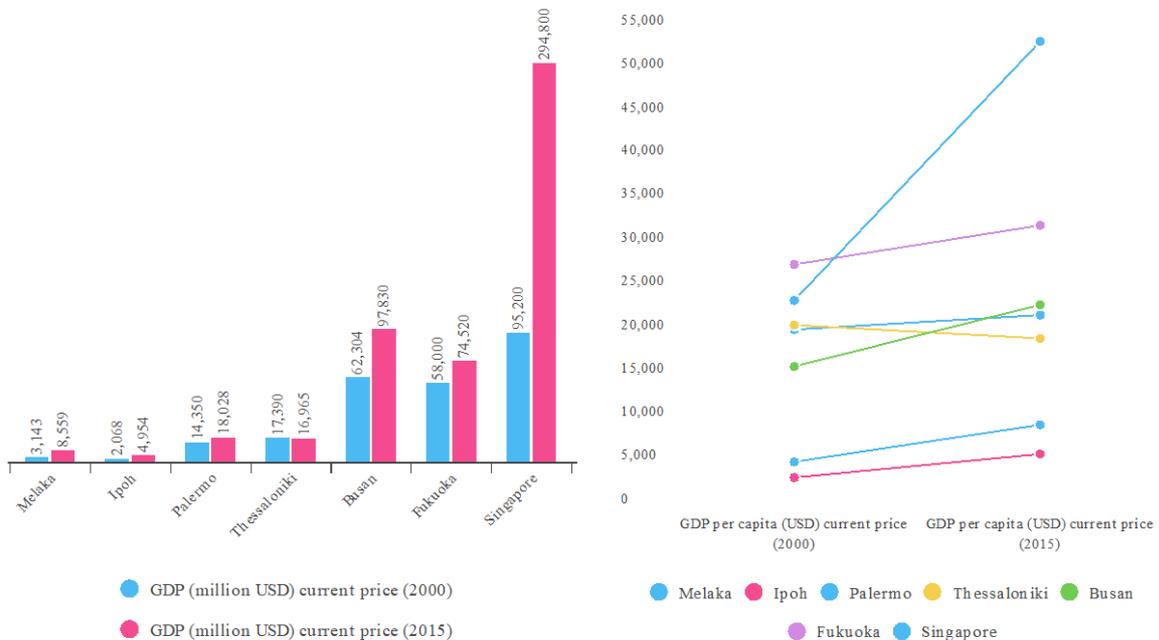
With a population representing only one-sixth of Singapore's, Melaka's built-up area was 10 percent larger in 2000 and 18 percent larger in 2015 than Singapore's. Furthermore, with similar population, Melaka (and Ipoh) used almost 4 times more land in 2000 and still more than twice as much land in 2015 than comparator European cities.

Figure 15 Urban land growth rate in Melaka and comparator cities between 2000 and 2015 (left), compared densities in Melaka and comparator cities between 2000 and 2015 (right)



Source: Urban Morphology and Complex Systems Institute. Data from: Melaka Structure Plan 2035; and Angel et al. 2016.

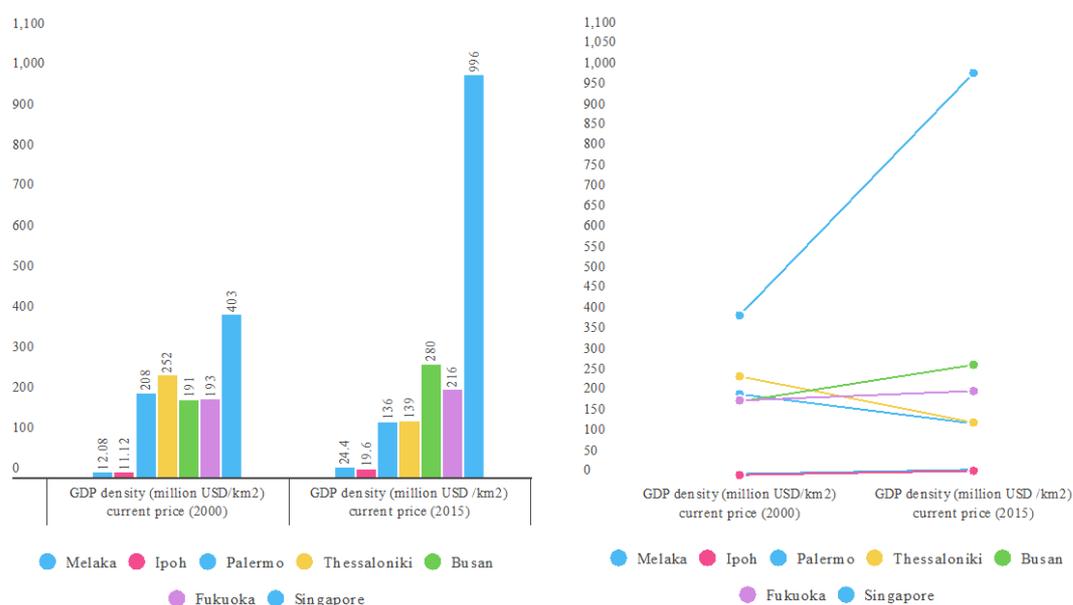
Figure 16 Economic size (GDP) of Melaka and comparator cities 2000-2015 (left) and GDP per capita evolution in Melaka and comparator cities between 2000 and 2015 (right).



Sources: Urban Morphology and Complex Systems Institute. Data from Melaka Structure Plan 2035. GDP data Sources: OECD, IMF, and World Bank (except Melaka and Penang States). For Melaka and Penang States, Department of Statistic Malaysia, 2017 a and b. For built-up areas: Angel et al. 2016 and Melaka Structure Plan 2035.

Overall, the economic size hierarchies (measured by total GDP) between the seven compared urban economies have remained similar but differences with European cities have narrowed and the hierarchies between the cities' wealth (measured by GDP/capita) have changed. Melaka has almost tripled the size of its economy (GDP has been multiplied by 2.7 times) in 15 years and has now a total GDP about half that of European cities of the same population such as Palermo and Thessaloniki, from 20 percent in 2000. During this time, the two European comparator cities have seen their economic size only slightly progress or even decline for Thessaloniki, as a result of the 2008 financial crisis. By contrast, the comparator Asian urban economies have increased their economic size: + 56 percent for Busan; + 27 percent for Fukuoka; + 200 percent for Singapore. With +170 percent Melaka comes only second to Singapore for total GDP increase. This is the result of both demographic and economic dynamism. GDP per capita has almost doubled in Melaka and Ipoh (+82 percent) between 2000 and 2015. However, Singapore has performed better with a GDP/capita multiplied by 2.25 during the same time period.

Figure 17 GDP density (GDP/km²) in Melaka and comparator cities (left) and its evolution between 2000 and 2015 (right)



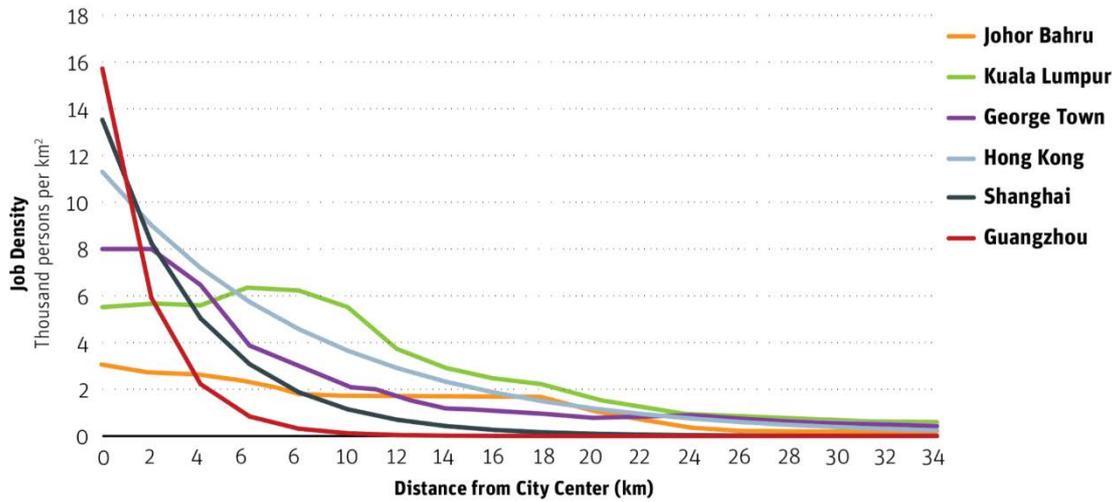
Sources: Urban Morphology and Complex Systems Institute. Data source: State of Melaka 2018. GDP data sources (for all except Melaka and Penang States): OECD, IMF, and World Bank. GDP data source for Melaka and Penang States: Department of Statistics Malaysia 2017a and 2017b. Data source for built-up areas: Angel et al. 2016 and State of Melaka 2018.

The most successful cities are the ones that have increased their economic agglomeration (measured with GDP/km²). Despite increase in total GDP, GDP/km² for Melaka and Ipoh remains extremely low compared to other Asian successful cities and even to declining European cities. GDP/km² in 2000 was in Melaka only 3 percent that of Singapore and 6 percent that of Busan. In 2015, GDP/km² is even less compared to Singapore (2.4 percent) and has only slightly increased at 8.5 percent compared to Busan. In 2015, GDP density is in Melaka only 18 percent that of Palermo and Thessaloniki.

Melaka, as other Malaysian cities, exhibits a relatively flat spatial form and thus lacks strong agglomeration. In the study of population or jobs, the density gradient refers to the change in density in an urban area from the center to the periphery. Economic density gradients (measured by the change in job or GDP density) matter as cities with sharp gradients, such as Shanghai or

Guangzhou, in the chart below, present higher levels of agglomeration in their centers or sub-centers¹⁶ than cities with flat gradients such as Malaysian cities.

Figure 18 Malaysian cities and reference cities compared job density gradients

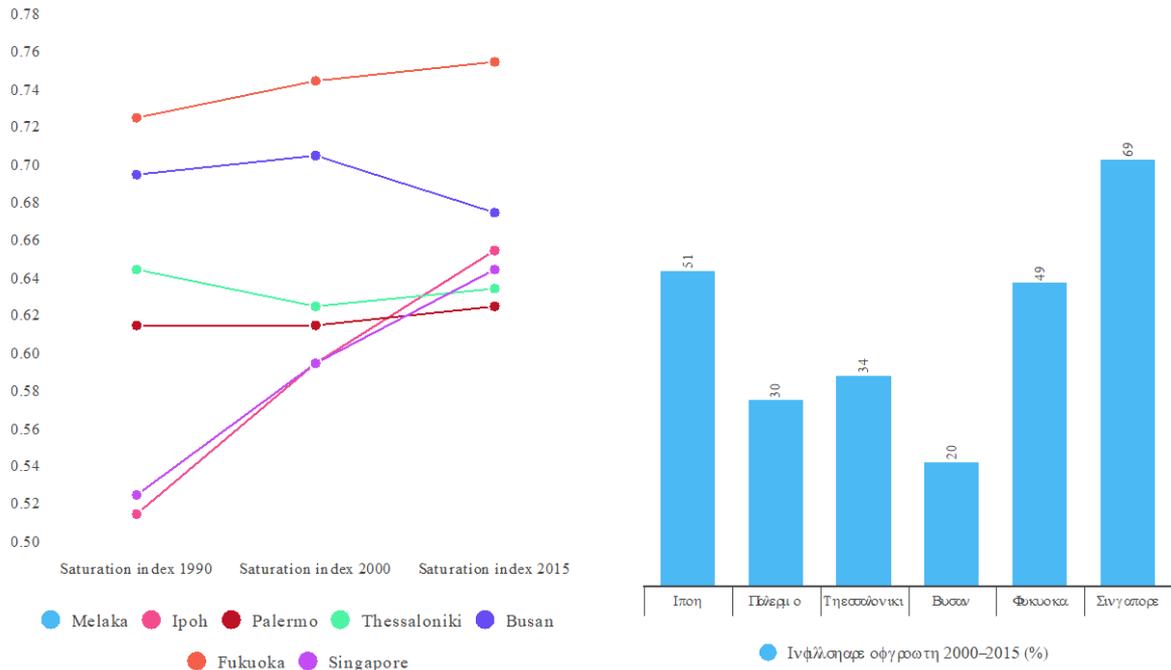


Source: Oxford Economics 2012.

Melaka and Malaysian cities are also more fragmented than comparator cities, but their fragmentation has reduced overtime. Today, Melaka, Ipoh and Singapore have similar saturation indexes at 0.66, as both Singapore and Ipoh have increased their saturation index by 23 percent since 1990. However, Japanese cities such as Fukuoka or Korean cities which started their urbanization earlier are less fragmented than South-East Asian cities. Sprawling European cities such as Palermo and Thessaloniki were less fragmented than Singapore or Ipoh until 2000, but they are today more fragmented. A key lesson for Melaka is to continue reducing its fragmentation to reach levels of saturation similar to Fukuoka today which is achievable if trends observed since 1990 are continued.

¹⁶ In polycentric cities, gradients can be generalized by inverse power laws modelling the decrease in density in a rank-size analysis of the density of all the urban cells (Salat and Ollivier 2017, Salat 2017).

Figure 19 Comparator cities saturation index evolution between 1990 and 2015 (left) and infill share of growth in comparator cities (right)

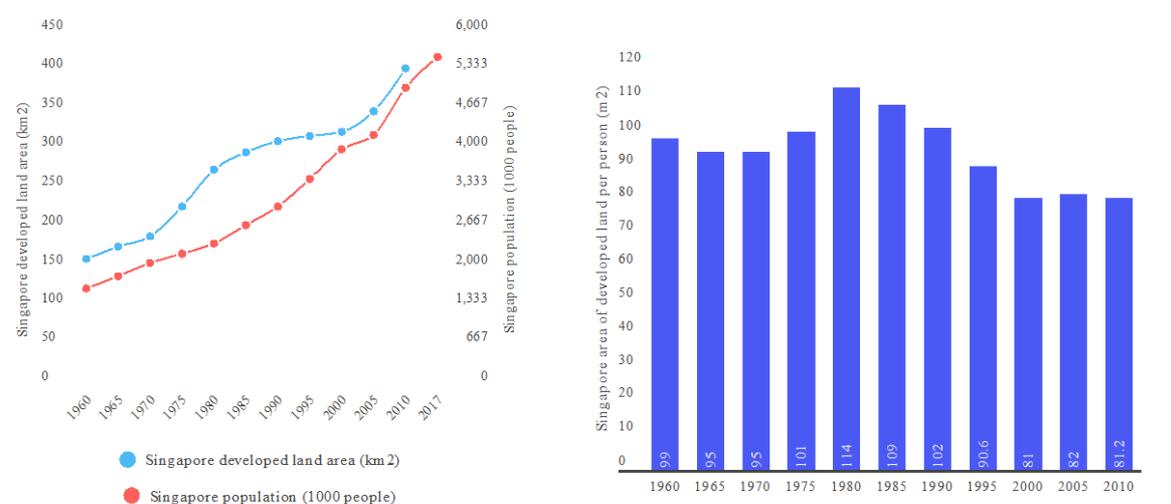


Source: Urban Morphology and Complex Systems Institute. Data source : Angel et al. 2016.

Box 6 Singapore’s Compact Growth

Singapore reduced its urban developed land per inhabitant by 20 percent from 100 m² in the 1960s and 90s to 80 m² since 2000, as shown in figure 20 below. Singapore urbanized land (urban extent) grew at an average rate of 0.7 percent per year between 2000 and 2015. Singapore grew mainly by infill (share of infill represented 69 percent of urban growth) which resulted in an extremely low ratio growth of urban extent / growth of population of 0.3. From the year 2000, urban land grew less than population.

Figure 20 Rate of growth of land and of people in Singapore from 1960 to 2017 (left) and average amount of land per inhabitant (m²) in Singapore and its evolution overtime (right).



Source: Urban Morphology and Complex Systems Institute. Data source: NUS.

Cities which have significantly reduced fragmentation by increasing share of infill growth have made economic use of existing infrastructure and reduced urban sprawl. Infill development consists of building within the open space of an urbanized area, instead of developing on periphery greenfield land. Among the compared cities, Singapore has the highest share of infill growth with 69 percent, followed by Ipoh with 51 percent, and Fukuoka with 49 percent. These three cities have significantly increased or consolidated a high level of saturation, compactness, and efficiency of their built form. Quite the opposite, Busan has experienced in the last 15 years a decrease by 30 percent of its initially high density, an increase of its fragmentation¹⁷, and has grown mainly by extension¹⁸ (37 percent) and inclusion¹⁹ (41 percent). Declining European cities have also mainly grown by extension and inclusion. A detailed fragmentation study for Ipoh, the capital city of the Malaysian state of Perak (Angel et al. 2016) is summarized in box 7.

Further to the comparison, the low population and economic densities of Melaka are a major liability as it increases infrastructure finance per capita and per km² and prevents reaping benefits from economic agglomeration. The Structure Plan 2035 envisions a GDP and urban built up area increase which would maintain the low densities, remaining 5 percent of that of Singapore and 17 percent that of Busan today, and also much lower to other comparator cities in 2000: 12 percent that of Palermo, Busan, or Fukuoka; 9.5 percent that of Thessaloniki. This will put the city at risk of generation only a minimum fraction of the value-added per capita and per unit of land compared to benchmark cities.

Also learned from the comparison is that Melaka's sustainable urban land policies should limit the urban extent's growth rate well below under the rate of growth of the population, discourage expansion at the urban fringe and concentrate on increasing economic and employment density by incentivizing infill. The benefits of density include productivity gains and the ability to share public amenities, two factors that lead to the urban wage premium. Melaka needs also to shape its urban form in a compact way in order to reduce distances. Distance affects the ease of moving goods and services, labor, capital, and information; distance also needs to consider time and financial costs. Locations close to markets tend to have lower transport costs and easier access to knowledge and other resources.

Analyzing Melaka's planning process and implementation challenges reveals opportunities

Melaka has put in place mechanisms for preparing and financing its strategic plans with institutional coordination across different levels of government. Melaka has a comprehensive and detailed long-term strategic and participatory planning processes in place to ensure inter-agency coordination. Moreover, mechanisms ensure prioritized financing with a strong integration between planning and finance. However, when it comes to implementation, Melaka faces challenges in coordination and linkages, in monitoring policy implementations and their impacts, in capacity building at local authorities' level, and in urban service delivery at the local level.

Melaka has a vision with long-term planning and strategy. Melaka State Structure Plan 2035 is a document that provides a planning framework which aims to guide and control the physical development at the state level as stated under Section 8, Town and Country Planning Act 1976 (Act 172). Melaka was given the mandate to hold a Review of the Structure of Malacca from 2015 to 2035 (RSNM).

¹⁷ Measured by the decrease in its saturation index.

¹⁸ Extension consists of all built-up areas added in the new period that constitute contiguous urban clusters that are attached to the urban extent of the earlier period.

¹⁹ *Inclusion* consists of all urban, rural, or suburban built-up areas that were outside the urban extent in the earlier period and are now within the urban extent of the new period.

Box 7 Development Plans in Malaysia

The preparation of development plans in Malaysia (i.e. all the plans defined under Town and Country Act 1976 [Act 172]), have over the years evolved to include a move towards a participatory approach, involving various categories of stakeholders, government agencies at federal, state, district and local authorities' levels. This also includes technical agencies and representatives from various community groups such as the Village Development and Security Committee (JKKK), business communities, NGOs, etc. The collaborative efforts for project implementation and service delivery are further strengthened with the introduction of National Blue Ocean Strategy (NBOS) tools and frameworks to formulate high-impact, low-cost national strategies that are able to be rapidly executed. Through NBOS, over 80 ministries and agencies – from the police and military, to women, youth, and higher education organizations – are collaborating to formulate and execute creative initiatives that are transforming the country. A similar approach is now also being introduced and recognized at the state level, especially for projects with state financing, with the State Economic Planning Unit (UPEN) implementing and coordinating state and local projects in a similar manner.

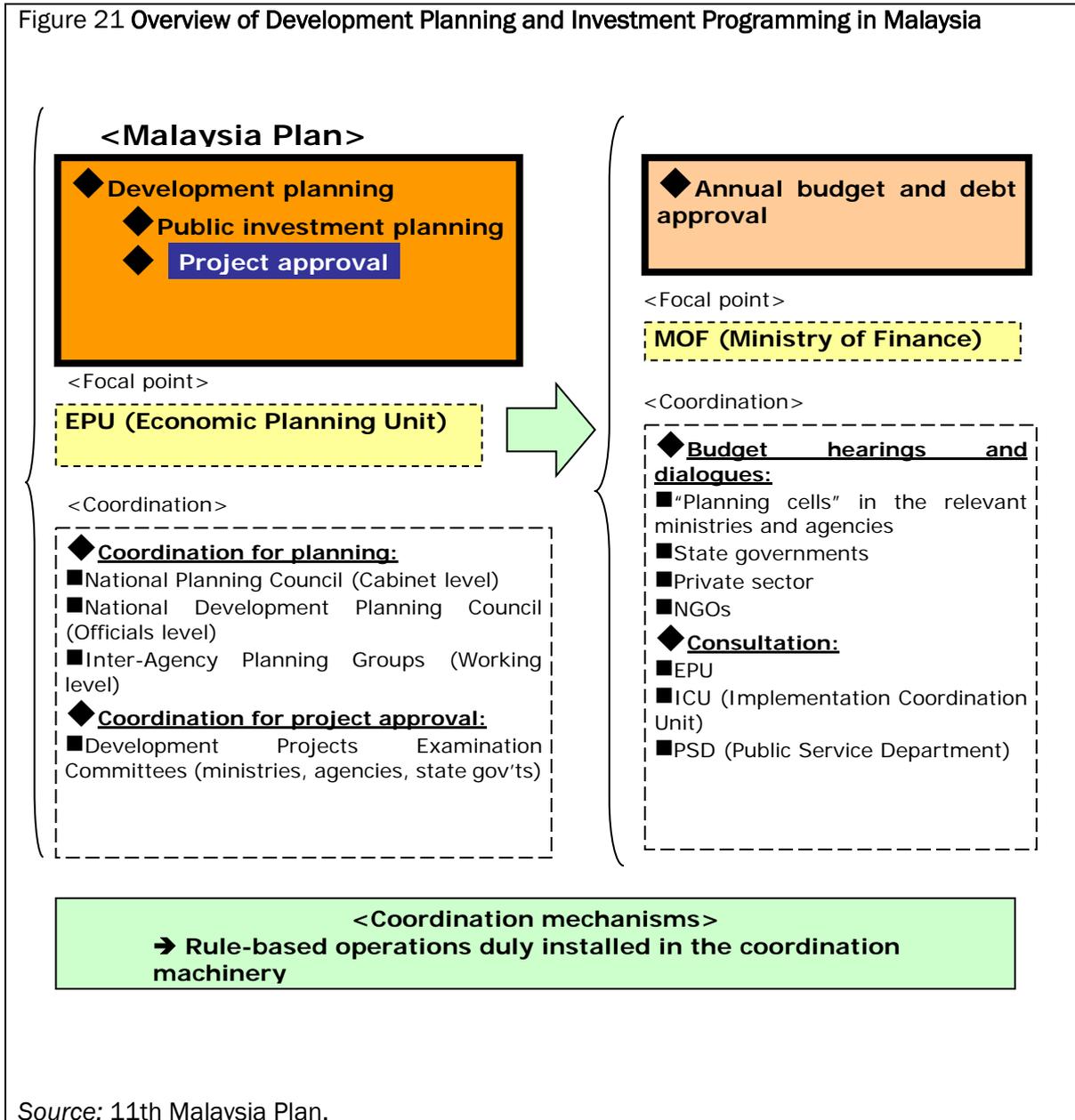
Malaysia's state structure planning process under Act 172 integrates priority setting and financing, and indicators for monitoring progress. Moreover, civil society participation is included in the plan preparation.

The strategic plan is developed with a participatory approach involving multiple agencies, including direct participation of civil society regularly and democratically. Public participation is included in the second stage of creating the draft structure plan, involving preparation of the Preliminary Report and Survey Report. The survey report, which was signed off by the Steering Committee, was put forward to the public for comment, review and/or any objection on the findings, preliminary strategies and recommendations. After public consultation is finished, feedback from all parties is considered during finalization of the DRS.

A plan includes mechanisms which ensure prioritized financing and program investments. The objective to involve agencies, particularly for service delivery, is to ensure that projects identified in the plan are accepted and agreed upon by the respective agencies, and then taken into the yearly budgeting of each agency for the respective areas of concern. The Economic Planning Unit (EPU) has put in a requirement that all projects requiring federal financing are to be identified in a more holistic manner and the development plans (i.e. structure plans and local plans) have now been recognized as important long-term project identification tools. These plans in Malaysia specify investment priorities, which are backed by budget implication. The EPU then considers several factors in prioritizing the projects, including consistency with the overall economic and development policies, urgency of the projects, financial viability and implementation capacity. The following figure 21 summarizes the integration of development planning and investment programming in Malaysia.

Measurable goals and indicators have been developed for monitoring progress. Malaysia has the building blocks for monitoring progress in implementation, including the Star Rating System and the Malaysian Urban-Rural-National Indicators Network on Sustainable Development (MURNInets). There are opportunities for enhancing these systems through the use of internationally standardized indicators to benchmark performance and identify good practices from leading cities worldwide.

Figure 21 Overview of Development Planning and Investment Programming in Malaysia



However, Melaka faces some challenges for coordinating the timing of different plans, for monitoring policy implementation and their impacts. Institutional coordination between different levels of government negatively affects the effectiveness of urban planning and implementation in Melaka State. For example, land use planning and urban transport are not well integrated. Institutional coordination and strong implementation capacity are important for integrating land use into strategic and structural investment planning across all sectors of Melaka State.

Although Malaysia has a comprehensive land use planning system that guides urban development, challenges exist in coordination and timing that prevent full integration of bottom-up knowledge from local plans into federally prepared master plans. Large project investments that are designed and planned centrally may not reflect local knowledge and priorities, while some local plans and zoning may be inconsistent with State-issued land titles and projects initiated at higher levels (Baker and Lee 2015). In Melaka, timing of preparation for many plans from federal agencies

differs from the need for detailed planning at local levels. For example, planning for regional public transport (which was previously SPAD's responsibility) takes time to become finalized, while at municipality level pressing public transport issues and pressure from developments necessitate faster decision making by local authorities. Many of the local plans are due for review after the acceptance and gazettelement of State Structure Plan. The review will be an important input into the regional public transport master plan. However, such detailed information that is more current and in tandem with State Structure Plan is not yet ascertained. Hence, there is a gap in how bottom-up demands feed into federally prepared master plans.

Capacity building of local authorities needs enhancement in the face of new and future challenges. Malaysian local authorities face constraints in terms of staff and their technical expertise. They have difficulty recruiting, motivating and retaining the right staff; they face staffing controls exercised by the federal-level Public Service Department, and offer relatively lower pay and fewer opportunities for career development compared to federal and state level agencies. New and future challenges especially including climate change, sustainable development and low-carbon cities necessitate new knowledge and capability at local levels. Assistance of international organizations, such as 100 Resilient Cities, has helped in capacity building.

Urban Form Recommended Actions

While Melaka aims for high-income status, several policy recommendations emerge. Some will require major policy changes and strong political will to implement, and these changes could make the most from progressive planning integration. Other policy options may be easier to implement and could be launched in a relatively short time. Over time these recommendations will produce the best results when fully implemented rather than through partial or selective implementation.

Malaysia and Melaka have established a process to develop a long-term plan; the challenge is integration in particular of land use, transportation and urban development strategy. This lack of integration increases risks of urban sprawl and further fragmentation. Melaka should promote its envisioned development in the most effective manner, and there is a need to integrate strategies and closely coordinate among implementation bodies. Well-functioning institutions are important to help promote population and economic density. Furthermore, under the vision of a competitive and environmental city, the environment should not merely be an appendage to development; rather, it should be the driving force to promote the city's sustainable development. To realize this, strategies for each urban subsector should have environment components in synergy with those in other subsectors.

The following recommendations are offered so that Melaka can achieve its aspirations for land use and urban form. An action plan for Melaka is also included in table 12.

4-A Incentivize higher density, mixed use, green, and compact developments with flexible land use regulations.

Melaka needs to incentivize higher people and economic densities to foster its economic transformation. Development of a compact city should be based on mass transit with mixed land use (commercial, business, and residential) with a population density of 10,000-15,000 people / km² along bus rapid transit (BRT). The broad environmental zoning (primary environmental consideration before development takes place, broadly classifying areas into Ecological Preservation Zone, Marine / River Zone, and Urban Development Zone) should restrict the quantity of land for Urban Development Zone, encourage doubling the present density on urbanized land, and growth by infill within the vacant space captured by the present fragmented spatial expansion.

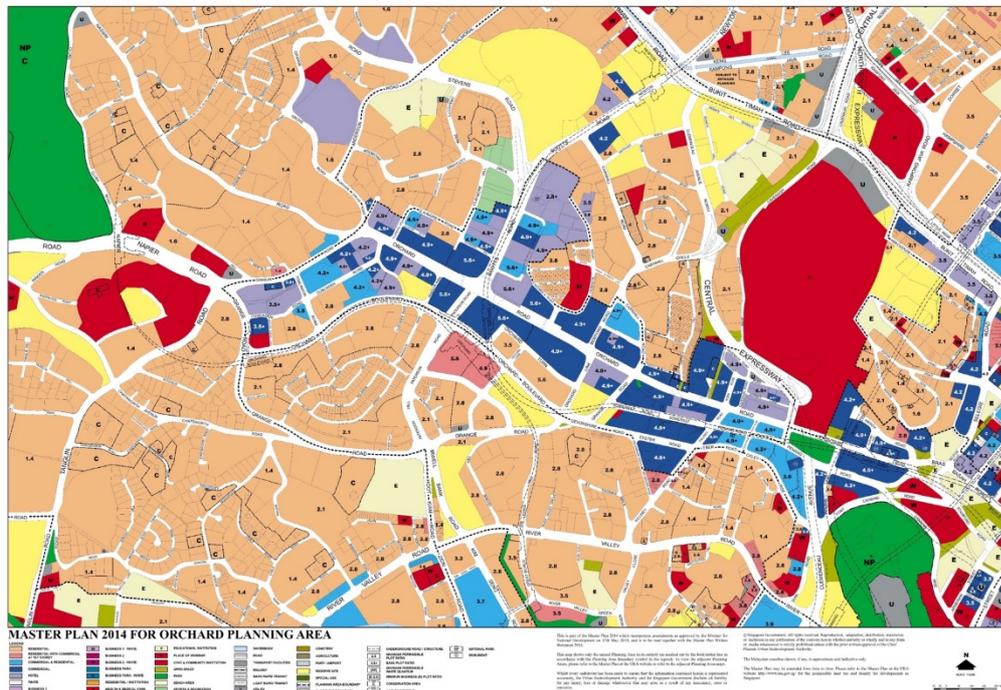
A green and open space network (utilizing rich natural environmental resource comprising forests, mountains and hills, greenery, water bodies to create the image of the city as well as for tourism / recreation) should be more clearly articulated.

To develop into a more compact urban form, Melaka needs to relax any overly stringent restrictions on land use, such as low plot ratios. Land market and real estate experts in Malaysia have pointed out that property developers often find it more financially attractive to build on rural land next to existing urban areas, rather than redevelop brownfield sites within cities. Recalibrating factors such as the premium payable for conversion of land use, and the allowable maximum plot ratio in and near city centers, would help shift incentives toward redevelopment and increasing density, rather than sprawl (Baker and Lee 2015). Melaka needs flexibility in land use to meet the strong housing demand and to evolve towards more dense and compact urban development. Realizing the potential of low-use land for more productive uses, such as affordable residential and commercial developments, would help increase economic density and promote economic growth. In addition, spatial development should focus mainly on mixed-use development, by integrating different areas close to the city center, with high density mix use residential, high plot ratio²⁰ and fine grain lot patterns. It can be commensurate with higher value of land and can promote more compact urban form.

Box 8 Innovative Land Use in Singapore

A key Singapore strategy is to optimize land through an integrated planning process where long-term strategies and goals are translated into granular short-term plans to guide development. Singapore co-locates complementary activities where possible, both for the convenience of users and to maximize the use of space. Floor Area Ratios are set based on uses and on metro accessibility. The floor area ratio is very high in the CBD (8–25), 6.0 next to the CBD, and 1.5–4.0 in most residential areas.

Figure 22 Singapore Master Plan along Orchard Road



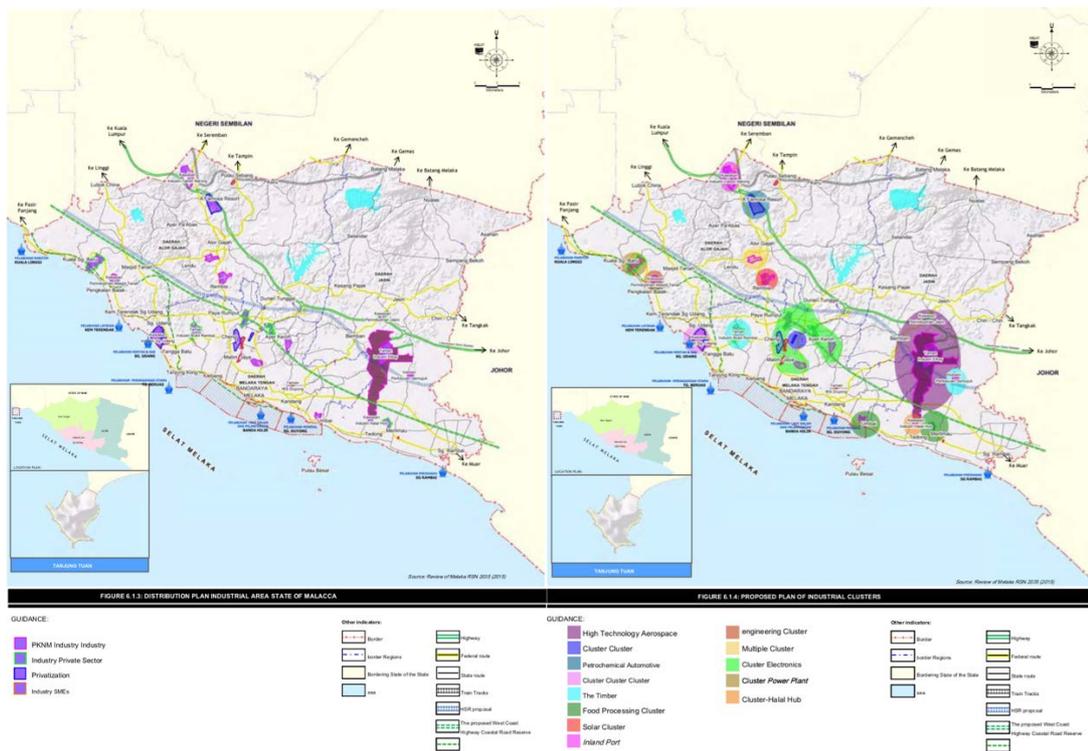
Source: Singapore Master Plan.

²⁰ Plot ratio is defined by the Town and Country Planning Act 1976 (Act 172) as: “the ratio of the total floor space area of a building to the area of the building plot as measured between the boundary lines.” Different terms for this same concept are in use around the world: floor area ratio, floorspace index, floor lot ratio, plot ratio; despite subtle differences, all are essentially similar.

4-B Shape a compact polycentric urban form and develop well-connected nodes.

Melaka has sufficient potential to become a major hub city in transportation, logistics, distribution, tourism, knowledge industry, business, and finance. Since Melaka already has geographical advantage and competitive transportation infrastructure will be strongly enhanced by the HSR and BRT corridors, the first step should prioritize strengthening the integration of land use and transportation infrastructure planning by developing and connecting strong nodes concentrating economic activity. Lastly, new functions such as business, finance, and knowledge industries should be gradually developed in accordance with the city’s growth.

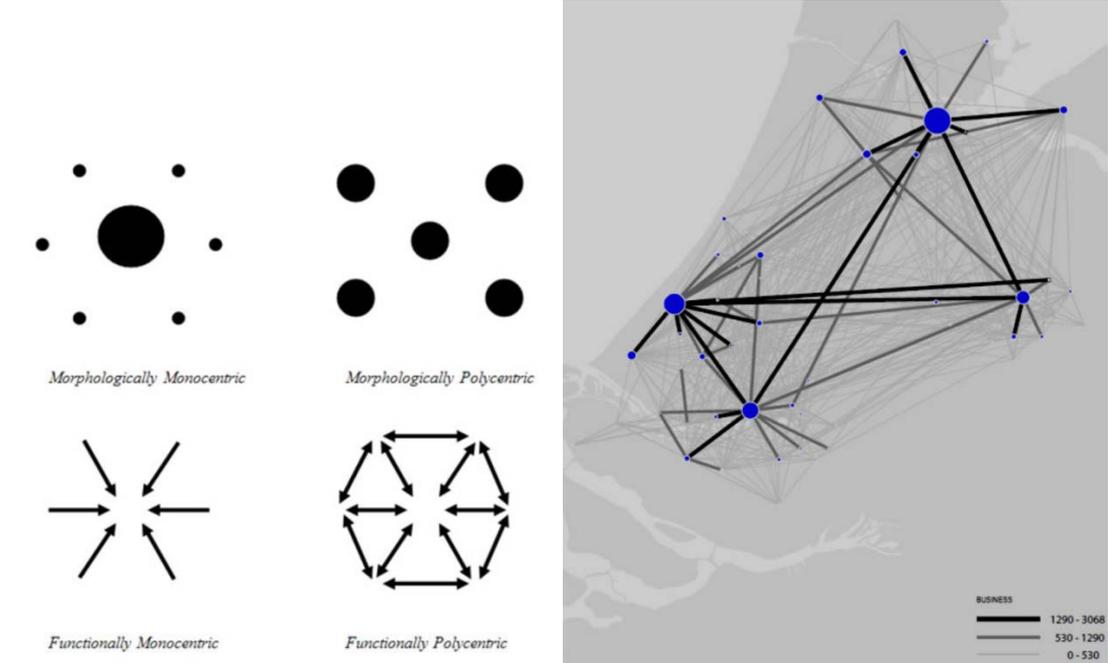
Figure 23 Distribution plan of industrial areas in Melaka State and proposed plan of industrial Clusters in State Structure Plan 2035



Melaka should evolve functional polycentric development by integrating its nodes into a connected network. Such a hierarchical connectivity can be found in Randstad in the Netherlands for example. It fosters the emergence of a polycentric system of human settlements at different scales with an efficient economic specialization. In such systems, different human settlements play different roles and connections to the primary city allows secondary cities to be well connected to the national and international economy. Human settlements in efficient polycentric patterns are differentiated by characteristics such as size, location and population density. Human settlements of different sizes complement each other with large cities, secondary cities, towns and villages, all linked by complementary functions. Major cities typically concentrate services and innovation, while secondary cities and medium-sized cities, which typically have more land, concentrate manufacturing and may specialize in specific industries based on their comparative advantages and strategies. Smaller towns connect rural and urban areas and act as market centers for agricultural products and other rural outputs. An efficient structure of transportation connectivity is needed to support such an integration of human settlements in Melaka state and their functional complementarity. These economic regional development processes have infrastructure investment implications. Multimodal transportation infrastructure is necessary for Melaka state efficient integration into a

system of complementary human settlements. The policy implication is to reinforce the present hierarchy of 40 human settlements in Melaka State and reinforcing them as a hierarchy of nodes rather than erasing this hierarchy by developing in a fragmented way half of the State land.

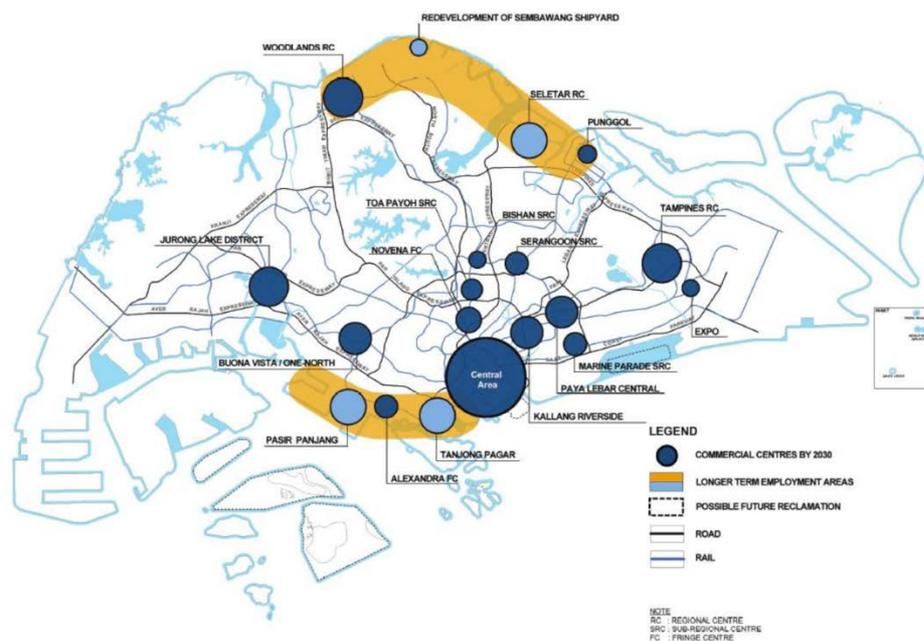
Figure 24 Morphological Polycentric Development versus Functional Polycentric Development (left) and Business Travel in the Randstad (right)



Source: Burger et al. 2014.

Box 9 Singapore polycentric development strategy

At just over 700 km², Singapore is one of the smallest and most land-scarce countries in the world. With perennial land constraints, foresight and careful planning are critical to achieve an optimal balance between competing demands. Singapore's Concept Plan provides broad strategic guidance on land use over a 40 to 50-year period, while the Master Plan sets out more specific land-use plans over the next 10 to 15 years. These blueprints are a hallmark of Singapore's urban planning framework. They are developed by the Urban Redevelopment Authority (URA), Singapore's urban and land-use planning agency, in consultation with other government agencies and private stakeholders, experts and citizens.



Source: Singapore Ministry of National Development, January 2013.

To reduce peak-hour congestion from traffic flowing in and out of the city-center, regional and fringe centers outside of the city center were introduced in the 1991 Concept Plan to bring jobs closer to home. Tampines Regional Centre and Novena Fringe Centre have since become bustling hubs, offering a mix of offices, retail, entertainment, and commercial facilities. Over the next 15 years, three new hubs are planned to support further growth in the commercial, retail, and entertainment sectors. The largest of these to be developed is Jurong Lake District in the West. The other two are Kallang Riverside at the fringe of the city centre and Paya Lebar Central in the East. Each of these hubs will have a different economic focus and unique identity, while Marina Bay and the city center will continue to be the key business and financial district.

Table 12 Recommendations Action Plan for Melaka’s Land Use and Urban Form

Item	0–4 Years	5–9 Years	10 or more Years
<p>4-A Incentivize higher density, mixed use, green, and compact developments with flexible land use regulations</p> <p>Lead Agency:</p> <ul style="list-style-type: none"> • PLANMalaysia Melaka 		<p>5 years</p>	
<p>4-B Shape a compact polycentric urban form and develop well-connected nodes</p> <p>Lead Agency:</p> <ul style="list-style-type: none"> • PLANMalaysia Melaka 			<p>15 years</p>

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Urban Form Annex A: List of Indicators Analyzed

During the Melaka Sustainability Outlook Diagnostic process, the indicators listed in the Measuring Framework of the Urban Sustainability Framework (GPSC, World Bank 2018) were referred to. This supporting report references the Enabling Dimension 1 regarding Integrated Urban Planning and Governance. Table 14 records Melaka’s status compared to each indicator. A legend of the possible statuses is included in table 13.

Table 13 Indicators Legend

Status	Description
Adequate	The current data is adequate to measure and monitor the dynamic observed.
Outdated	The current data and statistics dates from five years ago or longer and needs to be updated.
Missing	Statistics are currently unavailable.
Needs Revisiting	Information exists, but may no longer be adequate to measure the situation effectively. Revisiting the statistical definition of the indicator and the data collection is needed.

Table 14 Summary of Indicators Referenced to Analyze Melaka’s Land Use and Urban Form

1.1 Vision and Long-term Strategic Planning	Status
Existence of vision and long-term planning and strategy	Adequate
Number of planners per capita	Missing
Existence of an implementation process with measurable goals and indicators for monitoring progress	Adequate
1.2 Stakeholder Participation ²¹	Status
Presence of a structure that allows civil society to directly participate in urban planning and management and that operates regularly and democratically	Adequate
Number of stakeholders involved in decision-making activities, and mechanisms to encourage community engagement	Adequate
1.4 Trend Analyses	
Population and projected growth in the next 10 to 20 years	Adequate
Population density with time series and future trends (population/built-up area)	Adequate
Job density with time series and future trends (number of jobs/built-up area)	Adequate
Demographic structure: dependency ratio and expected trend	Adequate
1.5 Land Use and Zoning	
Average share of the built-up area of a city that is open space for public use by all, by sex, age, and disability status	Missing
Proportion of national population living in cities that implement urban and regional development plans integrating population projections and resource needs, by size of city	Adequate
Years since land use plan was reviewed and updated	Adequate
Density, integrated land use: Transit-oriented development promoted	Adequate
Use of existing built-up areas: Mixed-use development promoted through zoning regulations/incentives	Missing
1.6 Urban Growth Patterns	
Ratio of land consumption rate to population growth rate	Adequate
Annual growth rate of built-up areas as a percentage of total area	Adequate

²¹ Focus area 1.3 indicators for data management are found in section c of this report titled *Leveraging Data for Integrated Planning*.

Built-up land area in square meters per person and its evolution over the last two decades	Adequate
Percentage of urban development that occurs on existing urban land rather than on greenfield land	Missing

Urban Form Annex B: Additional SWOT Information

Strengths:

- 1. Long-term vision and strategic plan, with budgeted priority actions, with multiple agencies and civil society participatory processes, with goals and indicators to monitor progress**^[1]_{SEP}

Melaka has put in place mechanisms for preparing and financing its strategic plans with institutional coordination across different levels of government. Melaka has a comprehensive and detailed long-term strategic and participatory planning processes in place to ensure inter-agency coordination.
- 2. Fast population and employment growth; anticipated doubling of GDP/capita and multiplication by 5 of GDP catapulting Melaka in middle-high income cities**

Melaka is expected to increase its population by 70 percent in the next 20 years, where it is forecasted to grow twice faster than Malaysia average and 3 times faster than in Penang State.

Weaknesses:

- 1. Coordination and timing challenges between local and federal agencies and plans**

Large project investments that are designed and planned centrally may not reflect local knowledge and priorities, while some local plans and zoning may be inconsistent with State-issued land titles and projects initiated at higher levels.
- 2. Weak integration of planning dimensions (e.g. land use and transportation)**

The master plan for regional public transport takes time to become finalized, while at municipality level pressing public transport issues and pressure from developments necessitate faster decision making by local authorities.
- 3. Insufficient specialized staff**

Malaysian local authorities face constraints in terms of staff and their technical expertise. They have difficulty recruiting, motivating and retaining the right staff; they face staffing controls exercised by the federal-level Public Service Department, and offer relatively lower pay and fewer opportunities for career development compared to federal and state level agencies.
- 4. High land consumption and much lower densities than Asian counterparts with urban form fragmentation**

Melaka planning in the past has generally provided for excessive amounts of land for development and, as a result, densities are extremely low. The average built-up area population density in East Asia was around 5,800 people per km² in 2010 while it was less than half in 2013, in Melaka, at 2,550 people/km².
- 5. Very low economic density and low economic agglomeration**

As other Malaysian cities, Melaka exhibits a relatively flat spatial form and thus lacks strong agglomeration. The employment density of Seoul, Singapore and Hong Kong is 2.5, 5 and 10 times that of Melaka respectively, while economic density (the gross value-added per km²) of these cities is 10, 32 and 55 times that of Melaka.

Opportunities:

1. **Improvements in capacity, coordination and urban service delivery**
This can be done by shifting more management and decision-making roles to the local level and promoting an enhanced system of local performance indicators.
2. **Efficient use of the present developed land through infill growth**
To develop into a more compact urban form, Melaka needs to relax any overly stringent restrictions on land use, such as low plot ratios. Property developers often find it more financially attractive to build on rural land next to existing urban areas, rather than redevelop brownfield sites within cities. Recalibrating factors such as the premium payable for conversion of land use, and the allowable maximum plot ratio in and near city centers, would help shift incentives toward redevelopment and increasing density, rather than sprawl.
3. **Creation of a growth boundary to protect agriculture land and ecosystems and limit land expansion**
A green and open space network (utilizing rich natural environmental resource comprising forests, mountains and hills, greenery, water bodies to create the image of the city as well as for tourism / recreation) should be more clearly articulated.
4. **Polycentric compact growth and integration of transport and land use with TOD planning**
Since Melaka already has geographical advantage and competitive transportation infrastructure will be strongly enhanced by the HSR, the city should prioritize strengthening the integration of land use and transportation infrastructure planning by developing and connecting strong nodes concentrating economic activity.

Threats:

1. **Excessive amount of land classified as developable in Structure Plan 2035, leading to potential lower densities**
Envisioning multiplying by 2.5 the built-up land in Structure Plan 2035 is a major liability if predictions about GDP and jobs growth are not realized. Furthermore, expansion of the urban extent envisioned in Melaka State Strategic Plan 2035 leads potentially to a reduction by one-third of protected and agriculture land.
2. **Higher costs of low density for citizens and public finance (infrastructure costs) and reduced economic productivity with negative impacts of low density on congestion and transportation emissions**
Excessive land expansion would increase infrastructure needs, lead to longer commute, have a negative impact on local and global environment, increasing congestion, per capita transportation energy consumption and per capita GHG emissions.

Harmonizing Melaka’s Urban Fabric

Introduction

Achieving a sustainable urban fabric requires using physical identity characteristics typical of traditional cities and evolving them with urban design strategies utilized for modern developments. As cities grow and modernize, the approaches of tackling environmental, social and cultural challenges plays a vital role in an evolving a sustainable urban fabric. The overall urban fabric is fundamental to the quality of life and has benefits in terms of strengthening social and physical cohesion and enhancing the city's appeal to residents, tourists, and businesses alike. When urban fabric is preserved and simultaneously evolved with new developments, cities have a chance of being responsive, sustainable, and vibrant spaces.

Unlike Singapore, Melaka has a long urban history as a rich merchant city from the early fifteenth century, specializing in the trade of spices and minerals with China, India and Arabia. The influence of Asia and Europe then gave the city an intrinsic multicultural heritage with both tangible and intangible values. In 2008, UNESCO listed Melaka as a World Heritage Site (WHS) together with George Town, Malaysia (UNESCO 2017). Melaka has successfully leveraged its cultural and historical tangible heritage (such as Malay, Chinese and Indian monuments in the historic urban fabric), as well as intangible heritage (such as food, oral traditions and the performing arts). These advantageous traits have strengthened Melaka’s local identity and global appeal.

Image 2 “A Famosa” Portuguese fortress constructed in 1511



Source: “[Melaka 2016](#)” by Mohd Fazlin Mohd Effendy Ooi [CC BY 2.0](#).

However, in the last 20 years the overall urban, and more specifically the street landscape, of Melaka has changed considerably because of the rapid growth of the urban built-up area and the shift of the city becoming predominately car-orientated. Melaka shares with other fast-growing cities common urban sprawl issues, which entails occupation of large areas of land, inefficient land use, high car dependence, low density, and high levels of segregation with mono-functional urban fabrics. Current patterns of growth in Melaka translate into a fragmented urban space where the urban uniqueness is lost. These new developments are car-oriented and pedestrian unfriendly. Compared with its traditional urban fabric, Melaka's new sprawling urban form is of a very different nature— far from the scale, vibrancy, and livability of the core city.

Moreover, the fast-growing tourism sector has put pressure on Melaka's infrastructure, accessibility and livability, which may undermine Melaka's appeal. Today, the World Heritage Site is a relatively small portion of Melaka's sprawling urban extent (making up less than 1 percent of the total built-up area), and efforts to enhance the state's identity and quality of life should encompass all neighborhoods and communities, not only in the historic center.

This section of the supporting report is organized around the following two key messages:

4-2 Leverage Melaka's cultural, historical, and natural heritage

4-3 Harmonize Melaka's urban fabric

To thrive, Melaka is advised to create a strong urban fabric throughout its urban areas. This leads to three main recommendations:

4-C Adopt a sustainable approach to conservation

4-D Increase livability with a more vibrant public realm

4-E Pursue a more harmonious urban fabric by applying sustainable and historical urban landscape principles to development

Box 10 Urban Identity SWOT Assessment

A Strengths, Weaknesses, Opportunities, and Threats assessment was carried out for the urban identity of Melaka. The underlying message is that Melaka should to create a strong urban identity throughout the urban areas, not just in the historic center. Further elaboration is included in Annex B.

<p>Strengths</p> <ol style="list-style-type: none"> 1. Five centuries of complex and multicultural history 2. Well-preserved UNESCO Heritage Site, with unique urban fabrics, monitored by a comprehensive Special Area Plan 3. Blend of different cultures and religions creating a unique vitality and vibrancy 4. Enormous potential for cultural tourism 	<p>Weaknesses</p> <ol style="list-style-type: none"> 1. Gaps in the monitoring system and funding for the World Heritage Site 2. Loss of Melaka original streetscape and urban fabric patterns in the recent developments that represent 99 percent of Melaka 3. Poor integration between Melaka urban fabrics and fragmented mono-functional patchwork development
<p>Opportunities</p> <ol style="list-style-type: none"> 1. Geographical location: position as a sea, port, and tourism center 2. Historical and cultural wealth of the city 3. Leveraging on the Heritage to create a Dynamic Historic Living City 4. Implement historical urban landscape principles in the sustainable design of new neighborhoods 5. Increase livability with public realm and high-quality green spaces 6. Becoming a brand name in cultural tourism 	<p>Threats</p> <ol style="list-style-type: none"> 1. Negative impacts of mass tourism on local population way of life 2. Displacement and aging population in the World Heritage Site that may lead to disappearance of living traditions 3. Emergence of a sprawling city where the Heritage Site will represent less than 0.5 percent of the city

Key Message 4-2: Leverage Melaka's Cultural, Historical, and Natural Heritage

The city of Melaka is the result of 500 years of commercial and cultural contact between the East and the West. Immigration and influence from many parts of Asia and Europe have created a specific multicultural identity that manifests itself in tangible and intangible heritage, such as different ethnic groups and functions, religious pluralism and streets lined with typical shops and religious buildings. Multiculturalism and religious pluralism are among the major attractions of cultural tourism of Melaka's WHS. To add to these attractions, many of their religious buildings that continue to serve the communities have become iconic architectural buildings, with a strong tourist appeal.

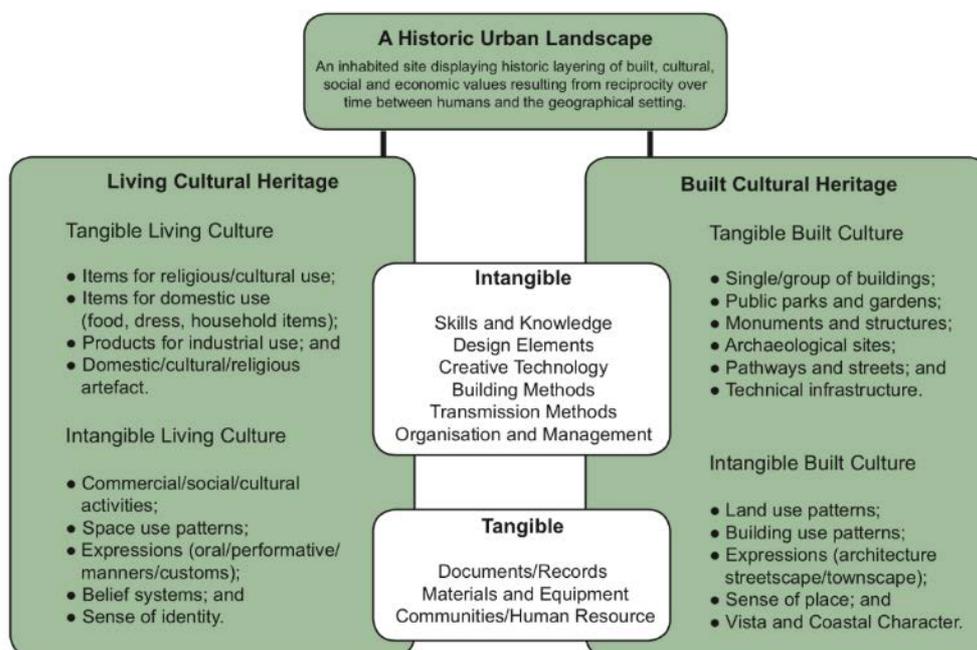
However, there are significant risks about the carrying capacity of the heritage site, which was not designed for the pressure of 25 million tourists, the preservation of intangible heritage, the way of life of the inhabitants, the integration of urban fabric scales between historical and modernist, and about access to the city center. The heritage zone is now dominated by cars - both driving and parking - with insufficient space for non-motorized transport (NMT). In addition, new enclave developments on the heritage site show off-scale generic modernist shopping malls and hotel architectures that create a break with Melaka's historical typology.

Melaka's historic town consists of 45.3 hectares which has two main areas. The first is the civic area of St. Paul's Hill which has several government buildings, museums, churches, town square and original walled city from the 16th century's Portuguese and the Dutch periods. The second is the historic residential and commercial area with more than 600 shophouses, commercial, residential and religious buildings and tombs on four main streets. This core zone is protected by 242.8 hectares of buffer zone providing an additional layer of protection to the World Heritage property (UNESCO 2017).

The character of the historic city of Melaka is also reinforced by the unique urban qualities of the streets and buildings which forms an urban landscape putting the World Heritage property into a wider context. "This wider context includes the site's topography, geomorphology and natural features; its built environment, both historic and contemporary; its infrastructures above and below ground; its open spaces and gardens; its land use patterns and spatial organization; its visual relationships; and all other elements of the urban structure..." (Historic Urban Landscape recommendations for Melaka, Special area Plan).

Compared with other cities in Malaysia, the urban landscape of Melaka is quite unique because of its sense of enclosure and the mix of houses, shops and places of worship. Along the narrow streets of Melaka, lined up on both sides, are rows of shophouses, mostly two and three stories high. The streetscape of these shophouses is punctuated by several religious buildings, mainly Malay mosques, churches, Chinese and Indian temples, dialect groups and clan associations. In addition to this is the unique blend of facades, which creates a sense of variety in unity - with each building along the streets being different from the others, while giving a sense of coherence. Melaka WHS is a vibrant city maintained alive by the communities that live and work there, thus, determining the historic urban landscape by human activity. The chart shown in figure 25 summarizes the layering complexity of an historic urban landscape.

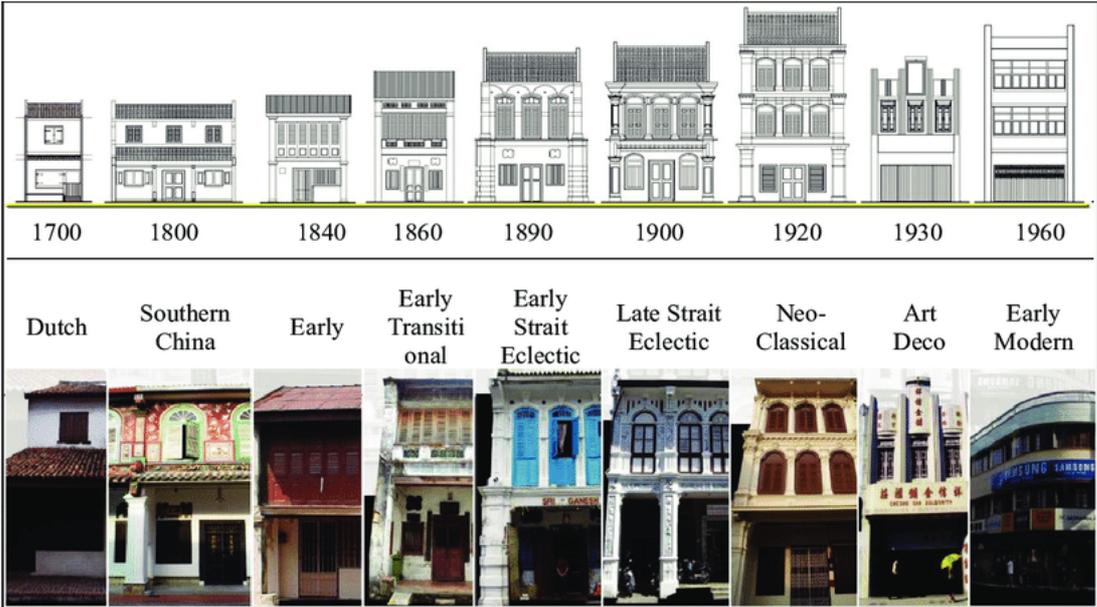
Figure 25 Historic Urban Landscape Layers



Source: Special area Plan, Melaka, Historic Cities of the Straits of Malacca.

The architectural landscape remains relatively intact and operate a cultural fusion of Portuguese, Arab, British, Chinese, Dutch, Indian and Malay influences. The result of a long process of typological transformation, the first shophouses developed in the 18th century and can be considered as a mixture of the Dutch tradition of efficient land distribution, local style and especially South Chinese construction (Firley and Stahl 2009). The typology made the best use of scarce resources. Shophouses in Melaka are extremely diverse and correspond to a long process of transformation. Within the Core Zone of the Historic City of Melaka there are more than 600 shophouses and town houses of different styles and influences, which can be divided into several categories, depending on their façade designs and such as: Dutch style; Southern China style; early shophouse style; early transitional style; early Straits eclectic style; late Straits eclectic style; Neo-Classical style; Art-Deco style; early Modern style. Further information regarding Melaka's shophouses is shown in Figure 26.

Figure 26 Melaka Shop House Types



Source: Documentation and Conservation Guidelines of Melaka Heritage Shophouses (2012)

Image 3 Jonker Street night festival



Source: "P7205466" by Tatsuya Fukata CC BY-NC-ND 2.0.

Figure 27 Urban fabric of Melaka’s UNESCO Heritage Area: Lot sizes (top) and shape factor (bottom)



Note: the shape factor is the length/width of lots. Source: Urban Morphology and Complex Systems Institute. Map source: Melaka GIS database.

Melaka has prepared a comprehensive Special Area Plan for the WHS under the Town and Country Planning Act 1976 (Act 172). The Special Area Plan is a statutory plan with legal support and has a strong impact on communities in these areas. In addition, special area plans are available for public review and objection prior to final adoption. Therefore, their recommendations and guidelines for the WHS are open to public debate and review. The plan has a monitoring strategy, with a set of initiatives, each with timelines and indicators that allow for regular monitoring of their progress.

According to the World Heritage Site Special Area Plan, the preservation and conservation activities at the World Heritage Site (WHS) in Melaka therefore aim to achieve the following objectives:

- Preserve the originality and authenticity of the multicultural living urban landscape
- Optimize and revitalize the use of cultural heritage for economic, social, cultural and educational development
- Preserve and transmit the continuity of significant values of living and built cultural heritage
- Maintain the close links between communities and their cultural and social ties and strengthen the feeling and pride of belonging; and
- Offer visitors the unique opportunity to live an authentic multicultural life

The Special Area Plan also recognizes the value of incorporating some of the concepts and tools of the UNESCO Preliminary Report to prepare a more integrated, visionary, realistic and inclusive approach to conservation management on the site. These concepts are:

- A global sustainability framework
- A landscape approach to conservation
- Observing the connectivity between built and living culture
- Comprehensive protection and development
- Multicultural and historical stratification of urban fabric and form

Figure 28 Sustainability consideration for the dynamic conservation of the heritage area.



Source: Special Area Plan, Melaka, Historic Cities of the Straits of Malacca.

However, the WHS is facing further development and gentrification that could undermine its cultural heritage in the medium and long-term. The potential for cultural tourism is enormous for the WHS but this growing demand puts considerable pressure to change the use of buildings to meet the expectations of tourists. The WHS is a living city and thus meets a variety of pressures and development demands that, if left on their own, could threaten its Outstanding Universal Value. It is therefore necessary to harmonize the need for urban regeneration to meet the demands of the tourism industry with the maintenance of local life, its diversity and its multiculturalism. The objectives of supporting the local economy, creating jobs and protecting cultural heritage sites should not be in conflict but be perceived as being consistent with each other.

The WHS still has a relatively large number of people residing in the core and buffer zones that may be impacted by tourism. Different communities such as Malays, Chinese, Indians, Arabs,

Baba-Nyonya Peranakan and Eurasians, each practicing their own culture and beliefs, enrich the WHS and create a vitality and vibrancy that are unique to them. The city is well known for its unique arrays of food that are one cornerstone of the tourism industry. However, tourism is presenting both challenges and opportunities for the population living in the WHS. This new activity has created various development pressures on properties in the WHS, with the transformation of shophouses into boutique hotels and commercial premises, which in turn have an impact on the living population that could be uprooted.

Moreover, the potential negative effects from displacement and aging population in the WHS are as follows (Special Area Plan Melaka):

- The slow out-migration of traditional businesses away from the Property Zone due to a lack of business;
- The closure of schools that are part of the cities' heritage;
- The declining population to sustain the vibrancy of city life;
- The loss of multi-culturalism; and
- The gradual decline of traditional skills and crafts from the lack of available replacement from the existing population.

As early as 2008, ICOMOS considered that the monitoring system of the heritage site should be improved by defining and implementing a more complete set of key indicators covering all the components of urban and architectural heritage. In a city with a living heritage, buildings are constantly used, adapted, repaired and remodeled by tenants and landlords according to their needs and resources. Such changes require authorizations and approvals from the authorities, without which these changes could threaten historical legacy. Legal requirements are in place to manage changes and modifications, where the local authority relies on a set of statutes and guidelines for renovation and restoration of heritage buildings. The owners, on the other hand, feel they lack knowledge and are insufficiently informed. Research on buildings and materials is an ongoing task and many efforts are being made to help homeowners, but there are still gaps. Monitoring and enforcement are weak and there are gaps in funding. Many homeowners in the WHS also do not have the financial resources to undertake repairs and restoration and there is a lack of incentives to motivate the homeowners to do more. All of this requires manpower and resources among the authorities and these still need to be effectively put in place. The size of the WHS requires a concerted effort by all levels of government to ensure that actions are broader in scope and deeper in implementation.

Key Message 4-3: Harmonize Melaka's Urban Fabric

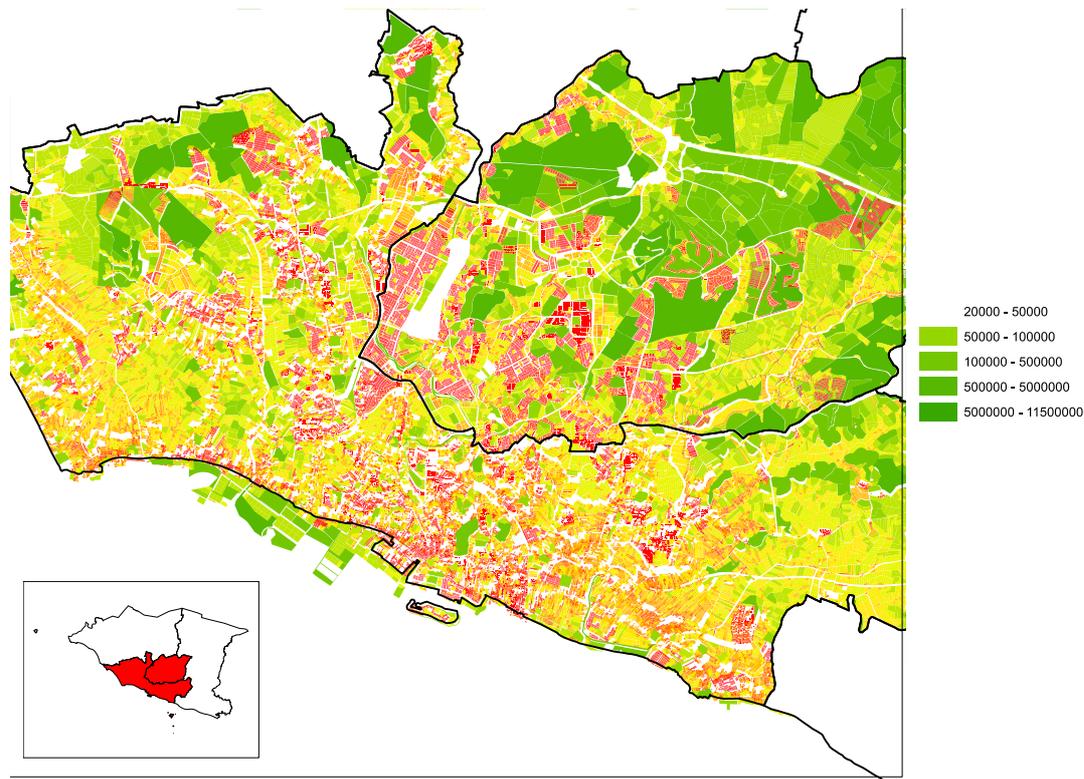
If the developable land in Melaka 2035 Structure Plan were fully developed, the original historical city would represent less than 0.05 percent of Melaka's built form. Moreover, the wide expansion of Melaka in the Structure Plan and the forecasted large influx of tourists raise issues of conservation of other sites beyond the listed heritage, such as typical kampongs that could diversify the destinations for tourists and be leveraged for creating a green livable city image for Melaka. The buffer zone represents only 0.4 percent of the present central city, and the areas immediately adjacent to the walkable and fine grain heritage streets are occupied by out of scale giant hotels and malls isolated in the middle of huge roads and parking lots.

There is an urgent need to integrate Melaka's urban fabrics with more harmony. In the historical center, a traditional plot system with long and narrow plots has been preserved, which gives scale and diversity to the buildings, and character to the streets. The ICOMOS nomination presented a number of policies and mechanisms to mitigate the potential adverse impacts of new developments and stated that there is a need to introduce an urban conservation guideline to stop more indiscriminate development projects. Beyond the heritage area, there is need to create and implement guidelines for developing a more harmonious urban fabric across the entire city.

Melaka's urban fabric can be decomposed into seven different types that show strong morphological differences: UNESCO WHS core area, buffer zone, walk-ups (mixed-use dense walkable urban places), tower blocks, industrial or warehouse, mono-functional residential in regular street patterns, and low density linear residential developments. Among these, Heritage area, buffer zone and walk-ups occupy a very small percentage of the built-up area.

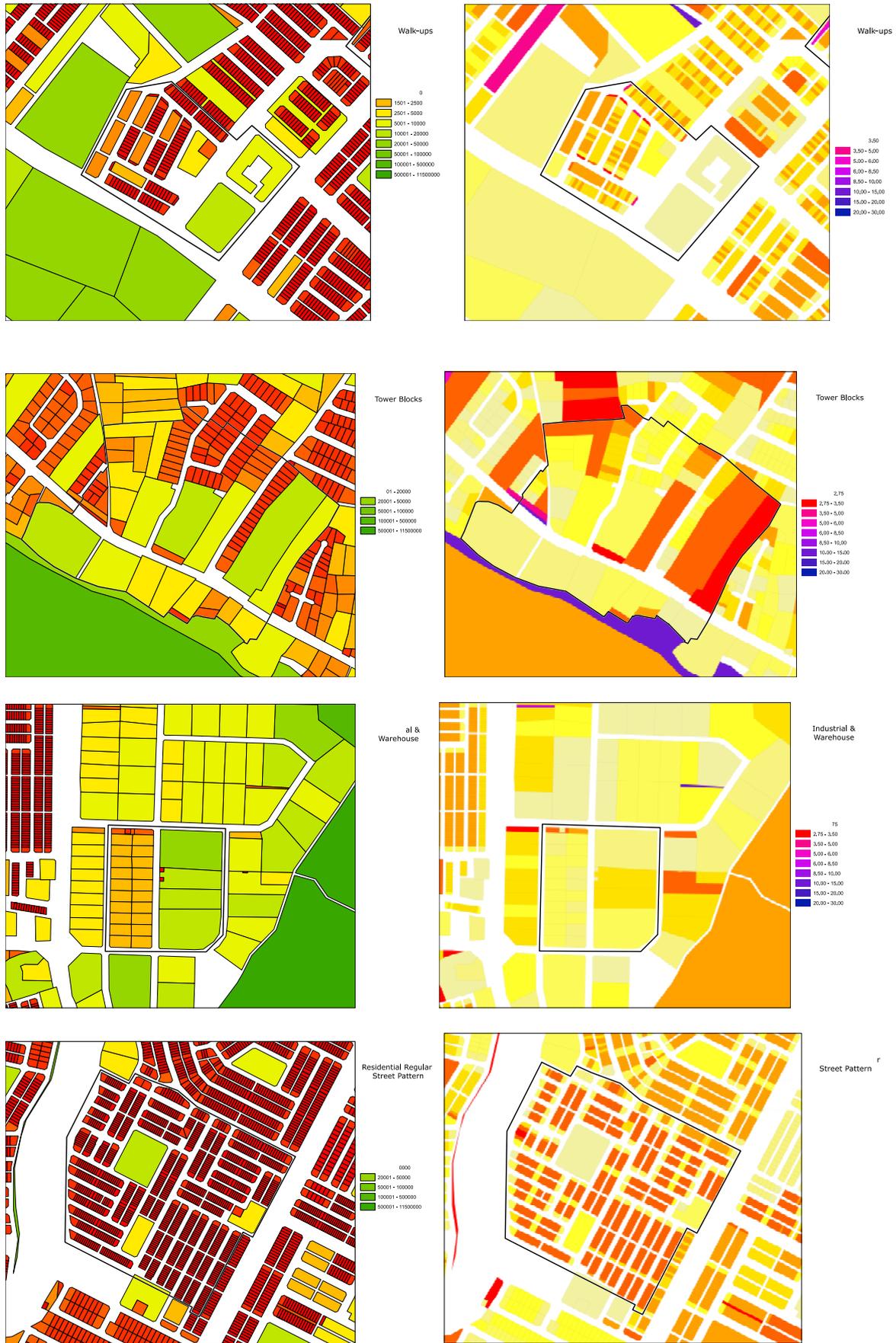
These morphological types are analyzed below with 4 indicators: *Average Block Size* is an indicator strongly correlated to the density of streets and the density of intersections and thus to the walkability of the neighborhood; *Average Lot Size* defines the grain of the urban fabric, the smaller the lots, the more human scale the urban fabric is; *Average Number of Lots per Block* defines the differentiation of the urban fabric; *Average Lot Shape Factor* (length / width of the lot) allows differentiating between traditional urban form (shop houses with elongated narrow lots) and more recent types of urban fabric. The analysis shows a strong difference between lots in the Heritage area (shape factor of 3.11 on average with some lots over 10) and other urban fabrics. The shape of city fabric changes significantly when leaving the buffer zone. As lot shape factor and average lot size differentiate strongly the morphological types, samples of the different types are shown below with a mapping of indicators. The maps in figures 29 and 30 present lot sizes in Melaka Tengah and their shape factors.

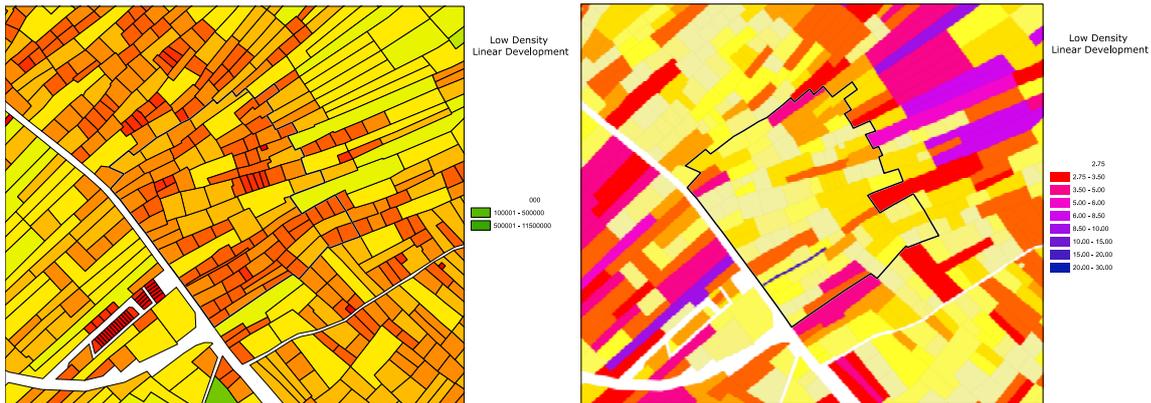
Figure 29 Melaka Tengah District Lot Sizes



Source: Analysis produced by Urban Morphology and Complex Systems Institute from Melaka GIS database.

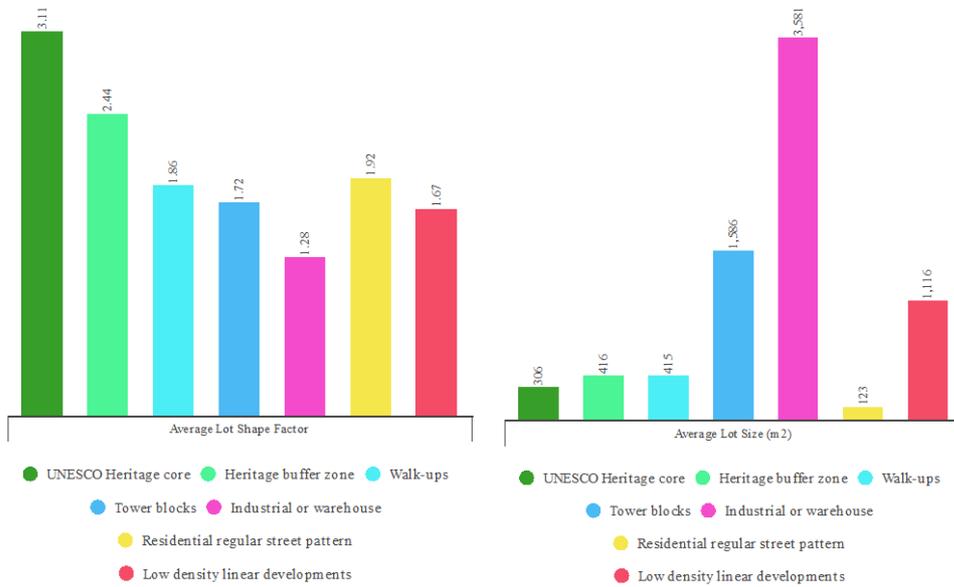
Figure 30 Lot Sizes (left) and Shape Factors (right)





Source: Analysis produced by Urban Morphology and Complex Systems Institute from Melaka GIS database.

Figure 31 Average lot shape factor of Melaka's urban fabric types (left) and average size of lots (right)

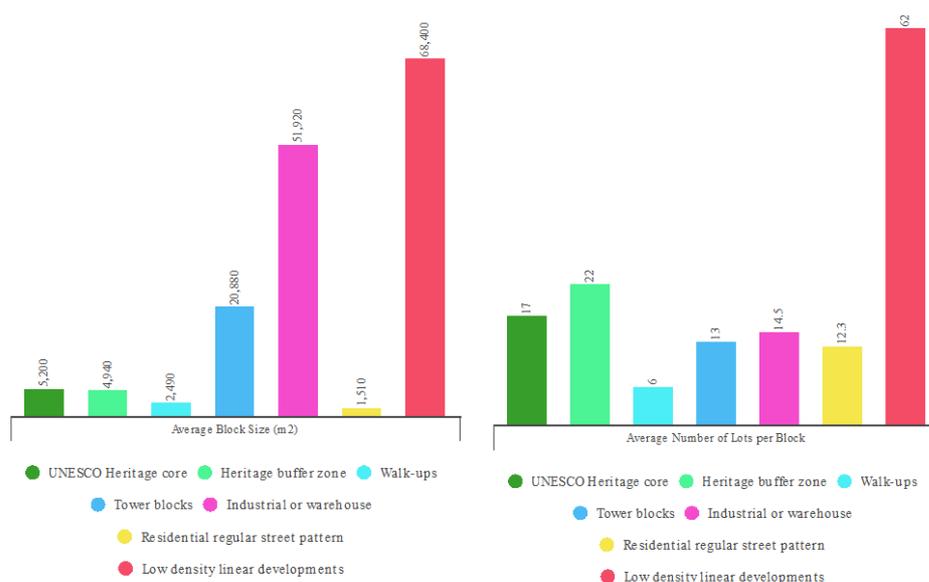


Source: Urban Morphology and Complex Systems Institute. Data source: Melaka GIS database.

The recent urban fabric does not follow elongated lot patterns characteristic of shophouses, with a depth of the plot on average more than three times its façade street width. The lots are less deep outside the buffer zone. This reflects deep changes in the residential architecture and in the mixed-use nature of the urban fabric. The reason for the narrow plot sizes was not only the convenient width in terms of structural efficiency – being the maximum span of a timber beam – but also the economically most favorable ratio between the street space and valuable façade perimeter. The Dutch influence on the development of this type is not based on an architectural model but on the long-term influence of their real-estate culture. By contrast the new plot shapes and sizes show a wasteful use of land.

The differences in average lot size across the different types confirm strong discrepancies between the scale and shape of the types. Coarse grain tower blocks and industrial warehouses contrast with the traditional urban fabric densely woven with diversified shophouses. Lots in low-density linear developments are nine times bigger than in residential regular street patterns, and almost four times bigger than lots in shophouses, also reflecting an inefficient and wasteful use of land.

Figure 32 Average block size of Melaka urban fabric types (left) and average number of lots per block in Melaka urban fabric types (right)



Source: Urban Morphology and Complex Systems Institute. Data source: Melaka GIS database.

The heritage core and buffer present positive attributes to sustainable cities, allowing both street continuity and a high diversity. However in Melaka expansion, the much bigger blocks of high-rise buildings, warehouses, and low-density linear developments fragment the urban fabric by intermingling their coarse grain amidst the small-grain of other developments. The most striking contrast is between block sizes in regular street patterns reflecting planning control and low-density linear development reflecting unplanned transformation of agricultural land plots into residential areas. While the two urban forms accommodate single family row houses or detached houses, block sizes in low density linear developments are almost 50 times bigger than in the planned regular street patterns. This not only limits the walkability but reflects a waste of land and reduces dramatically the density at the fringe of the city.

Horizontal Analysis

Melaka's shophouse urban fabric has been compared with other cities which have similar uses, typologies, and architecture. Similarities include firstly the uses being predominantly residential or mixed, such as Melaka's shophouses which are historically a mixture of commercial and residential uses. Secondly, as the Melaka shophouse is typologically situated between the courtyard and the row houses, these two urban fabric shapes are explored. Third, each morphological type has also been interpreted by contemporary architects to create outstanding new modern architecture, with more harmony, continuity, and coherence in the urban fabric. A figure ground comparison of urban fabrics is shown in figure 33.

The Japanese *machiyas* are shophouses having retail or work units on the ground floor and accommodating the owners or tenants on the upper levels. An interesting case of urban evolution is Kyoto where square blocks dating back from its foundation, 1200 years ago, according to a plan inspired by Chinese capital cities, were subdivided 600 years ago into narrow and elongated lots for building merchants' houses called *machiya*. Dating back to the 17th century in its present configuration, *kyo-machiya* which are typical of Kyoto, are exemplary for their internal organization. Over a relatively small surface, each house combines up to five different architectural elements: a commercial area, a residential area, one or more courtyards, a storehouse, and a large corridor, appearing as a small city within the city. Second half of 20th century Tokyo houses have been chosen as examples of a typological mixture of the row house and the detached villa, creating a dense carpet of individual houses.

Longtan or *lilong* (lane) houses built in Shanghai between the 1870s and the 1930s have been chosen as another example of mixture of Chinese and Western – predominantly British – influences, juxtaposing differently-scaled housing types and styles.

Similar to the Japanese case, in Europe most shophouses, such as the rowhouses of Amsterdam, have retail or work units on the ground floor and accommodate the owners or tenants on the upper levels. Terrace houses with mews in London’s Eaton Place, dating from 1828-1850, show the skilled insertion of lanes in the interior of each block as a suitable model for socially and formally diverse environments.

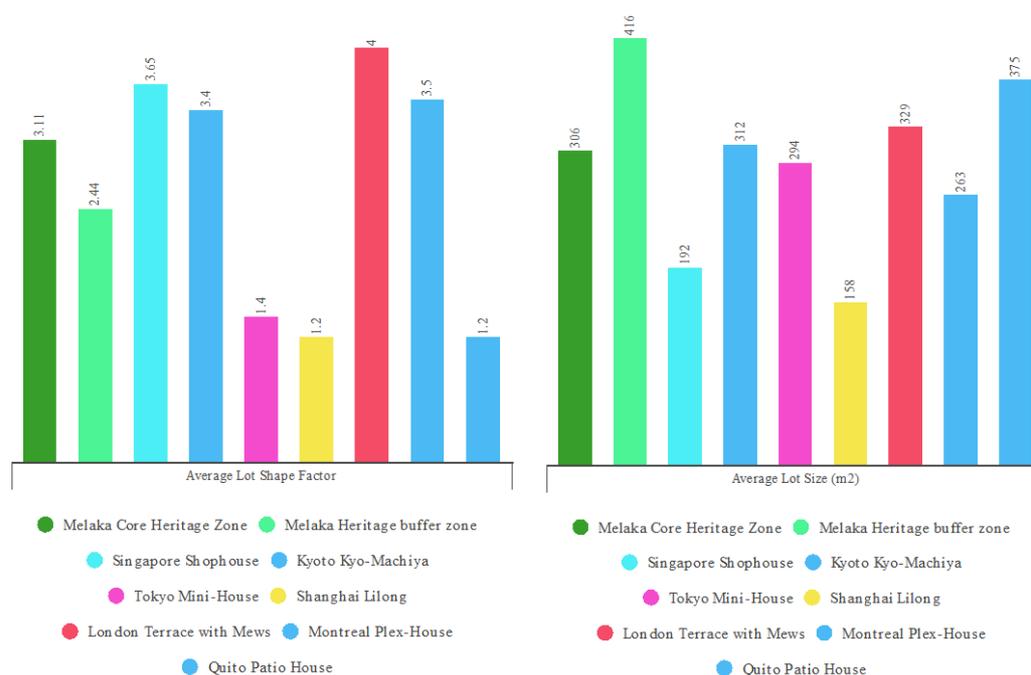
Looking to the America’s, Montreal’s plex houses (1880 – 1930) are an example of vertical densification of single family houses, leading to solutions for small-scale livable apartment buildings including lanes and communal gardens. As an example of planned Latin American cities, the 19th century patio houses in Quito old town, Ecuador, are built around an internal courtyard. The most striking feature of the street pattern is the dense and regular orthogonal grid.

Figure 33 Comparator Urban Fabrics



Source: Firley et al. 2009.

Figures 34 Average lot shape factor of Melaka Heritage Zone and of comparator cities (left) average lot size of Melaka Heritage Zone and of comparator cities (right)



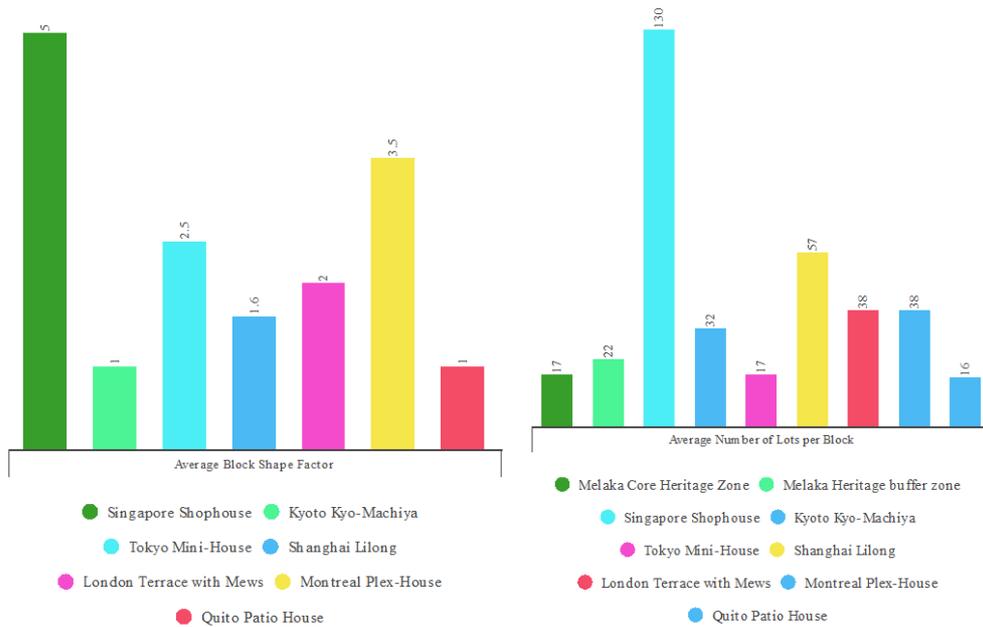
Source: Urban Morphology and Complex Systems Institute. Data source: Melaka GIS database and Firley et al. 2009.

Narrow and deep lots, that characterize Melaka heritage urban fabric, are also found in Singapore shop houses, in Kyoto merchants' houses (kyo-machiya) and in terrace houses such as the ones in London and Montreal. This pattern can accommodate multiple variations and levels of densification, including evolving towards apartment patterns such as in Montreal. This urban form is distinct from other typologies comprising square lots such as Tokyo's mini-houses, Shanghai lilongs, and the lots found in the square blocks of Latin American cities, such as exemplified by Quito.

Average lot sizes are quite similar across these historic patterns in Asia, Europe, and the Americas, and all are significantly smaller than the 4 to 10 times bigger lots found in Melaka's new developments. Moreover, Melaka recent lot sizes in tower blocks (1,586 m²) and in low density regular street patterns (1,116 m²) are oversized compared to the average size of lots in recent expansion areas (1990 – 2003) in Singapore (393 m²), Busan (389 m²), and Fukuoka, Thessaloniki, and Palermo (621 m²)²².

²² Source of data for comparator cities: Angel et al. 2016.

Figure 35 Average block shape factor of comparator cities (left) and average number of lots per block of Melaka Heritage Zone and of comparator cities (right)



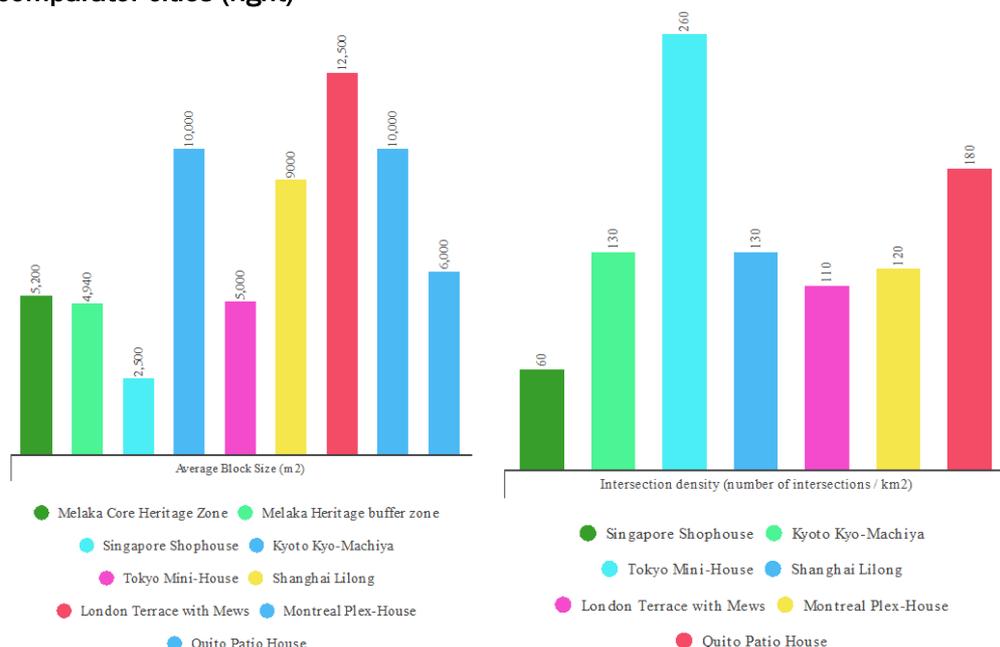
Source: Urban Morphology and Complex Systems Institute. Data source: Melaka GIS database and Firley et al. 2009.

Box 11 Singapore Shop House Types



Note: The urban fabric of Singapore shophouses, when compared to other historic urban fabrics, are characterized by very elongated narrow blocks which have a uniquely high shape factor of five. Source: URA 2012.

Figure 36 Average block size of Melaka Heritage Zone and of comparator cities (left) and average density of intersections (number of intersections per km²) in Melaka Heritage Zone and in comparator cities (right)



Source: Urban Morphology and Complex Systems Institute. Data source: Melaka GIS database and Firley et al. 2009.

Key lesson from the horizontal comparison is that Melaka has a unique historical urban fabric that shows diversity, adaptiveness, and evolution through variation and densification which needs to be preserved. Melaka heritage zone is characterized by small blocks and dense network of connected streets. However, instead of exploiting the potential of evolution of its unique urban fabric - as shown by the Japanese, London, and Montreal examples - Melaka has grown by juxtaposition of heterogeneous types. There is thus an opportunity with infill to deepen the morphological thinking within the detailed planning and to get more inspiration from the unique typology of the historic city.

Image 4 Melaka City's urban fabric



Source: "Melaka 2016" by Mohd Fazlin Mohd Effendy Ooi CC BY 2.0

Urban Fabric Recommended Actions

Create a Dynamic and Historic Living City

Melaka Special Area Plan defines its vision for Melaka as a Dynamic Historic Living City. Such a city “is capable of accepting changes that come with the contemporary epoch and assimilating these new dynamics into its existing historical built fabric, injecting new life into the city without compromising the integrity of its outstanding universal values”. It is a city “that safeguards and protects both its cultural and built heritage, maintains and strengthens the integrity of its components and builds its value on heritage”; a city “with vibrant, established communities, grounded in their cultural traditions, with access to amenities for living, working and recreation”.

A key part of urban legacy in historic living cities is their rich and complex systems of public spaces (Salat et al. 2011). Public spaces, when they constitute a complete and multifunctional urban system, are the first element that constitutes the city life. In recent years, an increasing number of cities, particularly in the South, have successfully used public space as a key driver of urban development, particularly to preserve their historical legacy, to shape their image and identity, to improve mobility and access to basic services, and to stimulate economic activity and investment.

Based upon the analysis, Melaka is recommended the following next steps to strengthen its urban identity. A recommended action plan is also included in table 15.

- 4-C Adopt a sustainable approach to conservation.** Melaka is recommended to put in place measures for sustainable tourism development in the World Heritage Site. Control of tourism pressures should be considered as one of the key goals of the heritage site management plan, as well as measures for decreasing motor traffic or pedestrianizing the heritage site. A comprehensive conservation plan should include all the buildings in the heritage site, including the proper conservation of shop-houses and the adequate techniques of intervention.

Cultural sustainability principles should be used to evaluate development or intervention within the Melaka WHS. Applying these principles of sustainability adds value and supports public and private actions to preserve and improve the quality of the human environment. The purpose of the mechanism will be to instill a culture where sustainability considerations become a core value in planning, design, and policy development.

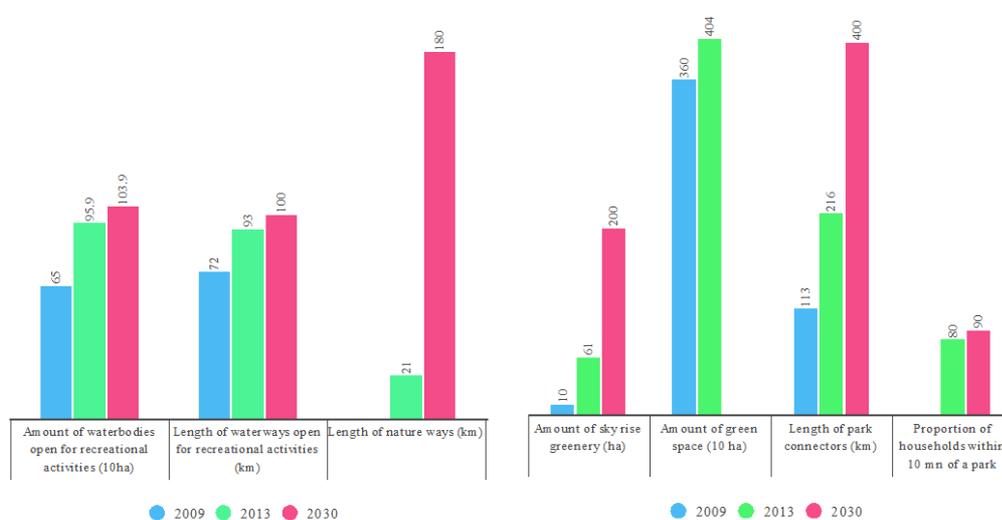
- 4-D Increase livability with a more vibrant public realm.** It is recommended that the city enhances its public realm and builds on its natural assets to enhance its image and global appeal, while developing green tourism and cultural interaction.

A key feature of sustainable cities is a vibrant street life. Melaka needs to develop animated streets beyond the restricted perimeter of the Heritage Zone. Based on the same principles as the traditional streets of Melaka, the new streets should allow for a variety of activities that offer continuous and diverse urban facades. The width of the streets, more important in Melaka than in other cities, are recommended to be scaled down and the role of private transport should be reduced. Moreover, bringing residents closer to parks, waterbodies and waterways will cater to a wide spectrum of social and recreational needs. Melaka needs to actively look for new ways to create more accessible green and blue spaces where people live, work and play, and involve residents more when enhancing these green and blue spaces.

Box 12 Singapore Target: aiming at having 90 percent of people with less than a 10-minute walk to a park by 2030

Today, close to one tenth of Singapore land is devoted to green spaces. Singapore's four Nature Reserves account for 3,300 ha of land. The city's 350 parks offer a wide range of natural and recreational experiences. Today, about 80 percent of Singapore households are within 400 m or a 10-minute walk of a park. The city's target is to increase this accessibility to more than 90 percent of households by 2030. To bring parks closer to homes, the city will provide more neighborhood parks and common greens within residential estates. NParks will also provide better connections between parks through the Park Connector Network. The network will be doubled from its current 216 km to 400 km by 2030. This includes a 150 km Round Island Route which will link major cultural, natural and historical attractions with other parks. Singapore's blue and green targets are shown in figure 37.

Figure 37 Singapore blue and green targets for 2030



Source: Urban Morphology and Complex Systems Institute. Data source: Ministry of the Environment and Water Resources and Ministry of National Development 2016.

Singapore also builds on, protects and reinforces its natural heritage and biodiversity within its urban environment. For example, NParks introduced a Nature Ways program to encourage the planting of biodiversity corridors in urban spaces that link to Nature Areas. These Nature Ways provide habitats and travelling routes for birds and butterflies, as well as bring biodiversity into the city living environment. Singapore aims to create more than 180 km of Nature Ways by 2030 – this adds to the current 8 Nature Ways totaling more than 43 km. NParks will collaborate with residents, community groups, schools and organizations to grow more plants along the Nature Ways and carry out biodiversity surveys to assess the effectiveness of planting efforts.

4-E Pursue a more harmonious urban fabric by applying sustainable and historical urban landscape principles. To mitigate the morphological break between the historic core and new developments and create a city corresponding in its entirety to the vision of a Dynamic Historic Living City, it is recommended to adapt the fundamentals of historic urban landscape to design new developments. These principles should not be limited to the heritage zone but be adapted to the overall development of the city to make it an organic whole. This historical urban landscape approach requires that a new perspective be adopted for the entire city, according to the following principles²³ :

- Examine the land use patterns and spatial organization of the city as a whole (historical and contemporary) to determine the complex use of space and the urban flow of human traffic
- Discover lines of sight that reveal the relationship of urban settlement to geographic landscape and spiritual and cultural expressions
- Reveal the historical stratification and accumulation of culture and tradition as manifested in traditional and modern settlement patterns, gathering spaces, cultural / religious enclaves and commercial enclaves
- Reveal the permeability between geographical and spiritual space and between personal and public space as it manifests itself through human activity (cultural, social and economic)

In particular Melaka should address the issues of its juxtaposition of mono-functional areas by promoting:

- **Mixed land-use.** UN-Habitat recommends that at least 40 percent of floor space should be allocated for economic use in any neighborhood (UN Habitat 2014).
- **Limited land-use specialization.** This is to limit single function blocks or neighborhoods; UN Habitat recommends that single function blocks should cover less than 10 percent of any neighborhood (UN Habitat 2014).

A more sustainable pattern of urban fabric will create sustainable, diverse, and thriving communities in an economically viable manner; encourage accessible neighborhoods and reduce car dependency; optimize land use and provide a network of interconnected streets that make walking, cycling and driving safer, more efficient and enjoyable; provide a variety of lot sizes and types of housing to meet the diverse housing needs of the community at densities that may ultimately support local service delivery.

Conclusion

Melaka's recent extensions lack the complex interconnectedness of the built and living elements that collectively contribute towards the cultural sense of place. When looking at long-term sustainability and unique identity of the city, it is important, beyond conserving the Heritage Area, to plan new developments to retain the strong sense of the connectivity between working, living and recreational opportunities in the city. This connectivity is manifested in the mixed building use (residential and commercial), accessibility to public amenities such as parks, post office, places of worship etc. and commercial chains connecting wholesale, retail and service. Melaka should not limit its identity to the limited area of the Heritage Site, with its multicultural authenticity and its overlay of various dimensions creating an historic palimpsest. It should leverage on its rich history to develop an in depth understanding of the uniqueness of its urban fabric and multicultural vibrancy and develop new high-quality neighborhoods that will become tomorrow's heritage.

²³ Adapted from Special Area Plan, Melaka, Historic Cities of the Straits of Malacca.

Table 15 Recommendations Action Plan for the Identity of Melaka’s Urban Areas

Item	0–4 Years	5–9 Years	10 or more Years
<p>4-C Adopt a sustainable approach to conservation</p> <p>Lead Agency:</p> <ul style="list-style-type: none"> • PLANMalaysia Melaka <p>Supporting Agencies:</p> <ul style="list-style-type: none"> • Chief Executive Officer of the World Heritage Office 	3 years		
<p>4-D Increase livability with a vibrant public realm</p> <p>Lead Agency:</p> <ul style="list-style-type: none"> • PLANMalaysia Melaka 		5 years	
<p>4-E Pursue a more harmonious urban fabric by applying sustainable and historical urban landscape principles to development</p> <p>Lead Agency:</p> <ul style="list-style-type: none"> • PLANMalaysia Melaka 			15 years

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Urban Fabric Annex A: List of Indicators Analyzed

During the Melaka Sustainability Outlook Diagnostic process, the indicators listed in the Measuring Framework of the Urban Sustainability Framework (GPSC, World Bank 2018) were referred to. Urban Identity references the Enabling Dimension 1 regarding Integrated Urban Planning and Governance. Table 4.16 records Melaka’s status compared to each indicator. A legend of the possible statuses is included in Table 4.17.

Table 16 Summary of the Urban Sustainability Framework’s²⁴ Urban Identity Indicators for Melaka

1.6 Urban Growth Patterns	Status
Ratio of land consumption rate to population growth rate	Adequate
Annual growth rate of built-up areas as a percentage of total area	Adequate
Built-up land area (m ²) per person and its evolution over the last two decades	Adequate
Percentage of urban development that occurs on existing urban land rather than on greenfield land ²⁵ (EBRD)	Missing
1.9 Cultural Heritage	Status
Total expenditure (public and private) per capita on the preservation, protection, and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed, and World Heritage Centre designation); level of government (national, regional, and local/municipal); type of expenditure (operating expenditure/investment); and type of private funding (donations, private nonprofit sector, and sponsorship)	Adequate
Number of WHS within 100 kilometers	Adequate

Table 17 Indicators Legend

Status	Description
Adequate	The current data is adequate to measure and monitor the dynamic observed.
Outdated	The current data and statistics dates from five years ago or longer and needs to be updated.
Missing	Statistics are currently unavailable.
Needs Revisiting	Information exists, but may no longer be adequate to measure the situation effectively. Revisiting the statistical definition of the indicator and the data collection is needed.

²⁴ GPSC, World Bank 2018.

²⁵ This indicator measures the ratio of urban development that occurs on brownfield sites to the urban development that occurs on urban fringe greenfield sites. The data should be collected from the building permits database once a year.

Urban Fabric Annex B: Additional SWOT Information

Strengths:

- 1. Five centuries of complex and multicultural history have given Melaka an enormous potential for cultural tourism**

Melaka is a rich merchant city dating back from the early fifteenth century, specializing in the trade of spices and minerals with China, India and Arabia. The influence of Asia and Europe gave the city an intrinsic multicultural heritage with both tangible and intangible values. This blend of different cultures and religions has created a unique vitality and vibrancy with an enormous potential for cultural tourism.

- 2. The well-preserved UNESCO Heritage Site, with its unique urban fabrics, is monitored by a comprehensive Special Area Plan**

Melaka has prepared a comprehensive Special Area Plan for the WHS under the Town and Country Planning Act 1976 (Act 172).

Weaknesses:

- 1. There are gaps in the monitoring system and funding for the World Heritage Site**

Monitoring and enforcement are weak and there are gaps in funding. In particular, many homeowners in the WHS do not have the financial resources to undertake repairs and restoration and there is a lack of incentives to motivate the homeowners to do more.

- 2. In its recent developments that represent now 99 percent of its land area, Melaka has lost its original streetscape**

Melaka shares with other fast-growing cities common urban sprawl issues, which entails occupation of large areas of land, inefficient land use, high car dependence, low density, and high levels of segregation with mono-functional urban fabrics. As a result, there is poor integration between Melaka traditional urban fabrics and recent fragmented mono-functional patchwork development.

Opportunities:

- 1. Melaka geographical position as a sea, port, and tourism center gives the city unique assets**

Melaka geographical location is a strong asset for its future development leveraging on its five-century history as the major waypoint in the Straits of Malacca, which gave the city a unique identity.

- 2. The character of the historic city of Melaka is reinforced by the urban qualities of its historical streets and buildings with a unique mix of houses, shops and places of worship.**

This architectural landscape in the core city remains relatively intact and operates a cultural fusion of Chinese, Dutch, British, Malay, Indian and Arab influence.

- 3. Leveraging on the World Heritage Site and increasing livability with public realm and high-quality green spaces has the potential to create a Dynamic Historic Living City and brand the city in cultural tourism**

Efforts to enhance the state's identity and quality of life should encompass all neighborhoods and communities, not only the historic center. This will relieve excessive pressure on the historical core and brand the city in cultural and green tourism.

Threats:

1. Negative impacts of mass tourism on local population way of life need to be mitigated

There are significant risks about the carrying capacity of the heritage site, which was not designed for the pressure of 25 million tourists. In particular, the displacement and aging population in the World Heritage Site that may lead to disappearance of living traditions.

Leveraging Data for Integrated Planning

Introduction

Integrated urban planning and governance are processes which rely upon a wide range of multi-sectorial data. In order to harness data to inform the decision-making process and achieve advantageous outcomes, cities need to embrace data management as a key function within the local government. This means developing in-house data capacity which allows effective data collection, management, integration and procedures to ensure data is up to date. While at the same time incorporating processes to assist with stakeholder engagement and major government functions such as operations management, and medium and long-term strategic planning.

Data is a valuable asset class for Melaka. From corporations to national governments and public-sector organizations, data is being leveraged more than ever to make evidence-based decisions. Urban areas arguably form the richest data environments, generating a vast amount of data which can be leveraged to inform decision-making. As such, data is becoming an asset class, alongside real estate, infrastructure and human capital, providing several benefits to urban planning and management processes. Such benefits include providing precise indicators to monitor urban dynamics and city performance, cost-effective metrics in evaluating policies and programs, and evidence-based inputs which allow for prioritization and trade-offs.

Melaka's State Structure Plan 2035 requires monitoring and evaluating strategic objectives which the document sets out. The use of data is particularly essential for sectorial areas with strong inter-dependencies such as land-use planning and transportation. The effective use of data as part of the planning process also helps facilitate coordination and prioritization between the state's different sectorial units, as this provides transparency and data-based information on which decision can be made.

This section of the supporting report is intended to provide a high-level assessment of Melaka State's existing urban data framework and capability and to formulate actionable recommendations to strengthen Melaka's overall use of data for more effective integrated planning and governance.

Local stakeholders and government agencies were interviewed about their data framework and data-sharing processes during two engagement meetings held in October and November 2017. They subsequently provided additional information following-up from those meetings. The assessment reviewed Melaka's State Structure Plan (State of Melaka 2018), the Open Data Strategy, existing GIS and mapping tools.

Based upon that information, the section elaborates the following key messages regarding Melaka's data capacity opportunities for integrated planning:

- 4-4** Encourage new data approaches and strengthen data capacity for integrated planning.

This section of the supporting report starts by assessing Melaka's current data situation through a Strengths, Weaknesses, Opportunities, and Threats (SWOT) diagram which is included in box 13. Melaka is also compared against relevant peer cities in box 14. The text then elaborates the two key messages, includes international case studies to illustrate emerging best data practices in those areas, and reviews strategic planning indicators (an elaboration is included in annex A). The section of the supporting report concludes by discussing the emerging risks and challenges that Melaka faces and outlines key recommendations toward action for the state.

Based upon this section of the supporting report’s analysis, the recommendations are as follows:

- 4-F** Address the data gap with alternative data sources and partnerships;
- 4-G** Increase data integration through cross-agency collaboration;
- 4-H** Encourage open source; and
- 4-I** Embrace open data.

Box 13 Data Capacity for Integrated Planning SWOT

The SWOT analysis quadrants below summarize Melaka State’s data capacity for integrated planning. Further explanation regarding each SWOT item are listed in Annex B.

<p>Strengths</p> <ol style="list-style-type: none"> 1. Track record of using data for strategic planning. 2. Spatial data expertise and infrastructure in place. 	<p>Weaknesses</p> <ol style="list-style-type: none"> 1. Lack of systematic cross-agency data sharing practice, protocols and platforms. 2. Significant data gaps prevail. 3. Limited information made available publicly by state agencies
<p>Opportunities</p> <ol style="list-style-type: none"> 1. Political and institutional support in advancing the State’s data capacity. 2. Vibrant local business and research community available to help strengthen state’s data capacity. 	<p>Threats</p> <ol style="list-style-type: none"> 1. Implementation of State Structure Plan policies and actions without proper cross-agency data integration. 2. Prevailing data gaps impede proper evaluation and monitoring of State Structure Plan’s policies and actions.

Box 14 How Melaka's Data Framework Compares with Peer Cities

Comparing Melaka's data framework with that of its peers has value to identify potential areas of improvements. The table below compares Melaka with the two aspirational comparator cities regarding data capacity for integrated planning. The key areas where Melaka is lacking relative to Singapore and Aarhus is in the development of cross-agency data sharing and data integration within the local government, the development of an open data platform, and the implementation of an open source strategy.

Table 18 Data Capacity for Integrated Planning Horizontal Analysis

Parameter	Melaka	Singapore	Aarhus
Year since last Census with city-level data	2010	2011	2011
Existence of a central GIS platform	Yes	Yes	Yes
Level of data sharing and integration between city agencies for planning purposes	Low	High	Medium
Existing of Data Partnerships with Private Sector	No	Yes	Yes
Existence of an Open Data Platform	No	Yes	Yes
Existence of an Open Data Strategy	Yes	Yes	Yes
Existence of Open Source Strategy	No	No	Yes

Sources: URA 2017 and Open Data Aarhus 2017.

Note: Insufficient information was available at the time of research on the other comparator cities of Penang, Da Nang, Porto, Izmir and Recife.

Color code: Strengths (green) and Weaknesses (orange).

Melaka has an opportunity to learn from Singapore and Aarhus, two of the world's leading municipal governments, in the use of IT solutions for strategic planning, and to see how they have succeeded with data integration, open data and open source strategies. However, while Melaka should look at these examples as aspirational case studies, it should not aim to reproduce their approaches integrally, but rather develop its own strategies that can be effectively implemented in the local context.

Key Message 4-4: Encourage new data approaches and strengthen data capacity for integrated planning

Effectively using data for planning and management remains a challenge. In Melaka, state-level data is often unavailable, unreliable, inaccessible or disconnected from the decision-making process. This shortage of readily available data, the so-called "planner's problem" (Bettencourt 2014) limits the ability of Melaka State to perform evidence-based diagnostics and make informed decisions. In addition, with the increasing complexity of urban systems and the rise of digitalization, traditional urban planning and urban management methods have reached their limits and require new data-informed processes and techniques. The development of the state's data capacity is an opportunity to both improve the local data framework and make the integrated planning process more effective.

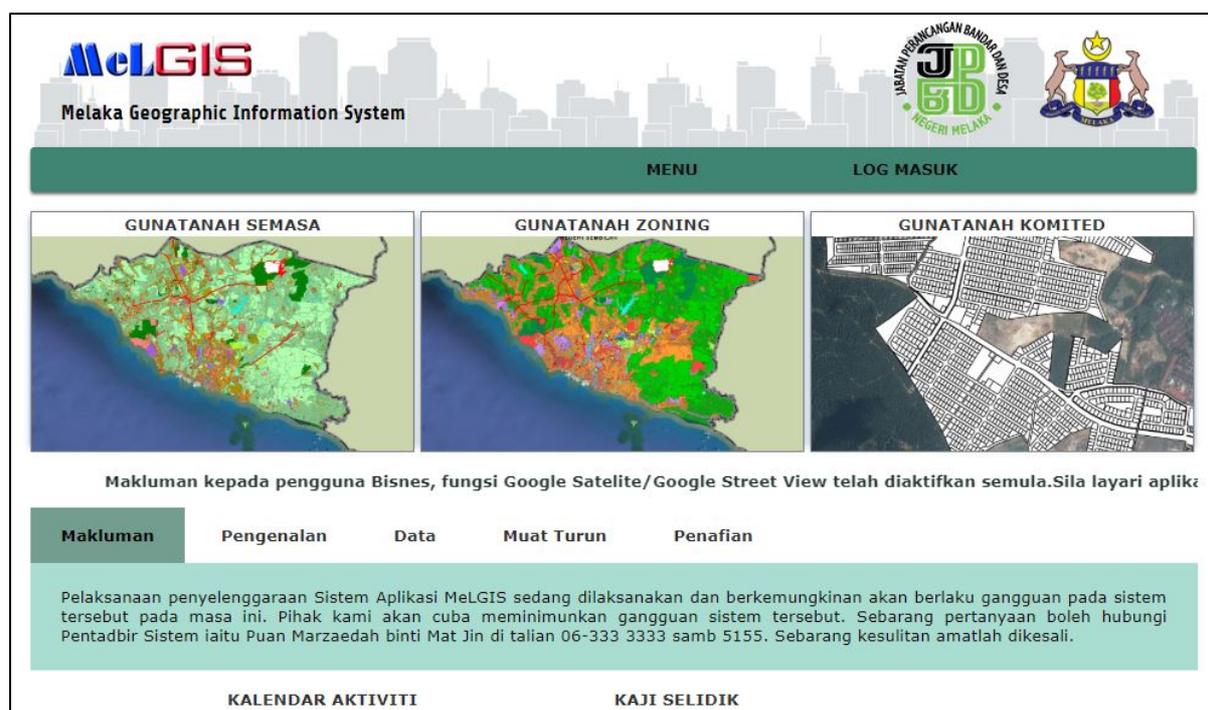
Melaka State already has a track record of using data for planning and monitoring purposes. In recent years, Melaka commissioned and prepared several data-informed research and strategic planning documents, including the Melaka State Greenhouse Gas Emission Inventory Report (ICLEI 2016), the Green City Action Plan for Melaka (2014), Towards a Greener Urban Transport System in Melaka (2017) and the State Structure Plan 2035 (2017). The federal Department of Town and Country Planning in Melaka (PLANMalaysia Melaka) and the Melaka State Economic Planning Unit (UPEN Melaka) generally coordinate inter-agency data collaboration for planning purposes, including during the recent preparation of the State Structure Plan 2035.

Furthermore, data-informed monitoring is planned as part of the State Structure Plan implementation process. Key indicators will be used to assess the progress of the plan's implementation, using a set of quantitative and qualitative targets to be achieved by 2035. The State Structure Plan monitoring committee is composed of several agency representatives and will monitor these strategic and sectorial indicators in collaboration with the relevant agencies. The indicators and datasets needed for the tasks will be shared within the committee, but no dedicated data integration platform is being implemented for this endeavor.

However, the data capacity remains fragmented within the Melaka State due to lack of leadership in advancing data capacity for planning purposes. Melaka's existing data capacity is housed within two separate government agencies, PLANMalaysia Melaka and UPEN Melaka. The two units used to operate as one, until they were administratively split about three years ago. But, they continue to collaborate regularly on data management, updating and validation through meetings and workshops held every six months or so. Each of the two units plays a unique and complementary data management role within the state government. However, despite collaboration between these agencies, the efforts remain fragmented and scattered across different government units.

Plan Malaysia Melaka manages land-use and geospatial information obtained from Melaka's four municipal authorities. Its data group is composed of 12 full-time technical resources with geographic information systems (GIS) capability (MapInfo software), however with no specialized analytical expertise. The department also operates the MeLGIS application (Melaka's online mapping and geographic information system), and provides geospatial information to i-Plan (Malaysia's national online geospatial portal managed by PLANMalaysia, the federal government's Town and Country Planning Department). The MeLGIS mapping application provides select land-use and land parcel geospatial information to state government agencies (for free) and to the public (subject to a subscription fee). However, the platform does not include demographic, economic, environmental or any other sectorial information and the datasets and map layers can be visualized but are not available for download. Furthermore, it is intended for information purposes and not as a planning tool. Also, no data is available for download on the i-Plan platform either.

Figure 38 MeLGIS Website



Source: Plan Malaysia@Melaka. 2017.

Melaka UPEN - through its data and GIS group - manages datasets on economic, social and environmental aspects obtained from national and state level agencies, including from the national census and labor force surveys. The Land Transport Commission also has a data management group for existing road and public transportation infrastructure which collaborates with other government units. However, data integration is not part of its role and mandate.

In addition, cross-sectorial data is not readily accessible between agencies. A significant data challenge in Melaka is the difficulty to access and use data from different government agencies for planning purposes. Sectorial data is managed in silos and is not automatically shared across entities. The existing data sharing process across agencies is a long and arduous journey, requiring the preparation of data requests and legal agreements, coordination of meetings and clearance from senior management. This results in a timespan of several months before data is shared across entities. Since cross-agency data collaborations are facilitated through personal relationships, occasional personnel changes and shifting priorities often hinder the data-sharing process. Other than i-Plan and MeLGIS, there is no formal data sharing and integration initiative between state agencies in Melaka. Data sharing occurs primarily as part of specific initiatives, such as the preparation and the monitoring of the State Structure Plan or other ad hoc projects, but not as an ongoing management practice.

Technical barriers and issues due to the absence of a centralized cross-sectorial data integration system also complicate the process. Each entity has its own data management system which is not connected to that of other agencies. Data inconsistency, system incompatibility and differences in sectorial data management approaches are often barriers to the effective use of cross-sectorial data for planning purposes within the State government. As a result, the use of multi-sectorial data for strategic planning of Melaka State is not developed to its full potential.

Melaka can leverage data to reap integrated planning outcomes. Similar to other cities and local governments around the world, there are opportunities for Melaka to implement data-informed approaches to further reap integrated planning outcomes moving forward. The following two sections – about strengthening data capacity and open data – explore key data capacity development approaches and considerations to support Melaka's integrated planning aspirations.

Develop data integration capacity through cross-agency collaboration

A key principle to strengthen data capacity for integrated planning is to break the data silos across government departments and agencies through solid long-term collaborations. In Melaka, enhanced cross-agency collaboration should start with a data charter, which set out the overall data sharing and collaboration protocol across agencies, and a common data platform to implement data-sharing.

The adoption of a data charter along with the development of a single centralized data platform would greatly facilitate the data integration process in Melaka. Laying clear data-sharing protocols and using ICT technologies, systematic cross-agency data integration would be made possible for operation management, strategic planning and policy-making. The data charter would establish the protocols and standards for data management and standardization across agencies to ensure that data quality, accuracy and timeliness are consistent across all government agencies and departments. The common data platform would ensure the accessibility of the government data for the contributing government agencies. In addition to providing data, the tools can also provide scenario testing and visualization applications to guide decision-making and facilitate coordination among agencies.

The data platform should be standardized, centralized and provide a geospatial/mapping interface housed on an appropriate computer infrastructure. Functionalities, applications and visualization interfaces should be standardized to allow different agencies to use them consistently. The datasets should also be hosted on a common server with sufficient computing power and be accessible to all contributing agencies and departments. The data should be easily accessible and

made available in consistently structured formats that allow for analysis with limited data manipulation, along with being easily spatially visualized.

A single entity should lead the data integration efforts. Strong leadership is essential to ensure active participation from the different agencies and departments in the data integration and sharing process and maintaining consistent data management. This will also mean updating protocols, including data quality control and data updates, and establishing long-term and systematic multi-agency data-sharing agreements. This agency or department should take the lead in drafting the data charter in collaboration with other government agencies and be mandated to implement the data-sharing and integration processes within the state, including providing capacity building to existing staff and senior management.

Cross-agency data integration efforts should prioritize the state’s key planning objectives. Cross-agency data integration initiatives rely on administrative and statistical data provided by government agencies or departments, each of which has its own mission, sectorial priorities and systems. As such, complete data integration of all datasets and systems across agencies and departments is not realistic and should not be the goal. Rather, agencies and department should identify and prioritize the specific datasets and indicators that will add value to the local integrated planning process.

Technical, analytical and capacity building expertise is essential to a successful cross-agency data integration process. As part of a cross-agency data integration platform, in-house data capability and technical expertise should be made available to the department and agency end-users to support their data integration and analytical efforts. One or more technical experts should be assigned to the data integration platform to be familiar with the data processes of all agencies and departments involved. In addition, capacity building should be made available to agency staff to make data integration tools and processes part of their operational toolkit.

A state-wide integrated data platform would be valuable to support the State’s strategic planning process. There would be several key benefits to implement such a platform in Melaka. Firstly, the implementation of a cross-agency data integration platform has the potential to streamline and systematize the data-sharing process between departments and agencies, thereby reducing the bureaucratic efforts and increasing coordination for data management. Secondly, it would facilitate the monitoring and updating process of strategic plans such as the State Structure Plan. Thirdly, it would provide a multi-sectorial perspective on the State’s land-use and strategic planning challenges using a single platform accessible to multiples departments and agencies, thereby improving coordination and communication across operational units.

This potential data integration platform initiative could incorporate land-use and land parcel data from the PLANMalaysia Melaka, along with social, economic and environmental data from the UPEN Melaka, transportation information from the Agensi Pengangkutan Awam Darat (APAD) and sectorial data from other relevant state agencies (housing, engineering, facilities, public utilities, etc.). The platform should integrate both semantic and geospatial datasets which would be accessible to all government agencies and departments on a centralized server.

Finally, it would address the sectorial data gaps by leveraging existing administrative and statistical datasets that are not currently made available for planning purposes across government agency silos. Below are a few examples of datasets that can be shared and structured in a way that informs strategic planning.

- **Business license data collection can be leveraged** to collect employee count by industry and place of work to monitor the evolution of Melaka’s economy and the development of employment districts on a yearly basis.
- **Building floor space inventory data can be utilized** to monitor urban development patterns in the retail, office, industrial and residential markets and land requirements across the State.
- **Real estate transactions data from the land registry office can be utilized** to study the health of the real estate market by subarea, including monitoring demand and supply

dynamics and assessing the implications of land-use policies and land-value capture mechanisms on land prices.

- **Demographic and social census micro-data for fine grain areas can be harnessed** to understand the demographic and social composition of the population in subareas across the state and provide public services accordingly. Collaborations with Malaysia's Department of Statistics should be developed to obtain micro-data (i.e. at the urban block scale), for population and demographics, that are readily available for spatial analysis.
- **Public utility consumption data can be utilized** to monitor housing vacancy in the Melaka State through water and electricity usage to improve the accuracy of housing supply and demand indicators in the state.

Box 15 Cross-agency Data Integration in Singapore

Singapore's Urban Redevelopment Authority (URA) faced major data gaps due to limited data-sharing between Singapore government agencies. These gaps hindered URA's ability to develop evidence-based planning programs. As part of Singapore's Smart Nation Initiative, two cross-agency GIS-enabled data integration platforms were developed under the leadership of URA to address key data gaps and inform Singapore's land-use and strategic planning processes.

ePlanner

ePlanner is a one-stop, geospatial data integration and analytics tool which translates large amounts of data into useful planning insights, allowing for integrated data-driven and evidence-based planning. The application tool was developed in-house and in collaboration with local research centers. It integrates data from various sources, including administrative and statistical data from multiple government agencies. ePlanner enables various agencies to access and analyze together detailed land-use planning information, such as zoning and development control parameters, as well as social, economic and environmental information at a small scale. The platform is currently being used by more than 25 ministries or agencies across the Singapore government, including URA, the Housing and Development Board, and the ministries of National Development and Health.

GEMMA

GIS-Enabled Mapping, Modelling & Analysis (GEMMA) is a cross-agency data integration tool that incorporates Geographic Information System (GIS) modelling, analytics and visualization solutions to conduct urban planning scenario analysis to provide options to decision makers. GEMMA enables URA and other government agencies to compose multiple land-use scenarios quickly, through a series of applications that simulate urban development processes. It also allows planners in collaboration with partner agencies to search and select sites quickly, and jointly evaluate scenario outcomes in consideration of potential impacts on supporting infrastructure (e.g. transport, public housing, and public utilities).

As an alternative to purchasing a commercial solution that would only partly meet its needs, the URA developed the tool in-house with the partnership with local research institutes, using an agile product life-cycle development approach. URA and its collaborators conceptualized and translated business ideas into technical requirements and developed the tool into interactive parts and modules with rapid prototyping. The tool is currently being used as a platform for agencies to share planning scenarios and perform analysis and is undergoing some iterative improvements.



Address the Data Gaps through Private Sector Partnerships

Cities are rich data environments. Yet, local government authorities continue to face serious data gaps. For example, commercial, agent-based and market-driven activities are rarely captured in government datasets. Local governments traditionally commission advisory firms to conduct special surveys and studies on local economic, transportation and real estate trends. These studies are expensive and difficult to incorporate into the long-term planning and monitoring framework as they occur in certain set points of time.

With the rise of information technology and data analytics in recent years, cities and local governments now have the option to use unstructured private proprietary data (“Big Data”) as an alternative to commissioned studies and surveys. Mobile phones, credit cards, social media and transactional data provide a wealth of information that is increasingly used to address information gaps. Private proprietary data is not usually available to local governments as private network operators carefully safeguard this information. As such, data partnerships with private sector companies are becoming central components of local governments’ data strategies.

The State Structure Plan 2035 already identifies the implementation of Big Data programs by local authorities as a key principle to further the understanding of Melaka’s economic, physical and social aspects. Melaka has much to gain to develop partnerships with private sector organizations to fill some of its existing data gaps. It is also important to consider potential data partnerships carefully based on the value they add to the strategic planning objectives. A cost-benefit and viability analysis should be conducted before embarking on data partnerships with private companies. The following paragraphs include the principle considerations – including the risks – of successful data partnerships.

The local data ecosystem should be mapped out and tapped into. Finding the right data and indicators for the right policy objective is a challenge for local governments. In the State Structure Plan 2035, several sectorial indicators are missing which makes the assessment of the current data situation and the monitoring process difficult. These data gaps should be identified, listed, and a search for meaningful data should be conducted within the local business community, universities and civil society organizations. Other organizations may already collect information and data on the topic of interest and may be willing to share those sources with the local government as part of the planning process.

Melaka should think beyond procurement and adopt experimental data approaches. When it comes to data-related partnerships, local governments should embrace experimental approaches and think beyond their typical procurement processes, particularly when it comes to data analytics applications. Data science is a relatively new field of expertise with a lot of knowledge being developed. Melaka State should encourage approaches to data analytics using emerging technologies and methods to answer key strategic questions that cannot be answered with traditional data. It is essential however to clearly define strategic questions and the desired outcomes before proceeding with experimental analyses. Adopting this approach is less costly and constraining than the typical procurement process which involves strictly-defined quality levels and deliverables. Local start-ups and research centers are natural partners with which experimental approaches can be developed to address the data gaps and harness data science for strategic integrated planning purposes.

Melaka should develop mutually-beneficial data partnerships and avoid foreseeable risks. Data is a highly sought-after asset class for private sector organizations. Yet they – just like local governments – often struggle to obtain the information they need to make evidence-based decisions. Local governments sometimes have access to the optimal data sources and may be able to provide information that will add value to the business community. In fact, a growing number of companies are now partnering with local and regional governments simply to obtain valuable information. Melaka State can benefit from private sector partnerships by gaining access to private proprietary data and data analytics capability at a lower cost than a traditional procurement process. However, some risks of collaboration include the loss of data control and confidentiality, and private companies profiteering from their unique access to data. Hence, partnerships should be carefully agreed upon to be mutually-beneficial and respectful to those who the data is collected from.

Developing data partnerships with the private sector would effectively address some of the key existing data gaps in Melaka. The types of data presented below are some of the alternative sources of information that can be harnessed through mutually-beneficial data partnerships with the private sector:

- **Mobile phone data** to conduct future household transportation and origin-destination surveys. Partnering with national telco companies and data analytics firms, it would be possible to use mobile phone data as an alternative to traditional phone-based transportation surveys. Currently, Melaka does not have a comprehensive transportation survey structure in place and very limited information exists on transportation patterns within the state.
- **Credit card spending data** to monitor local and tourism retail spending and the economic vitality of main shopping streets and districts. Such a partnership can include for instance the local and national tourism development authorities and local retailers' association. Companies such as Mastercard and Visa have subsidiary data companies that work with local authorities around the world to help them understand spending patterns by category, location and origin. One of the key benefits of using credit card data is to measure the origin of spending and measure the role of tourism spending by retail categories and by area within the state, which can inform future business and tourism development strategies.
- **Social media data** to monitor the use and appreciation of public spaces by tourists and locals alike in specific areas of Melaka. Data from social media such as Facebook, Instagram and Twitter can be harnessed by local authorities and business improvement areas to inform long-term place management and development.
- **Satellite imagery data** to monitor environmental, traffic and land-use patterns throughout Melaka State. A historic database of high-definition satellite images could support the monitoring of carbon concentrations in the area, traffic congestion patterns, pedestrian flows in certain area, including in Melaka City, and the evolution of land-use development over time.

- **Transaction and housing market information data** from local real estate brokerage companies can be incorporated to the state’s data framework to monitor land values, property prices, foreign property buyers and overall market sentiment. For further information, refer to *Supporting Report 3: Enhancing Services and Housing* regarding services and housing on the need for housing data.

Encourage Open Source and Embrace Open Data Platforms

Open source and open data are growing technology approaches with tangible benefits for public sector organizations. A growing number of public authorities are now encouraging the use of open source and open data within their administration. “Open source” refers to software solutions whose source code is made available for use or modification by an open community of users and developers. “Open data” consists of providing free and open access to large amounts of government data. The potential benefits and drawbacks of open data are mentioned in box 16.

Box 16 Open Source Data’s Benefits and Drawbacks

The benefits of open source data platform solutions are numerous, including:

- Customization based on unique organizational needs;
- Flexibility in system compatibility, interoperability and modularity;
- Independence from commercial vendors (no long-term lock-in);
- Capital and maintenance costs are often lower than commercial solutions (although not always);
- Innovation and adaptability;
- In-house expertise and capability development; and
- Knowledge transfer throughout the community.

However, open source solutions also have their drawbacks. They require in-house resources with technical know-how to develop and integrate open source solutions with the local government’s existing systems. They are also less predictable, less secure, and require longer implementation timelines compared to proven commercial solutions.

Encourage Open Source

Making Data Available for the Community. Despite the drawbacks of open data which are mentioned within box 16, open source solutions can play a key part in developing Melaka State’s data capacity for integrated planning. Melaka State started embracing open source IT solutions several years ago and even established the Melaka State Centre for Open Source Excellence in 2013. Currently, the two units responsible for data management in Melaka use different systems, which limits the data integration capability. PLANMalaysia uses MapInfo while UPEN uses ArcMap as their main systems for data management. The use of complementary open source solutions would potentially better integrate the systems across agencies. The following paragraphs list some of the considerations for using open source solutions to develop data capacity for integrated planning.

A business needs assessment should inform the viability of an open source solution. A cross-agency business needs assessment is essential to evaluate the potential for an open source application. In some cases, an open source solution may not be the option that offers the best value for the state. Some of the valuable questions as part of this assessment could include:

- What are Melaka’s specific data integration and analysis needs?
- How will an open source data platform be integrated to the state’s existing data management infrastructure?
- Which existing open source tools could potentially meet Melaka’s data and planning needs?

- Should a new customized tool be developed to suit Melaka's data needs?
- Should open source solutions replace the GIS software currently used in Melaka?

These questions should be part of the discussion between government agencies and departments to assess their specific data capacity needs.

An open source strategy should align with the procurement policy. One of the main barriers to implementing open source solutions is the local government's strict ICT procurement policies. In order for Melaka to reap the benefits of open source solutions, the state's procurement policy is recommended to provide a framework for open source solution implementation and support it as a viable option. Given the state's recent experience in adopting open source solutions, the procurement policy should already provide some guidelines regarding open source implementation.

The implementation of open source solutions requires the development of solid in-house technical and management expertise. Unlike commercial solutions where vendors provide most of the technical support, open source solutions are generally implemented and managed internally. Local governments with successful open source solutions hire IT specialists with significant open source expertise and provide in-house capacity building to existing staff. Should a new open source solution data integration tool be implemented in Melaka, it is essential that dedicated qualified personnel be deployed to manage its implementation.

R&D partnerships can support the development of custom-made open source solutions. Open source solutions are often developed as part of academic and scientific research and design (R&D) initiatives conducted by local and international research institutes. Those organizations are natural partners for local governments because they often need to test their open source solution in the real world and require fewer financial resources. Melaka can develop mutually-beneficial relationships with local and international research institutes by providing the beneficial "living laboratory" to test specific open source solutions with limited financial commitment.

Melaka's integrated planning objectives can be facilitated with open source application. Some of the potential open source applications to address state's data gaps and improve its data capacity for integrated planning include:

- Data integration platform and visualization tools for cross-agency collaboration;
- Smart phone applications and surveys for household transportation surveys, public space use and appreciation surveys; and
- Smart phone applications and surveys for tourists and visitors.

Embrace Open Data

While citizens and stakeholders outside of local government are the primary beneficiaries of open data initiatives, there are also many strategic benefits to the local authorities. Firstly, open data initiatives help develop mutually-beneficial relationships with local and national stakeholders, including collaboration, to solve local data issues and improve the quality of the data. Secondly, they support local innovation by allowing research institutes, companies and entrepreneurs to easily access information that may generate new inspiration, ideas and applications. Thirdly, free and open data promotes a culture of transparency and accountability, which improves relationships with the local business community, civil society and citizens. Fourthly, they facilitate access to information from other government agencies that may not have data-sharing agreements in place. Finally, open data platforms reduce the cost and work-load associated with providing stakeholders with information. Melaka recently adopted an Open Data Policy which is expected to be implemented in the coming years. The plan is explained in box 17.

Box 17 Open Data Policy for Melaka

Melaka State prepared the Open Data Policy for Melaka in 2016 that commits to three specific principles:

1. Publishing public data, which includes: creating a cross-agency data inventory; creating a roadmap for the release of datasets; and ultimately releasing public information online.
2. Investing in key enablers, which includes: forming a Data Oversight Authority entity within the state government; creating a central location for data publication; and building partnerships to create a flourishing data ecosystem.
3. Creating a culture of open data, which includes: engaging with citizens to facilitate and prioritize data publication; ensuring appropriate safeguards for sensitive information; and creating processes to ensure data quality.

The implementation of the Open Data Policy for Melaka is being planned as of this assessment and no data has yet been published by the state government.

Source: Draft Policy for Open Data Melaka and Open Data Policy for Malacca 2016.

The following paragraphs include key considerations to ensure that the implementation of the Open Data Strategy for Melaka aligns with the state's integrated planning objectives.

The Open Data Strategy should add value to the local data ecosystem by providing information needed by local research institutes, the business community and civil society groups. For example, providing detailed and structured datasets on land-use, population, built environment, housing, economic activities and environmental aspects of Melaka can help local stakeholders generate analysis and address local challenges. An engagement process with key stakeholders is essential to identify local data needs and evaluate the option of making this information publicly available. Also, it is important to have a process in place that ensures the quality, timeliness and accuracy of the data before data is made available to the public.

The Open Data Strategy should balance transparency and openness with confidentiality and security. A key concern about open data is how to deal with information that may be sensitive due to confidentiality or security reasons. The decision to release data should be carefully evaluated based on the level of risk and criticality of the data. Every effort should be made to protect confidentiality of private and sensitive information. The data made available publicly should be at a scale and have a sample size large enough to not disclose individual information. Data aggregation and data point elimination are techniques used to balance data openness with confidentiality.

There should be a single centralized online open data platform. A key concern from citizens and local data end-users is the ease at which the data can be accessed and obtained. In the case of Melaka, several agencies provide data and information on their respective websites and in strategic documents, but no centralized data platform currently exists. This complicates access to data from the perspective of the end-users. Successful open data strategies effectively centralize all datasets on a single well-structured platform that is easily accessible on local government's websites and through search engines.

Box 18 Aarhus Open Data and Open Source Action Plan

As part of the Smart Aarhus Partnership, the city of Aarhus in Denmark implemented a series of policies and initiatives to make use of digital opportunities and add value to its strategic planning and stakeholder engagement process. Among these initiatives are Open Data Aarhus and the Aarhus Open Source Strategy.

Open Data Aarhus

Open Data Aarhus (ODAA) is an online platform that provides the community with access to data which can be used to deliver services to citizens and from which companies and entrepreneurs can generate business ideas. The platform was launched in 2013 as the first open data portal in Denmark, and today ODAA is a core project in the Smart Aarhus initiative. So far, the data has been used as raw material by local stakeholders to develop digital analyses of the community's traffic, recreational areas, recycling, health, sports-related apps and services. ODAA was implemented in collaboration with multiple stakeholders, including citizens, students, researchers, the Aarhus Municipality, the Central Denmark Region, Aarhus University, as well as private companies.

Aarhus Open Source Action Plan

Aarhus Open Source Action Plan was adopted in 2014 as part of the municipality's new IT strategy. The main aim of the action plan is to increase its use of open source software and standards to avoid vendor lock-in and maximize interoperability across systems. While the goal was not to totally get rid of commercial licensed products and proprietary data, the plan considered reducing the municipality's exposure to these through open source solutions. The action plan was needed to effectively reap the benefits of open source solutions, while minimizing operational, technical and legal risks. One of the key principles of the action plan is that open source software and solutions should always be considered as an alternative to commercial solutions as part of the procurement process. The open source action plan includes in-house resources as well as close collaboration with other municipal government across Denmark. The initiative has yielded a number of results, including cost-savings as well as several innovations that are being tested and implemented.

Source: Open Data Aarhus 2017.

Melaka's Open Data strategy, when implemented, can significantly add value to the local data ecosystem. This is recommended through three strategies: (1) MelGIS can be leveraged and expanded as an open data platform; (2) the State Structure Plan's monitoring indicators can be made available publicly on the state's website and be periodically easily updated; and (3) a summary of all Melaka's datasets and indicators from national census and survey can be gathered in one data platform and made available for download in a structured and ready-to-use format. Further information regarding typical open data platforms is include in box 19.

Box 19 Features of a Typical Open Data Platform

An open data platform can take multiple shapes and forms depending on the specific needs and objectives of local government authorities. Some common features of open data platforms include:

- Datasets (including GIS layers, social, economic and built environment data), are made available publicly for free download in structured ready-to-use data formats (such as .XLS, .CSV and shapefiles).
- A detailed data catalogue comprising the named datasets, their sources, definitions, collection method, and recorded updates can be easily accessed with a built-in search engine.
- The conditions on use of the data should be clearly stated, including any restriction on commercial use.

Typical GIS layers and datasets made available for download on local authorities' open data platforms include:

- Land-use designation policy and zoning by-laws;
- Actual land-use by category;
- Administrative boundaries;
- Land parcel boundaries, size and lot information;
- Building footprints and gross floor area information;
- Public facilities such as schools, medical centers, hospitals, public safety and recreational facilities;
- Road networks;
- Public transportation infrastructure;
- Parks and green spaces;
- Population and demography by subarea;
- Housing by sub area; and
- Land values by sub area.

Data Recommended Actions

Melaka State already has a track record of using data for strategic planning purposes. However, there are opportunities for the state to implement data-informed approaches to further reap integrated planning and governance outcomes. This section of the chapter has presented four key approaches for improving data-informed processes within the state. Further to the suggested approaches, the following key recommendations should be considered, along with the sequencing suggested in table 4.19:

4-F Address the data gap with alternative data sources and partnerships

- Assess the feasibility of using private proprietary data, including big data and data analytics from private service providers to address key data gaps, such as private transportation patterns, retail spending, housing prices, air and water quality, and public space use.
- Explore the potential for mutually-beneficial partnerships with key private sector service providers that would include data sharing and data analytics services.

4-G Increase data integration through cross-agency collaboration

- Develop state-level data management and innovation capability for integrated planning, through the development of specialized data expertise team, and make the soon-to-be-appointed State Chief Data Officer (as proposed in the Open Data Strategy) responsible for overseeing all data integration initiatives.
- Develop a roadmap for data integration at the state level in consultation with all government units involved in the integrated planning process. The roadmap should identify key data gaps, needs and potential forms of collaboration and develop an action plan to achieve cross-agency data integration. The roadmap should be aligned with Melaka's Open Data Strategy.
- Enact a Melaka State data charter which regulates key aspects of the data-sharing aspects across government units, sets standards, and clarifies the roles and responsibilities of the different agencies.
- Consider re-integrating the GIS and data management units of PLANMalaysia Melaka and UPEN Melaka to make a single unit the local leader in data integration for planning purposes. This should be in collaboration with the Data Oversight Authority which is proposed in Melaka's Open Data Strategy.
- Explore implementing centralized data hardware and software infrastructure along with data integration methods to facilitate cross-agency collaboration and standardization.
- Streamline processes for public-private data sharing through long-term systematic data-sharing agreements across organizations.

4-H Encourage open source

- Develop an Open Source policy roadmap for Melaka to coordinate open source data governance at both the state and municipal levels.
- Identify existing open source data platform solutions that would address Melaka's immediate and future data needs.
- Develop mutually-beneficial collaborations with local and international research and expertise centers to develop data analytics approaches and open source solutions, including R&D test bed initiatives.
- Build in-house capability and expertise in open source software and platform use and development, including hiring an open source technical specialist and providing training and capacity building courses on open source solutions to technical staff.

4-I Embrace open data

- Engage and consult with key local stakeholders regarding the type of data that would create value if publicly accessible.
- Identify which integrated planning datasets and information are suitable for public release, as part of the roadmap for data integration and the implementation of the Open Data Strategy.
- Create one integrated webpage to be the community's source for public sector open data. Link all data sources, to this single source and update them to publish structured and ready-to-use datasets publicly.
- Make publicly available the results of the State Structure Plan's monitoring indicators on a regular basis.

Table 19 Action Plan for Leveraging Data for Integrated Urban Planning

Item	0–4 Years	5–9 Years	10 or more Years
<p>Recommendation:</p> <p>4-F Address data gaps with alternative data sources and partnerships</p> <p>4-G Increase data integration through cross-agency collaboration</p> <p>Lead Agency:</p> <ul style="list-style-type: none"> • PLANMalaysia Melaka and EPU <p>Supporting Agencies:</p> <ul style="list-style-type: none"> • All participating agencies 	<p>2 years</p> <p>1 year</p>		
<p>Recommendations:</p> <p>4-H Encourage open source</p> <p>4-I Embrace open data</p> <p>Lead Agency:</p> <ul style="list-style-type: none"> • Open Data Working Group set up by Chief Minister <p>Supporting Agencies:</p> <ul style="list-style-type: none"> • All participating agencies 	<p>1 year</p> <p>2 years</p>		

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Data Annex A: List of Indicators Analyzed

Table 20 Indicators Legend

Status	Description
Adequate	The current data is adequate to measure and monitor the dynamic observed.
Outdated	The current data and statistics dates from five years ago or longer and needs to be updated.
Missing	Statistics are currently unavailable.
Needs Revisiting	Information exists, but may no longer be adequate to measure the situation effectively. Revisiting the statistical definition of the indicator and the data collection is needed.

Table 21 Summary of the Urban Sustainability Framework's²⁶ Data Capacity/ Management Indicators

1.3 Data Management	Status
Year since last census with city-level data.	Adequate
Existence of a central GIS platform.	Adequate

Data Annex B: Additional SWOT Information

Strengths

1. **Track record of using data for strategic planning.** Melaka State has a culture and track record of using data for strategic planning, including in State Structure Plan. The state's government agencies already own, manage and update datasets within their areas of jurisdiction and leverage it for planning purposes.
2. **Data expertise and infrastructure in place.** The data infrastructure of the state is already in place and operational within specific agencies. The state agencies have staff who can operate the data management systems, including GIS and spatial information systems, and the information is being used for both strategic planning and operation management.

²⁶ GPSC, World Bank 2018.

Weaknesses

1. **Lack of systematic cross-agency data sharing practice, protocols and platforms.** While the state agencies have a culture and track record of using data within their own areas of responsibility, systematic cross-agency and cross-sectorial data sharing is not well-developed within the state government. Cross-agency data sharing for planning purposes occurs informally through personal connections without established protocols. There is no platform for common data sharing, analysis and scenario assessment available to the agencies for planning purposes. The lack of coordination, technical inconsistencies and legal hurdles often lead to significant delays and additional costs in the planning process.
2. **Significant data gaps prevail.** Some key indicators needed for strategic planning in a local government remain unavailable within the Melaka State government, either because the data is not currently collected by the agencies and/or not made available to the other agencies/departments who could tailor it to their needs. Data and information gaps are a significant weakness when it comes to effectively monitor, evaluate and update strategic planning frameworks such as the State Structure Plan.
3. **Limited information made available publicly by State agencies.** The state government agencies release a very limited amount of data and information publicly. Considering the importance of data as an asset class in today's business and social environment, it is the role and duty of local authorities to provide citizens and businesses with relevant and reliable data about their community.

Opportunities

1. **Political and institutional support in advancing the state's data capacity.** There has been strong support from both elected officials and agency leadership for advancing the state's government data capacity. The recent adoption and implementation of the Melaka Open Data Policy is setting the stage for other similar data-related initiatives. The support from leadership illustrates that such initiatives are deemed valuable for the state government and is an opportunity to expand other such initiatives in the future.
2. **Vibrant local business and research community available to help strengthen state's data capacity.** Melaka State's vibrant business and research community have shown interest in supporting the state's data capacity development efforts and are natural partners to help the government fill existing data gaps.

Threats

1. **Implementation of State Structure Plan policies and actions without proper cross-agency data integration.** There is a risk of planning policy and action implementation to be unsuccessful if agencies are unable to properly share cross-functional data and information. In addition, the lack of data sharing between agencies may cause additional delays, costs and inconsistencies in the execution of the actions proposed.
2. **Prevailing data gaps impede proper evaluation and monitoring of State Structure Plan's policies and actions.** The lack of appropriate data and information to evaluate and monitor planning policies and actions is a significant threat to the effectiveness of the planning process. In order to comprehensively understand the implications of the policies and actions implemented (and their future amendments), it is essential that cross-functional data and information be readily available for evaluation and monitoring. In the absence of the latter, there is a risk that planning policies will not take a comprehensive view at the issues to be addressed.

Melaka State in Malaysia has strong sustainability aspirations and is an important member of the Global Platform for Sustainable Cities (GPSC). To inform the next update to Melaka's State Structure Plan, GPSC performed a sustainability outlook diagnostic to holistically consider six dimensions of the state's urban sustainability. The diagnostic consists of an overview report—containing a policy brief, executive summary, and benchmarking assessment—and six supporting reports that cover each of the diagnostic's dimensions. Informed by a wide range of stakeholder consultations and by data, analyses, and the benchmarking assessment, the reports offer key messages and recommendations for action so that Melaka can chart its own pathway to urban sustainability.

