# 2 West Masterplan: A New Paradigm in Urban Planning

Bij Borja, JTC Corporation, Singapore

## INTRODUCTION

*"Urban density spurs innovation"*

With just approximately 730 square kilometres of land area, the competition for land and labour in the small island state of Singapore has increasingly heightened. To tackle such issue, new urban planning approaches and innovative strategies have been developed to further optimize land and increase productivity in Singapore. As the nation's leading industrial developer and master planner, JTC Corporation (JTC), a statutory board under the Ministry of Trade and Industry has progressively positioned itself as one of the key drivers of land intensification by constantly innovating and thinking of out of the box solutions while staying true to its vision of creating a dynamic and integrated industrial landscape.

By 2030, the population of Singapore is expected to be at 6.9 million which will result to a denser built environment. Inevitably, industrial land will be in close proximity to other land uses such as residential and commercial areas. Thus, the challenge will be how to integrate the different land uses while maintaining the liveability of the estates in Singapore. Hence, as the primary developer of the nations' industrial estates, JTC has started to masterplan its future estates to become sustainable and liveable environments where both industrial and other non industrial uses co-exist.

This paper will share one of JTC's newest developments, the 2 West Masterplan, and will discuss the future ready and innovative planning concepts in structuring and strategizing the master plan's overall framework. It will also discuss the planning approaches adopted in addressing the concerns over land scarcity, better distribution of good jobs and urban liveability through mixed-use integration and through the development of a new urban infrastructure.

## 1. The 2 West Conceptual Masterplan

After JTC's highly successful one North, a 200 hectare work-live-play-learn development which is home to clusters of world-class research facilities and business park spaces, the corporation has now embarked on shaping another integrated development, the up-and-coming 2 West. A conceptual masterplan has just been developed to transform this 700 hectare site consisting of CleanTech Park, Nanyang Technological University (NTU), Wenya Industrial Estate and part of Tengah New Town into a mixed use development with work-live-play-learn and make elements. Located in the western area of Singapore, 2 West derived its name as it is the 2nd integrated development with work-live-play-learn components developed by JTC after the one north development.

The main objectives of the master plan is to intensify land use, to enhance the connectivity, liveability and vibrancy of an industrial township and to increase the potential synergies between NTU, Cleantech Park, Wenya, Jurong West and Tengah New Town developments. 2 West is envisaged to bridge the gap between research & development and manufacturing with prototyping, pilot testing and process optimisation while industry focus includes Clean Technology, Materials Science and Manufacturing Technology (3D Printing, Robotics, Advanced Manufacturing).

## 1.1 Challenges of Conventional Planning

In order to conceptualize new urban planning concepts for this integrated development, conventional planning norms have been reviewed to address its existing issues and challenges. Thus, in structuring the master plan's overall framework, the few questions below have been formulated with the intention to come up with innovative planning resolutions.

- Can we rethink some of our current policies to adapt to a new way of masterplanning and developing JTC's estates?

- How do we make use of limited resources in an environmentally sustainable manner?

- What is the most suitable developmental or business model in creating cost effective working and living environments?

- With the growing population in Singapore, how can we accommodate various uses within a dense yet liveable urban space?

- How can we tap on new methods & technologies in construction as well as IT technologies to enhance the built environment within a Smart city and making it future ready?

## 1.2 Championing New Concepts

In response to the challenges posed above, a number of strategies for the 2 West masterplan have been developed which aim to champion new concepts in the following 5 areas:

- Policies
  We aim to review current policies and regulations to facilitate innovative development models and breakthrough infrastructural solutions.

- Environmental
  To save and optimize land as it has become a scarce resource and be environmentally sustainable in our masterplanning and development efforts.

- Economic
  To explore potential developmental models and partnerships that can be formed from integrating various uses within single developments.

- Social
  To develop eco-districts that shall encourage interaction within communities as well as walkable mixed use districts.

- Technology
  To bridge the gap between the academic research and industrial manufacturing, so as to encourage and facilitate 'prototyping' that would enhance the test-bedding possibilities in the area. Moreover, to integrate sustainable estate-wide goods mover systems and people mover systems to improve on the last mile logistical and transport issues of the flow of goods and people.

## 2. Key Planning Principles

To address the concerns over land scarcity, better distribution of good jobs and urban liveability, the following four key planning principles were adopted to strategize the planning framework for 2 West.

*Source: JTC Corporation*

*Figure 1 : The key planning principles adopted for 2 West include (Left) integrated development with seamless connectivity, (Center) liveable and walkable urbanism, and (Right) environmental sustainability.*

### 2.1 Integrated Development with Seamless Connectivity

2 West is envisaged as a sustainable integrated mixed-use development wherein various land uses such as commercial, residential, industrial and institutional harmoniously merge. Within this development, industries and companies are clustered together to share common facilities and services. Seamless connectivity is achieved through the development of an efficient infrastructure that facilitates effective flow of goods and services as well as people.

### 2.2 Liveable and Walkable Urbanism

The 2 West development shall heavily promote pedestrian mobility and encourage walking. Residential homes, recreational facilities and amenities are within walking distances from places of work to reduce travel time and reduce strain on the public transport system. Increased walkability shall bring forth not just health benefits to many individuals but also social benefits to the entire community as it brings about opportunities for social interaction. Hence, a sound pedestrian network shall be developed within 2 West with strong considerations for accessibility, good street designs and creative placemaking.

### 2.3 Vibrant and Compact Mixed-use Setting

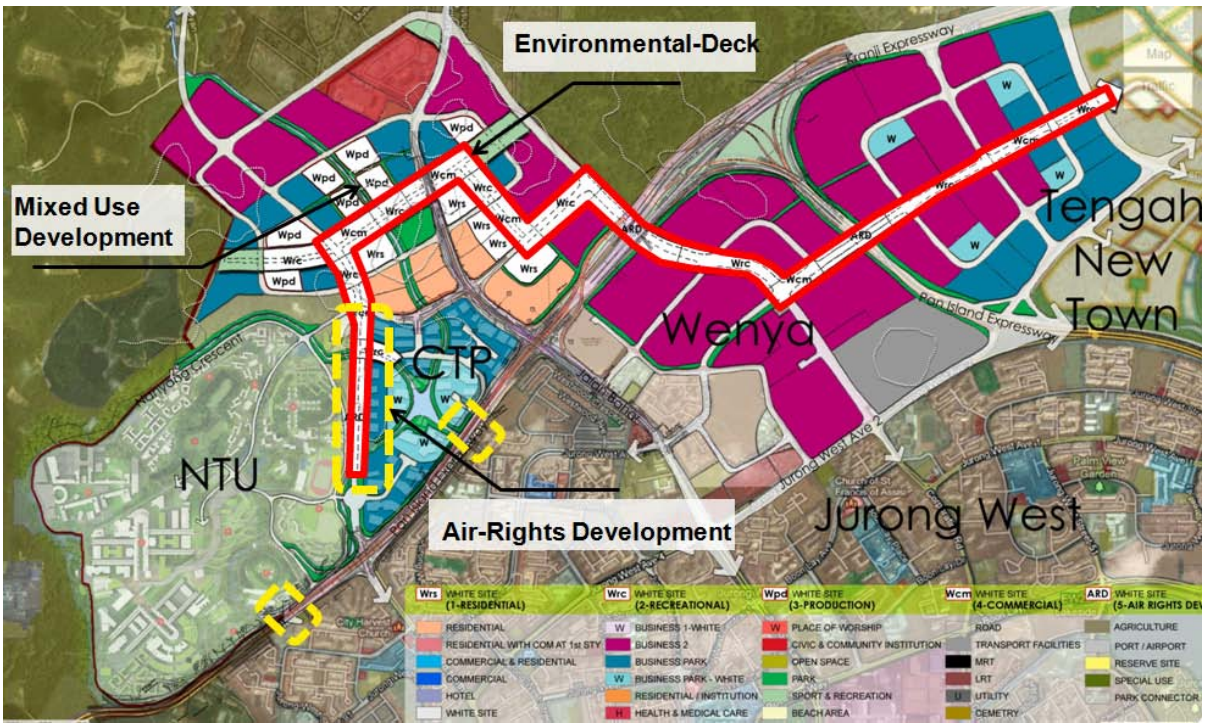
The planning of 2 West shall adhere to high-density and compact planning strategies thereby reducing urban sprawl and creating efficient land-use synergies. The various nodes within 2 West shall be anchored with transit oriented developments. These areas shall offer mixed-use settings along mass transit corridors so that a variety of urban functions are densely located making it very accessible to people.

Vibrancy is another urban characteristic envisaged for 2 West. Although compact developments are planned, lively street life and dynamic public spaces shall be designed to create a vibrant setting. These urban design considerations shall help build a distinctive neighbourhood character and shall help foster attractive communities with a strong sense of place that reflect the values and culture of the modern Singaporean society.

## 2.4 Environmental Sustainability

As land is a valuable commodity, the overall planning framework for 2 West warrants environmental sustainability efforts as one of its primary objective is to improve the quality of life of its users. The urban framework is set not just to resolve how land should be properly used but also how the environment should be well safeguarded.

Although JTC drives the development of 2 West, the corporation also collaborates with various government agencies in harnessing state-of-the-art green technologies to respond to environmental protection issues, climate change, energy conservation and resource optimization. In addition, to ensure sustainable urban growth for 2 West, proper urban management shall be adhered through the formulation and implementation of innovative policies. Through this, businesses, industries and the whole community become responsible in reducing negative impacts to their environment.




*Source: JTC Corporation*

*Figure 2: The masterplan for 2 West creates synergies between the districts of NTU, Cleantech Park, Wenya, Jurong West and Tengah New Town*

## 3. Key Urban Features at 2 West

The 2 west masterplan focuses on the following three (3) key features conceptualized in response to the issue of land scarcity and increase in productivity:

### 3.1 Mixed Used Developments

With the adoption of smart growth principles, mixed-use developments shall constitute the key district nodes of 2 West to facilitate work-live-play-learn and make activities. Industrial buildings, business parks, offices, retail shops, residential homes, recreational facilities, communal amenities and a university shall intermix in this vibrant and compact yet liveable setting. Vertical mixed-use developments are also encouraged within 2 West to hinder mono-use of a single plot and to amplify a building's efficiency.

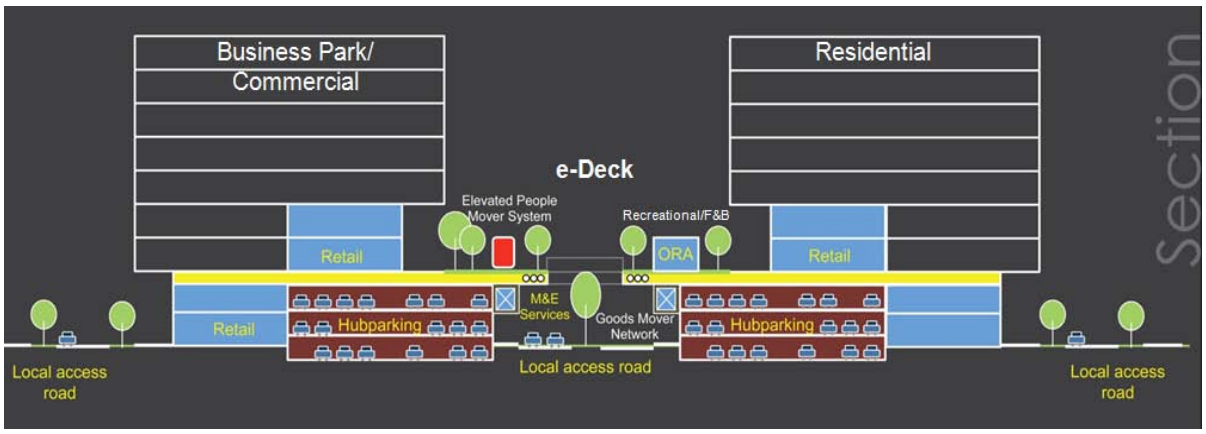
To suffice the residential demands in 2 West, affordable housing and rental housing models are considered for the residential quantum so as to meet the accommodation needs of the workers in 2 West including researchers on short-term visits and foreign students attending short-term courses. As 2 West upholds compact planning, various essential facilities and amenities that support the different housing estates shall be of easy access by the residences.

### 3.2 Environmental Deck

One of the key planning principles for this development is to create seamless connectivity and integration between the districts of 2 West and their surrounding communities supported by the cutting edge economy and technology. The enabler of such strategy is the Environmental Deck (or e-Deck for short), an innovative system of multiple functions that redefines the concept of urban infrastructure. Considered as the highlight feature of this development, the e-Deck is an innovative urban infrastructure envisaged to link up the various elements in 2 West and span approximately 5 kilometres across the entire site. It is an efficient form of a synergistic relationship between public facilities such as public open spaces, amenities and hub parking, the environmental and micro climatic medium such as urban greeneries, storm water management, a state-of-the-art logistics system such as the Estate-wide Goods Mover System (eGMS) as well as common services tunnels providing plug & play utilities options for companies such as electricity cables, water pipelines, sewer pipelines, gas pipelines and telecommunication lines.


*Source: JTC Corporation*

*Figure 3: An aerial view of the 2 West development showing the e-deck that connects the various mixed use developments - industrial, business park, commercial, institutional and residential. Recreational facilities, amenities and the people mover system will be provided at the e-deck, whilst goods mover system, utilities, services, hub parking and roads will be located under the deck.*




*Source: JTC Corporation*

*Figure 4: A sectional view of the e-Deck illustrating the people mover system, recreational, landscaping, and F&B spaces above the e-Deck with the retail shops and amenities on the 1st two floors of the buildings next to the e-Deck and the public roads, hub parking and goods mover system under the e-Deck.*

***Elevated Green Core***

Although the concept of environmental deck is not new, this is the first time that such concept will be implemented in a very large scale. As a green artery, the e-Deck will first and foremost serve as an elevated communal green space acting as the main activity spine, providing shared amenities, F&B spaces and public gathering spaces for residents and workers to congregate and interact 24/7, thereby enhancing liveability and vibrancy at 2 West. There is also a continuous space for a variety of recreational activities along the e-Deck that promotes healthy lifestyle and improves quality of life such as running paths, fitness corners and cycling routes.

***People Mover System***

The deck level will also be integrated with a green Transport System that provides efficient public transportation and strengthens the development's accessibility by linking up the various districts within 2 West. The people mover system will possibly be connected to the main Rail system and there shall be provision for smaller people mover system and cycling paths outside the e-Deck to further establish a good transportation network.

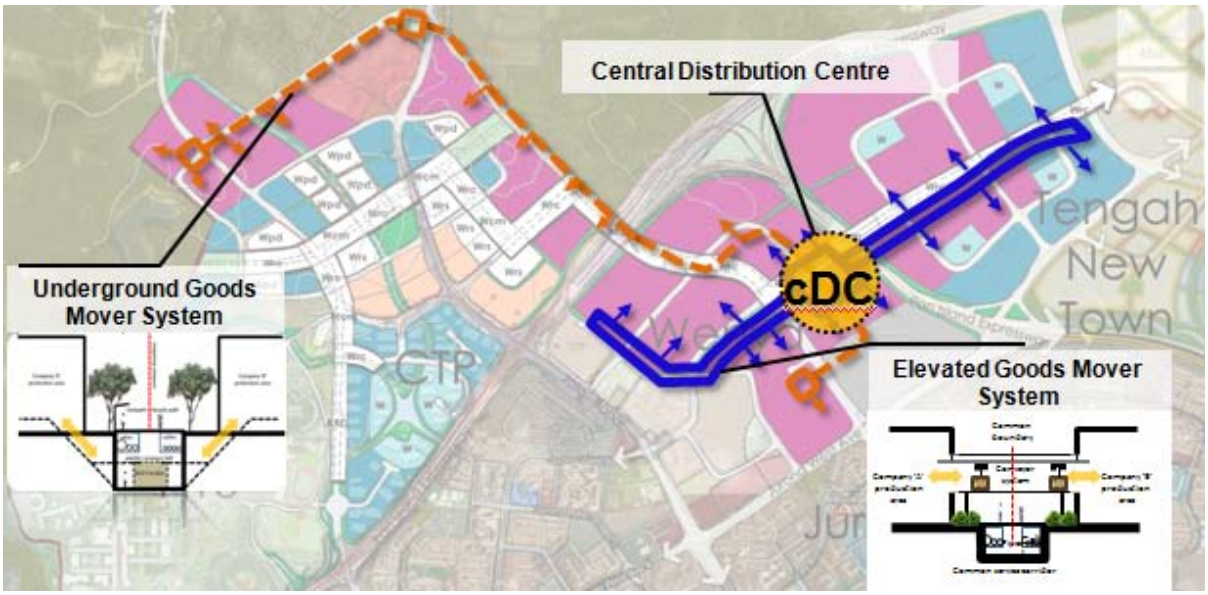
***Hub Parking***

Housed underneath the e-Deck are two other major components that make up the shared infrastructure system. First is the hub parking, a network of multi-storey car parking facilities catering to the various industrial, commercial and vertical mixed used developments along the stretch. Accessed via the public local road, the hub parking facilities are very accessible to the nearby buildings as most of the surrounding developments are planned within 10 minutes walking distance from the e-Deck. The hub parking aims to reduce the requirement of providing individual car parks for each of the buildings as well as to reduce congestion. Consolidation of the parking spaces not only warrants land savings but also highlights walkability and the inclusiveness of the e-Deck to pedestrians as these facilities are well segregated from people.

***Estate Goods Mover System (eGMS)***

The other major component under the e-Deck is the estate wide goods mover system (e-GMS), an automated smart logistic system for the distribution of goods to the various industrial developments within the estate. The system is connected to the Centralized Distribution Centre which is eventually linked up to the sea port, the centralized underground warehouse facilities and other industrial estates along its corridor. After arriving at the port,

raw materials and goods are sent to the centralized distribution center (CDC), the main warehouse distribution and sorting hub functioning as the heart of this state-of-the-art goods delivery system. From the CDC, palettes of goods travel via an automated track and delivered to individual industrial companies. Finished products from the industries are then sent back to the CDC via the eGMS for distribution to the companies' various customers.

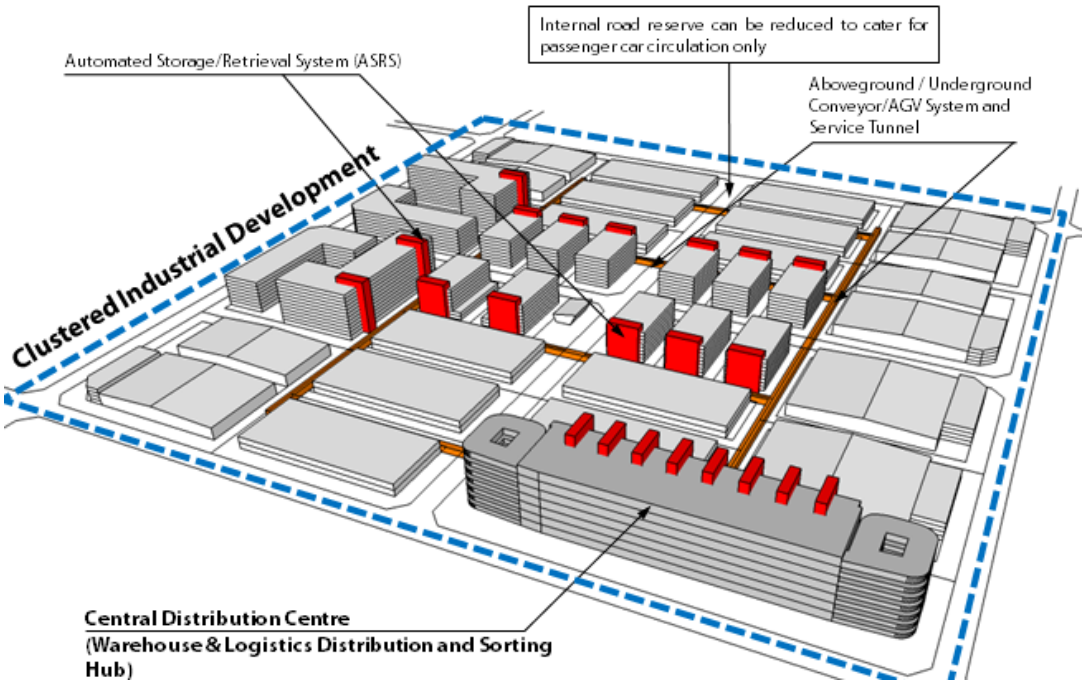



*Source: JTC Corporation*

*Figure 5: The estate wide goods mover system corridor at 2 West with an elevated goods mover system located along the e-Deck and an underground goods mover system provided outside the alignment.*

The eGMS aims to facilitate the movement of goods from point to point without relying on highways and roads, potentially relieving traffic congestion. Current typical industrial developments have individual warehouses and loading/unloading zones dedicated to each industrialist's needs and through outsourcing of each industrial development's goods storage, loading and unloading processes to a centralized third-party logistics solution provider, land taken up by these large roads, internal driveways, warehouses and loading/unloading zones shall be heavily reduced. Additionally, the eGMS can assist in curbing the vehicle population growth and help in freeing up additional land for other productive uses as well as mitigate the health and safety buffers imposed by the movement of hazardous goods.

From the end-user's point of view, clear predictability of suppliers' movements and delivery schedules can also bring about cost savings, and facilitate an increasingly just-in-time production model across an industrial park. Freight movement along the e-Deck via eGMS shall be elevated while goods movement running outside the e-Deck alignment is proposed to be underground. The eGMS is envisioned not just to serve 2 West but also the other industrial estates in Singapore thereby creating an island-wide automated goods system.




*Source: JTC Corporation*

*Figure 6: A conceptual simulation of the eGMS showing how the centralized distribution centre serves a cluster of industrial developments with the aid of technological systems such as the aboveground/underground conveyor system and automated storage retrieval system.*

### 3.3 Air Rights Development

As a land creation initiative, air rights developments are also planned for 2 West so as to make full use of typically unused air space above roads for new developments. The overall objective is to create elevated structures that can span across existing thoroughfares with the intent of supporting a range of different land uses such as commercial, institution, industry and transport. Exploring air rights development can further contribute to significant land savings and could potentially improve connectivity between spaces previously inaccessible as well as facilitate better movement of people and goods.

*Source: JTC Corporation*

*Figure 7: The conceptual air-right development decking over Ayer Rajah Expressway will create more land and synergize one-north's mixed-use development with Science Park which has been separated by the expressway.*

## 4. Moving Forward

In order to ensure that JTC's visions for 2 West shall be implemented and turned into reality, the next step to be taken is to focus on research and development. Through R & D, the micro details of the proposed elements including technical feasibility, financial viability, operational costs and system limitations shall all be carefully studied and investigated assuring successful execution in the future. The results of the studies will definitely aid and guide the planners in developing the detailed design of the masterplan and in finalizing the details of the various urban elements within 2 West.

The conceptual masterplan has generated a number or R & D opportunities in various areas relating to the 2 West development. For the environmental deck, modular, prefab and large span structure design including construction for multi-phase development can be further explored. The details on how to effectively incorporate the people mover system, common services tunnel, recreational facilities, green and blue features, storm water management as well as biodiversity shall also be carefully analyzed to ensure synergy. For the air rights development, JTC is exploring new construction materials and building technologies for long span and heavy loading. Cost effective M&E systems for ventilation, health and safety, evacuation management as well as cost effective system for fire safety & protection are also being thoroughly examined.

JTC will be collaborating with the National University of Singapore (NUS) to embark on the feasibility study for the estate wide goods mover system with the objective of developing the detailed design of this smart logistic system. The study shall look into the potential goods mover corridor alignment, ideal speed, safety & security, mode of goods movement, potential scaleability and applicability to other industrial parks. The research also aims to identify the most suitable business model, to resolve last mile issues as well as to develop a software for the effective automation of the eGMS.

## CONCLUSION

With limited land supply, increase in population and rapid industrial evolution, Singapore's urban landscape is constantly transforming. As the country's industrial landscape custodian, JTC is also constantly keeping up with the change of times and with the fast transition of industrial and economic demands. The 2 West development is a fine reflection of how JTC responds to urban concerns through creative advanced solutions. Indeed, 2 West can be considered as a new paradigm in urban planning as the master plan made use of innovation and technology as the key enablers in resolving the challenges of urbanization, hence bringing forth sustainable growth in Singapore's urban planning milieu.


*Figure 8: This is another artist impression of the potential 2 West development showing the seamless connectivity between NTU and CleanTech Park. It will be a vibrant meeting place and collaborative environment for industrialists, researchers, academics and students to come together to imagine, create and testbed the next disruptive technologies and groundbreaking innovations.*

Bij Borja
JTC Corporation
Singapore