# GEF China Sustainable Cities Integrated Approach Pilot

June 2017



### **Project Development Objective**

Participating cities incorporate **Transit-Oriented Development (TOD) principles** into their **policies** and into future urban and transit **plans**.

### Why TOD in China?

Current urbanization pattern of sprawl, superblocks, and single-use districts not sustainable

Chinese government recognize a new paradigm for urban development and energy is needed and has set ambitious goals to change urban form and peak greenhouse gas emissions

China's urban population is projected to reach 1 billion by 2030



### Why TOD in China?

Policy requires mass transit planning to be informed by land use plans, but huge gaps exist between high-level mandates and on-the-ground technical guidance

> National Guidelines on Urban Development and Management (2016) Ministry of Transport's 13<sup>th</sup> Five-Year Plan on Transit calls for transit-land use integration (2016) New Urbanization Plan also calls for improved planning of cities (2014 – 2020) New Guidelines on Planning and Design of Areas along Urban Rail Transit (2015) State Council Notice Cities to prepare dedicated land administration plans during transit planning (2003)

Ministry of Housing Urban-Rural Development's National TOD Technical **Guidelines** (2015) and policies above meant to address this gap



### Why TOD in China?

Planning with TOD can create high-quality and livable neighborhoods

Increase accessibility and mobility with more transportation choices
Increase connectivity to jobs, housing and retail
Increase inclusiveness and competitiveness

- Increase resilience to natural hazards
- Lower infrastructure costs
- Lower CO<sub>2</sub> emissions





### **Key Project Players**

### MINISTRY OF HOUSING AND URBAN-RURAL DEVELOPMENT

7 CITIES







China Child Project City

## City Profiles (2014)

City	Built-up Area (km²)	Urban population per km2 of built-up area	Total Municipal Population including migrants	Total population of urban districts including migrants*	Municipal GDP per capita (RMB)
Shenzhen	890	12,111	10,779,000	10,778,900	149,495
Nanchang	262	6,997	2,525,000	2,496,000	70,373
Guiyang	299	5,567	3,387,000	2,653,600	55,018
Ningbo	309	5,931	3,141,000	2,668,382	98,362
Tianjin	797	8,437	10,081,000	7,864,900	105,231
Beijing	1386	11,585	21,516,000	18,590,000	99 <i>,</i> 995
Shijiazhuang	264	6,328	4,678,000	2,817,700	48,970



GDP per Capita of urban districts (RMB) 149,495 86,837 57,882 128,863 105,231 102,338 58,850

## **Project Framework**

### GLOBAL ENVIRONMENT FACILITY SUSTAINABLE CITIES INTEGRATED APPROACH PILOTS







### MOHURD

### **National TOD Platform**



### Component 1: National TOD Platform, Toolkit, and Policy Support (\$1.928 million)

- Establish a National TOD Platform and Toolkit ۲
  - National and city level coordination
  - International good practices collection and technical training development
  - Comprehensive toolkit development with modules to help cities conduct analysis and monitor impacts
- **Capacity Building**
- Project Management •
  - Operation of MOHURD project management office and monitoring and evaluation







National TOD Platform Modules:

**TOD Digital Repository** - resources, existing tools, guidelines, manuals, best practices including institutional, policy, technical, financial data, and TOD Indicators

**TOD Dashboard -** inventory of ongoing TOD initiatives across China **TOD Diagnosis** - GIS-based data analytics to allow complete and quick assessment of a city's current level of sprawl and auto-centricity **TOD Planning** - development scenarios with projections based on different transit-oriented and compact city development scenarios **TOD Impact Evaluation** - existing context and future interventions **TOD Monitoring** – short and long-term, existing and developing TOD, environmental, social, and economic costs and benefits of various interventions Monitoring / Learning

Impact evaluation







### Component 2: City TOD Technical Support and TOD Application (\$30.8 million USD).

- City-level TOD Strategy ullet
- District-level application of TOD strategy ۲
- Corridor-level application of TOD strategy
- Station-level application of TOD strategy
- Project management

Activities	Beijing	Tianjin	Shijiazhuang	Ningbo	Nanchang	Guiyang	Shenzhen
2.1 City TOD Strategy	V	V	V	V	V	V	V
2.2 District-level application of TOD strategy	V	V	V				V
2.3.Corridor-level application of TOD strategy	V			V	$\checkmark$	V	
2.4 Station-level application of TOD strategy	V			V	V	V	V
2.5 Capacity building							
2.6 Project management	V	V	V	V	V	V	V



## **Project Phasing**





### 

## Timeline of City Master, Urban Rail Plans & Updates (27)

Time horizon	2000	~	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
GEF SC-IAP Project																				
Beijing																				
Time horizon of City Master Plan																				
Time horizon of Urban Rail Plan																				
Timeline for updating City Master Plan																				
Timeline for updating Urban Rail Plan																				
Tianjin																				
Time horizon of City Master Plan																				
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Timeline for updating City Master Plan																				
Timeline for updating Urban Rail Plan																				



## **Project fund allocation (US\$)**

6

**GEF Grant Allocations by Cities and by Project Components** 





### **Project Indicators**

- (a) Number of cities incorporating TOD **strategies** in urban and transit plans
- (b) Number of cities endorsing city-level TOD strategy or policy
- Number of cities **using** the National TOD **diagnostic** (c) tool

### **Project Intermediate Indicators**

- Development of a National TOD Platform
- # of training modules under TOD Platform used by cities
- # of person/days in training on TOD training modules

- # of cities with **TOD strategies** and related guidelines
- # of cities using project TOD databases
- # of citizen engagement sessions on TOD at the city level
- # of districts introducing TOD **approaches** into their **plans**
- # of corridor level policy guidebooks or manuals produced
- # of cities that adopt TOD-friendly station area planning
- # of citizen engagement sessions part of station design

rm atform used by cities D training modules

elated guidelines ases on TOD at the city level ches into their plans or manuals produced tion area planning part of station design

### **Further Project Details**

Stakeholder Engagement Approach City TOD Strategy Outline **TOD Diagnostic and Impact Indicators** Private Sector Framework Approach

## **Stakeholder Engagement Approach**



- Each City has set up a Steering Committee chaired by the Vice Mayor The project will support public consultation and stakeholder engagement to understand actual on-the-ground demand-side issues
- Key local stakeholders include the government departments Transport, Planning, etc., and state-owned enterprise groups who have been involved in transit construction
- Private sector voice and engagement
- Consultations with the public-at-large



### **City TOD Strategy Outline – Major Sections**



- Ι. Context
- Diagnostic Analysis of Existing Conditions and TOD Priority Area Identification 11.
- **TOD Typology Identification**
- **Monitoring and Evaluation** IV.
- **TOD Action Plans** V.



### **City TOD Strategy Outline – Section I Context**



- I. Context
  - A. Provide an overview of the city's historical expansion as it relates to the evolution of land use and public transit development (Review relevant plans, i.e. city master plan, urban rail system plan, etc.)
  - B. Articulate a TOD vision for the city



## **City TOD Strategy Outline – Section II Diagnostic Analysis of Existing Conditions and TOD Priority Area Identification**



II. Diagnostic Analysis of Existing Conditions and TOD Priority Area Identification

- A. Conduct comprehensive quantitative and qualitative analysis on current development of integrated transit network and land use
- B. Identify and rank promising areas or corridors for further TOD improvement or new investment based on diagnostic analysis
- C. Outline current TOD investment needs and financing gaps
- D. Provide thematic analysis of city-specific issues such as parking management, housing, jobs, private sector engagement, or low-carbon development



## **City TOD Strategy Outline Section II – TOD Diagnostic Indicators:** Macro-level (City and Network)





Macro-Level (Network) Indicators	
Mass Transit Line density (km/km2)	the kilometer of mass transit lines over the soft the covered area
Mass Transit Station Density (unit/km2)	the number of mass transit stations over the of the covered area
Urban Land Coverage Ratio (%)	the percentage of land within the 800m rad all stations
Urban Population Coverage Ratio (%)	the percentage of population over the 800n radius of all stations
Job Coverage Ratio (%)	the percentage of jobs over the 800m radius all stations





## **City TOD Strategy Outline Section II – TOD Diagnostic Indicators:** Macro and Micro-Level (Station)





Node value	Place value	Potential market value
<b>Degree centrality</b> : describes the number of links connects to one specific station.	Density of Street Intersections: measures the number of street intersections within an 800 m radius from each station.	<b>Density of people and jobs:</b> measures the number of people and jobs per km <sup>2</sup> around a transit station within a catchment area of 800 m.
<b>Closeness centrality:</b> ranks the stations based on their distance to all the other stations in the network.	<b>Diversity of land uses:</b> measures the number of different type of land use around a station (800 m radius).	Activity mix: is the job to housing ratio, which measures the mix of residents and jobs in an area.
Intensity of station activity: describes the traffic flow volume in a station, which could be reflected by the frequency of departures of public transit system and/or by the ridership of the station.	<b>Density of amenities:</b> measures the number of cultural, education and health services and more generally social infrastructure, within 800 m of a station.	Floor Area Ratio (FAR): the total floor size over the area size, which measures the land intensity potential.

Node value	Place value	Po
<b>Diversity of connectivity:</b> is the number of different transportation modes (regular buses, BRTs, metros, etc.) that a station connects.	<b>Pedestrian accessibility:</b> measures the proportion of the area around a station (800 m) actually reachable through a 10-minute walk.	Fo hu for plu ba pla de
Betweenness centrality: ranks the stations based on the number of shortest paths between all other stations that pass through one specific station.		Th jol jol tra giv mi



### otential market value

### precasted rate of growth in uman density:

recasted density of people us jobs around stations, used on the urban mobility ans or mass transit evelopment plans.

### ne number of accessible bs:

easures the number of bs accessible through ansit and walking within a ven timeframe (such as: 30 inutes to 1 hour).

### From the 3V Approach

## **City TOD Strategy Outline Section II – TOD Impact Indicators: Macro-Level (Network)**





Macro-Level (Network) Indicators						
Transport greenhouse Gas	The annual amount of CO <sub>2</sub> e produced by travel activities (					
(GHG) emissions (ton/yr)	passenger car, bus, truck, etc.) for the entire city					
Mode Share in Peak Hour	Percentage of journeys in peak hour undertaken on p					
	transport and non-motorized transport (NMT)					
Travel Time (min)	The average travel time needed to finish one working trip					
	mode (passenger car, public transit, etc.) with either orig					
	destination in the traffic analysis zone (TAZ) covering					
	TOD stations.					
Accessibility (%/#)	The percentage/number of jobs that is accessible through					
	transit and walking within certain timeframe					







## **City TOD Strategy Outline Section II – TOD Impact Indicators:** Micro-Level (Station)





Property value	Residential property price (RMB/m²) &
	Commercial property price (RMB/m <sup>2</sup> ) within a cat area of 800 m
Investments	Investment activity within the TOD design area (F
Construction	Commercial and residential floor space construct TOD design area (800m catchment area) (m²/yr)
Social Inclusiveness Measure	The number of affordable housing units within th catchment area of the station.



### tchment

RMB/yr)

ted within

ie 800m

### City TOD Strategy Outline Section III – TOD Typology Identification



III. TOD Typology Identification

- A. Develop TOD typologies based on the indicators
  - TOD typologies differentiate transit station areas based on their suitability for accommodating growth. They link regional and local public policy recommendations to support the type of development that is best suited for a specific site and community.
  - TOD typology aims at creating an aspirational vision of future land uses, prioritizing stations for investment, providing guidelines and actions for implementation, and measuring performance on a range of metrics.
- Categorize corridor, station, and/or district areas that are under review in study and map by Β. type



### **City TOD Strategy Outline Section IV – Monitoring and Evaluation**



*IV. Monitoring and Evaluation* 

A. Develop clear KPIs for the strategy based on the indicators



## **City TOD Strategy Outline Section V** – Actions Plans



- V. TOD Action Plans
  - A. Typology-Specific Implementation Plans
    - Develop typology-specific implementable plans of 3 to 5 years
    - Include projected GHG emissions reductions for each plan.
  - B. District, Corridor, and/or Station-level Approaches
    - Develop broad approaches as a guide for the district, corridor, and/or stationlevel applications to follow



### **City TOD Strategy Outline Section V** – Actions Plans cont'd



- V. TOD Action Plans
  - C. TOD Regulatory Framework Plan
    - Articulate how TOD principles can be effectively channeled and incorporated in existing city policies and legal plans, including specific actions to be taken by relevant city departments and bureaus
    - Include a list of existing supporting TOD policies and technical guidelines and any recommendations for policy improvements or reforms, and recommended new policies would support a healthy TOD regulatory environment
    - Include institutional management coordination mechanism and restructuring recommendations





### **City TOD Strategy Outline Section V** – Actions Plans cont'd



- V. TOD Action Plans
  - D. Financing Plan
    - Identify financing and investment strategies, with a specific focus to involve the private sector at different stages in order to lessen the reliance on land financing to support TOD; clear coordination mechanisms between the private and private should be articulated and carried out
    - The framework can be explored at two levels, a broad and specific framework. More details and a hypothetical Analytical Framework for Private Sector Participation on next slide





## **Private Sector Framework Approach – Potential Use for Financing** Plan under TOD Action Plans from the City TOD Strategy





Framework sets out options for involving private sector at different

levels and stages of TOD (Developed with TOD Community of Practice, IFC and peer reviewers)

- A. Broad Framework
- B. Specific Framework

Table 6.1 Analytical Framework for Private Sector Participation in TOD in China

National Level <-----> City Level C: Current R: Recommended

Components	Policy		Laws &		Institutio	nal	Financing		
			Regulations		Setting		instruments		
	С	R	С	R	С	R	С	R	
CORRIDOR									
Transit									
Infrastructure									
Investment									
Guided wats (rail									
and BRT line)									
Trains and Buses									
Transit Stations									
(platform,									
concourse,									
ticket office,									
waiting room)									

STATION								
AREAS								
TOD Related					tical			
Infrastructure	from Anal							
Investment		Sample Rector Parti						
Roads /Street		Private Sector						
Pedestrian								
Bike Lanes								
Street Light								





### **THANK YOU!**

Joanna Masic Senior Urban Specialist World Bank Group

jmasic@worldbank.org



# TOD Finance and M&E

## **TOD: Types of Capital Investment**

When considering financing strategies for TOD corridor development, what needs to be financed?



Real-estate development / Housing Construction



Investment Size: Large

- Capital costs for BRT, LRT, or metro systems
- Often paid by public sector, but funding can be raised through capturing land value uplift and real estate improvements
- Investment Size: Small-Medium
- Local street improvements & sidewalk/ NMT infrastructure
- Can be paid by developers in strong markets or by local government
- Investment Size: Varies
- Consists of construction costs of residential/commercial buildings
- Most costs to be paid by developer, but public subsidy sometimes required if weak market or affordable housing is required

### **A Business Model for TOD Investments**

The Round, a TOD in Beaverton, Oregon, U.S.A.

Image Source: M.O. Stevens. *Beaverton Central and the Round*. Photograph. Wikimedia Commons. December 1, 2009. Accessed November 17, 2016. https://commons.wikimedia.org/wiki/File:Beaverton\_Central\_and\_The\_Round\_-\_\_Beaverton,\_Oregon.JPG.

A business model is a framework that includes all of the elements that make it possible for an investment to generate a return. A TOD business model is a framework that includes all the elements that allow a TOD investment to generate [social, economic, environmental and financial] return.


# Corridor scale Investment components

#### Tangible assets

- Land ٠
- Transit Track (Bus Lanes, Railways etc) and Transit stations
- Roads, street networks, pedestrians, bike lanes,
- Other TOD related • investments (station plaza, bus terminal, public amenities, etc)
- Public and private buildings
- Public utilities

#### Intangible assets

- Articulated Density
- Public safety
- Walkability
- Mixed land use
- **Cohesive Community**
- High Quality Public places and Cultural heritage

- Feasibility studies
- Detailed engineering and investment cost estimate ٠
- Financing arrangement ٠
- Securing lands and site preparation
- Procurement and construction

Processes

- Monitoring and evaluation ٠
- **Operation and Maintenance**
- Community engagement (all through critical stage from planning to implementation)





## Financial products: de-risking products



Financing cost

**De-risking products**: products designed to lower the costs of finance by reducing the likelihood that an investor will not receive a return on investment TOD products can access guarantees and insurance for de-risking purposes, which include:

- Credit guarantees
- Revenue guarantees
- Political risk insurance

# **A Review of TOD Benefits**



**Mobility Benefits** 



**Social Benefits** 

- Increase access to jobs and
   amenities city wide
- Improve access to a low cost transport solution (public transit/walkable urban
   space/bicycle infrastructure)
- Reduce automobiledependency

- d Revitalize neighborhoods
- Promote social equity
   through creation of mixedincome housing near transit
- Increase accessibility for
  less mobile.
- Improve health and increase physical activity through creation of walkable neighborhoods



Environmental Benefits

- Lower air pollution and GHG emissions by reducing automobiledependency and urban sprawl
- Reduce energy consumption
- Conservation of green and natural spaces



**Economic Benefits** 

- Increase agglomeration and access to employees
- Encourage economic resilience through diversity
- Energize local economy
- Increase property values along corridors to help fund needed infrastructure
- Reduce infrastructure costs
- Reduce transport cost

# Thoughts on M&E Systems

- When creating a M&E system for a TOD project, the project owner must:
  - o Establish project goals, in collaboration with other project stakeholders
  - o Set output and outcome performance indicators
  - o Collect data on outputs and outcomes at regular intervals
  - o Integrate feedback into project implementation





Image Source: EMBARQ Brasil. DOTS Cidades - Manual de Desenvolvimento Urbano Orientado ao Transporte Sustentável. November 2014. Accessed August 23, 2016. http://wricidades.org/research/publication/dots-cidades-manual-de-desenvolvimento-urbano-orientado-ao-transporte.

# **Performance Indicators**

### Measuring for Mobility Outputs and Outcomes



#### **TRAVEL BEHAVIOR**

#### Output Performance Indicators:

Changed parking rules (such as limits,
 pricing, and location)

#### Outcome Performance Indicators:

- Automobile usage, measured in VKT •
- Mode share
- Auto ownership
- Transit use

#### **ROAD SAFETY**

#### Output Performance Indicators:

- Number of redesigned street intersections and crossings
- Km of bicycle lanes

#### Outcome Performance Indicators:

- Vehicular speeds on roads
- Public perception of pedestrian and bicycle safety
- Number of vehicular accidents and fatalities

#### **TRANSIT SERVICE & QUALITY**

#### Output Performance Indicators:

- Number of transit options
- Integration of multi-modal options within transit stations
- Frequency of transit service Outcome Performance Indicators:
- Total area accessible in 45/60 mins
- Percentage of jobs accessible in 45 mins by public transport+NMT
- Satisfaction levels
- Changes in travel time

#### **ACCESSIBILITY & WALKABILITY**

#### Output Performance Indicators:

- Number of high-density developments located within a station-area
- Change in length and width of unobstructed sidewalks/footpaths

#### Outcome Performance Indicators:

- Walkability Score
- Number of pedestrian and bicyclist accidents

# **Performance Indicators**

### Measuring for Social Outputs and Outcomes



#### NEIGHBORHOOD REVITALIZATION

#### Output Performance Indicators:

- Number of community facilities, amenities, and educational services within a project area
- Redesigned streetscapes, public spaces, and building facades throughout a project area
- Number of mixed-use developments within a project area Outcome Performance Indicators:
- Public perception of a project area

#### **SOCIAL EQUITY**

#### Output Performance Indicators:

- Number of affordable housing units
- Interconnection designed for the less mobile

#### Outcome Performance Indicators:

- Improved access to transit and services for all socioeconomic groups
- Diversity within a project area, including racial, ethnic, gender, religious, & socioeconomic diversity of local residents, business-owners, and workers
- Increase accessibility for less mobile

#### SOCIAL CAPITAL & CITIZEN PARTICIPATION

Output Performance Indicators:

• Number of community outreach programs

#### Outcome Performance Indicators:

• Residents' involvement in community projects and initiatives

# **Performance Indicators**

Measuring for Environmental Outputs and Outcomes



#### **REDUCED EMISSIONS**

Output Performance Indicator:

- Transport system and land use prioritizing transit and NMT
- Establishment and implementation of low emission zones around metro stations

### CONSERVATION OF GREEN AND NATURAL SPACES

#### **Output Performance Indicator:**

- Creation/maintenance of park and/green space as a result compact urban development in TOD areas
- Infill and brownfield reclamation

#### Outcome Performance Indicator:

- Number of days of good air quality
- Overall GHG intensity of transport
- Overall energy intensity of transport

#### Outcome Performance Indicator:

- Habitat conservation through preservation of ecological areas
- Increased tree cover and reduced heat island effect



A WORLD BANK STUDY



Sustainable Urban Transport Financing from the Sidewalk to the Subway

CAPITAL, OPERATIONS, AND MAINTENANCE FINANCING



Arturo Ardila-Gomez and Adriana Ortegon-Sanchez

### DEVELOPMENT

### FINANCING TRANSIT-ORIENTED DEVELOPMENT WITH LAND VALUES

Adapting Land Value Capture in Developing Countries

Hiroaki Suzuki, Jin Murakami, Yu-Hung Hong, and Beth Tamayose







### Infrastructure Financing Options for Transit-Oriented Development

Office of Sustainable Communities Smart Growth Program

#### TRANSIT COOPERATIVE RESEARCH PROGRAM

#### **TCRP** RESEARCH REPORT 190

#### Guide to Value Capture Financing for Public Transportation Projects

Sasha Page IMG REBEL Bethesda, MD

William L. Bishop Development Planning & Financing Group, Inc. Chapel Hill, NC

> Waiching Wong IMG REBEL Bethesda, MD

Subject Areas Public Transportation

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# List

- <u>https://www.nap.edu/download</u> /23682
- <u>https://www.epa.gov/smartgro</u> <u>wth/infrastructure-financing-</u> <u>options-transit-oriented-</u> <u>development</u>
- <u>https://openknowledge.worldba</u> <u>nk.org/handle/10986/23521</u>
- <u>http://hdl.handle.net/10986/21</u>
   <u>286</u>

- India: TOD Guidance Document on TOD developed for Indian cities by Ministry of Urban Development under the Sustainable Urban Transport Project <u>https://collaboration.worldbank.org/docs/DOC-</u> 21859
- <u>http://www.moud.gov.in/upload/uploadfiles/files/TODMumbaiFINAL.</u> <u>pdf</u>

# Quick Wins

- 1) Long term impact are major, but start with manageable size projects
- 2) There is a role for the national government
- 3) Review the vision of the city, key objectives and real estate demand
- 4) Develop indicator targets to stimulate development around transit
  - a) Percentage of new permitted development around station
  - b) Target percentage of jobs and housing around stations
  - c) Additional rule and cost for development outside mass transit
- 5) Classify stations in three categories based on node, place and market potential values, discuss among agencies, developer and citizens
- 6) Identify stations with available land for the different types and start developing
- 7) Adopt design guidelines for streetscape

https://globaldesigningcities.org/publication/global-street-design-guide/



Link to the TOD COP Group <u>Asato1@worldbank.org</u> <u>gollivier@worldbank.org</u> <u>jgood@worldbank.org</u>

https://collaboration.worldbank.org/groups/tod-cop

Also connect on Linkedin for regular news: "Gerald Ollivier"

# Quick win (Serbia)







Serge Salat

INTEGRATING SUSTAINABLITY INTO URBAN PLANNING AND STRATEGY - JOHANNESBURG SPATIAL DEVELOPMENT FRAMEWORK AND CORRIDORS OF FREEDOM



- Session 1 How do we understand the city
- Session 2 Theoretical underbuilt and International Benchmarking – Developing an approach for Johannesburg
- Session 3 Testing development options and models
- Session 4 Strategy for future development

### Johannesburg in the 80s



# Johannesburg today



# The traditionnal model Polycentric city



The polycentric city is the traditional pattern of city growth, with a dense and large urban core surrounded by dense sub-centers. This structures supports agglomeration economies.

### Johannesburg Inverted polycentricity



Johannesburg metropolitan structure is unique and inherited from its complex history. It displays inverted polycentricity, with satellites urban areas much larger than the core of the city.

### **DEPRIVATION, INEQUALITY & THE GEOGRAPHY OF POVERTY**



### Income

A strong socio-spatial divide



Figure 7: The socio-spatial unequality in South African Cities: Deprivation areas are concentrated in high density residential areas. High income areas are concentrated in low density northern suburbs

# Unemployment



Figure 8: The socio-spatial unequality in South African Cities: High density of unemployed people are concentrated in high density residential areas. High unemployment rates are concentrated in high density residential areas

# Both private investment and informal settlements further fragment the city





Figure 12: 180 informal settlements, growing fast

Figure 11: The role of the private sector in the City of Johannesburg

# This results in 100-fold variations in residential densities





Figure 19: Formal job density is highly concentrated in Norther areas



Rank of the ith cell



# Strong imbalances in street network per capita

Figure 27: Street networks per km<sup>2</sup> are evenly distributed, but street networks per capita display high spatial inequality

### **MAINTENANCE BURDEN PER CAPITA**







Disconnected Street patterns in 93 % of the land



Figure 31: The number of intersections per km<sup>2</sup> in the north or Johannesburg is much lower

Figure 29: Only 7% of the metropolitan area has an intersection density higher than 100

than international best practice

intersections per km<sup>2</sup>

### LAND USE DIVERSITY (ENTROPY)

- Limited diversity and inefficient land use patterns
- The lack of land use diversity is even more critical in deprived areas where we find mostly residential land uses





# Strong imbalances in mixed use

Figure 38: The inner shows high levels of land use diversity, indicated by high entropy cells



Figure 39: Soweto shows first signs of land use diversification with seldom high entropy cells









# **DEVELOPMENT STRATEGY**


- Position the political debate as a central component of the entire planning process
- Integrate planning process with political expectations and mandate
- Regular sessions with the Mayor and senior politicians at every step of the process (Provide information and testing the concepts)
- Mayoral and Council approval of Draft SDF for publication and further public input. (November 2015)

### **STABILITY IN POLITICAL TRANSITION**





- Evidence based planning creates common understanding of development issues
- International guidelines and principles for sustainable development creates universal acceptance of the vision
- Participative processes and continued civic engagement ensures legitimacy of the plan
- Flexibility allows for shifts in focus and emphasis on specific elements of the plan – ie economic development and job creation

## The inverted polycentricy and the polycentric scenario









How to build on the Corridors of Freedom opportunity to reshape the spatial structure of the metropolis?







### Business as Usual scenario

Residential density increases are scattered within the entire CoJ area



#### Linear densification scenario

Urban sprawl is contained and residential density is concentrated along transit corridors (zones 0, 1 and 2)



#### Compact scenario Urban sprawl is contained and residential density is concentrated in priority development areas (zones 0 and 1)





# Building spatial growth scenarios: Towards polycentricity





Average residential density in the four zones, now and in 2040 for the three scenarios: Business as Usual, Linear densification and Compact Polycentricity. Source: Urban Morphology Institute

From top to bottom: 3D density distribution in 2040 in the Business as Usual scenario, Linear Densification Scenario and Compact Polycentricity Scenario. Source: Urban Morphology Institute

Transect analysis along the BRT backbone (Empire Perth and Louis Botha Avenues) Residential and job densities remain low



Transect analysis along the BRT backbone (Empire Perth and Louis Botha Avenues)

Job Housing Ratios show a job housing mismatch, but a great economic potential in close transit catchments



Transect analysis along the BRT backbone (Empire Perth and Louis Botha Avenues)

Low FAR and building footprints provide densification opportunities



Transect analysis along the BRT backbone (Empire Perth and Louis Botha Avenues) Land use diversity



Transect analysis along the BRT backbone (Empire Perth and Louis Botha Avenues) Income per household







#### **INTEGRATION ZONES (TRANSFORMATION ZONES)**









### **COMPACT POLYCENTRIC CITY IN 2040 - PEOPLE**



26% of the people living less than 1km from transit, compared to only 11% today.

64% living less than 2km from transit, compared to only 18% today





### **COMPACT POLYCENTRIC CITY IN 2040 - JOBS**

33% of the jobs located less than 1km from transit, compared to 10% today.80% of the jobs less than 2km from transit, compared to 17% today









# How do we implement the plan?

- 1. Capital investment
- 2. Special Development Zone
- 3. Indicators
- 4. Inclusionary housing



#### **DIRECT LINK: PLANNING – INVESTMENT - OUTCOMES**



ERF 87 41 Bays

LVL 0 - GROUND FLOOR

A THE THE THE THE THE

LVL 3 - THIRD FLOOR





#### TOTAL CAPEX DEMAND vs STRATEGICALLY TARGETED INVESTMENT





#### **SPATIALLY TARGETED AREAS % CAPEX ALLOCATION**

35















### **ORANGE GROVE – FUTURE FORM**

Special Development Zone Providing market certainty . Up front package of rights • Service contributions • Design requirements Additional units - 13447









## **Implementation Mechanisms**

# Evidence based planning and Indicators



### **Access to Train Stations and Nodes**







500m Service areas representing road networks and different walkability around different train stations



## **Access to Commercial Jobs**







Commercial buildings in 2km

Representing access to commercial jobs



## **Access to Community Facilities**







Access to hospitals



### Thank You