

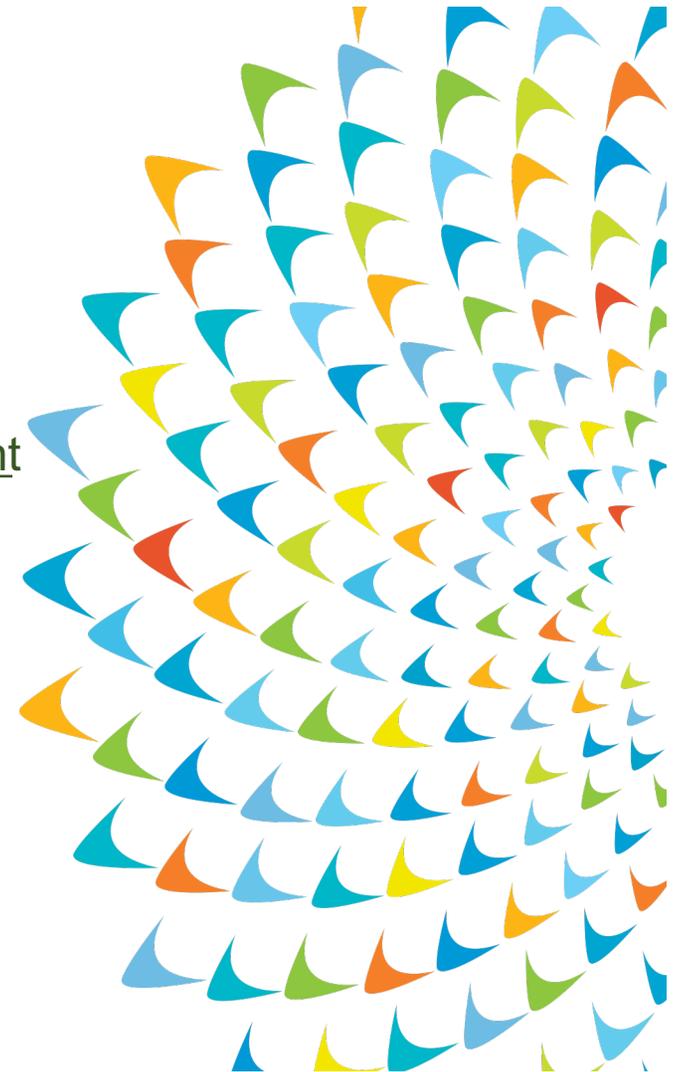
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# Designing Climate Resilient Housing

## Ulaanbaatar Green Affordable Housing and Resilient Urban Renewal Sector Project

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# Ulaanbaatar Sub-standard Peri-Urban Areas

**Ulaanbaatar:** 1.4 million population (Mongolia: 3 million)

**Ger areas:** 840,000 population; 60% of the City; 30% of the country

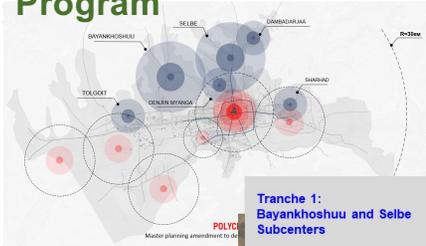
- Open pit latrines system leading to severe soil pollution especially when temperature rises
- Limited access to water, supplied by water kiosks
- Poor drainage, absence of green buffer zone, and dirt roads exacerbating flood events in summer
- Lack of public space; sport, cultural, education and health facilities; and business opportunities
- No heating network, inefficient individual stove burning low quality coal, and low energy efficient shelters cause vulnerability to low temperatures and high emission and extreme air pollution in winter

▶ **Continue to grow (migration + natural growth) due to lack of sustainable strategy, infrastructure, and affordable alternative**

▶ **High vulnerability to climate change, highly emitting, highly polluting**



# POLYCENTRIC AND DECENTRALIZED URBAN DEVELOPMENT STRATEGY - Ulaanbaatar Urban Services and Ger Areas Development Investment Program



Tranche 1:  
Bayankhoshuu and Selbe  
Subcenters

Tranche 2:  
Denjin and Dambadarjaa  
+ Tranche 1 Subcenters

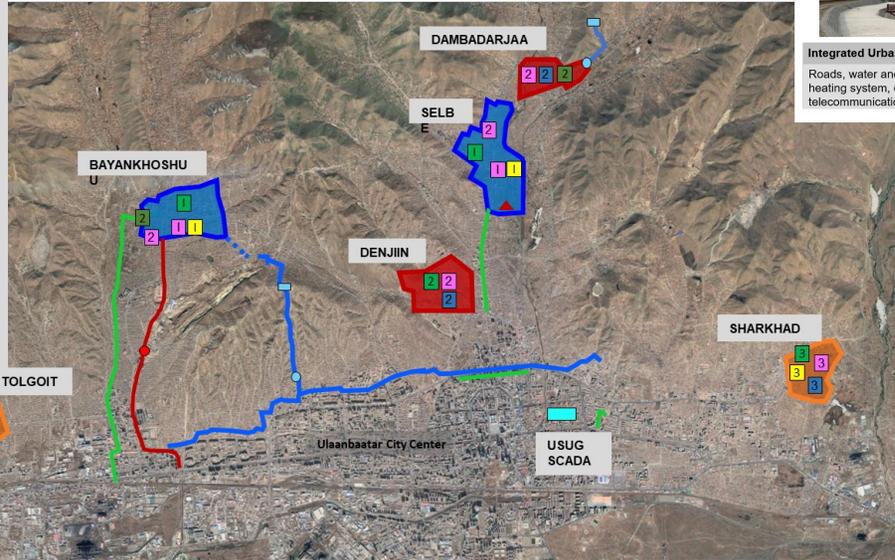
Tranche 3:  
Tolgoit and Sharkhad  
Subcenters

- Business incubator
- Kindergarten
- Urban Park
- Sport complex
- Community center
- Shelter for victims of domestic violence
- Heating plant
- Water reservoir
- Pumping station



Increase density where infrastructure are available  
Decrease density where infrastructure are lacking

1. Extension of main truck infrastructure, and basic urban and social services
2. Affordable Housing and Eco-District Solutions



### BAYANKHOSHUU SUBCENTER

**Integrated Urban Infrastructure:**  
Roads, water and wastewater networks, heating system, drainage, bridges, power, telecommunication, street lighting

**Social Facilities:**  
BI = Business Incubator  
KG = Kindergarten  
UP = Urban Park  
SC = Sport Complex

T1 = TRANCHE 1  
T2 = TRANCHE 2

Green Affordable housing core projects



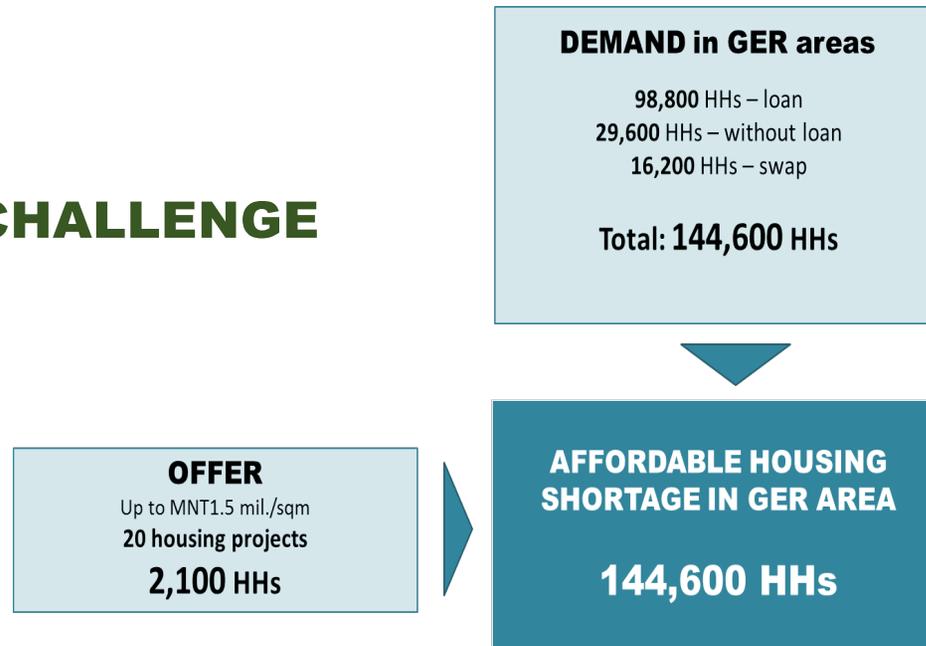
Investment Program	\$ million
ADB	163.7
MUB	96.0
EIB	60.3
<b>Total program</b>	<b>320.0</b>

**Infrastructure where growth potential is high, to encourage densification, and initiate a change in the urban fabric**  
**Compact, low carbon and resilient development**  
**Upgrade of 6 Subcenters as the backbone of peri-urban developments to unlock economic potential**

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## RESULTS ON AFFORDABLE HOUSING

# THE HOUSING CHALLENGE



- High and Medium real-estate market saturated
- 60% of households want to buy apartments with 8% mortgage loan at MNT1.2 million/m<sup>2</sup> in average. Prefer to stay within their communities.

# ECO-DISTRICT PRINCIPLES

**Mixed land uses and functions**  
(residential, commercial and recreation functions; ample public and green space; education, cultural and health facilities; minimize needs for transportation)

**Social mix** (urban areas that mixed different category of population having different income level) and vibrant/engaged communities

**Green and resilient** using implementable renewable energy and energy efficient

▶ Attractive for communities: Quality of life, Social integration, and Affordable

▶ Attractive for real estate developers: Reasonable Net Profit Value

▶ In line with City master and local plans, and urban regulation

## GREEN FEATURES

### Renewable Energy

- Passive Solar Design
- PV (Photo Voltaic) Panels

### Energy Efficiency

- High efficiency isolation system based on Mongolian Norm and Regulation “Thermal Performance of Buildings”

### Efficient land use planning

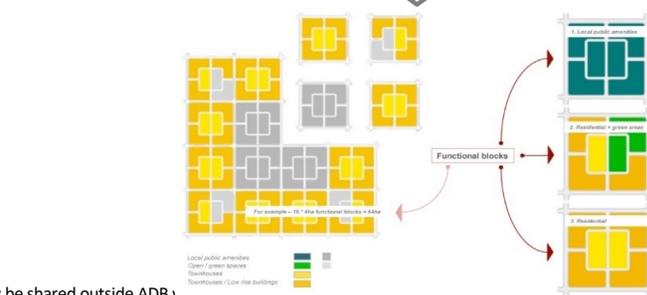
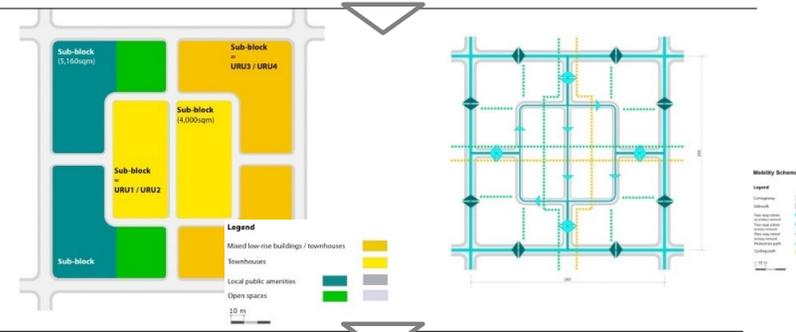
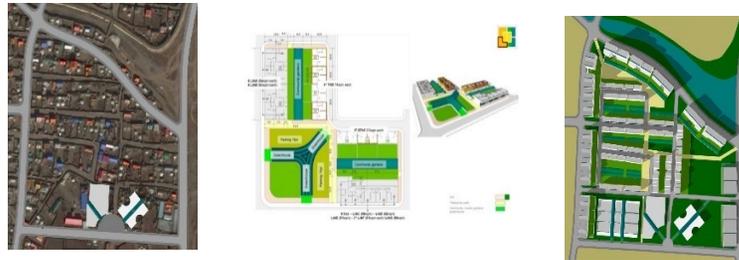
- Compact design
- Shape and building orientation

### Energy Performance Monitoring System (green and smart)

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# ECO-DISTRICT / BLOC DEVELOPMENT

**Integrated** planning and development process, and **complete solution** at the neighborhood level to build up **citywide sustainability** and **green development**



Block



DISTRICT



City



Combination of public policy, catalytic investments from local government and utilities, private sector and communities participation

Bridge the gap between green policy objectives and practical investments

Appropriate scale for step by step implementation and to enhance neighborhood urban and environmental solutions

## ULAANBAATAR GREEN AFFORDABLE HOUSING AND RESILIENT URBAN RENEWAL PROJECT

**Large scale demonstration project and complete solution**, leveraging private sector investment, to deliver **affordable and green housing stock**, and establish policies, mechanisms, and standards for sustainable affordable housing and green urban development.



**10,000 housing units** (55% affordable, 15% social, and 30% market rate units) and redevelop **100 hectares** of *ger* areas into **ecodistricts** that are:

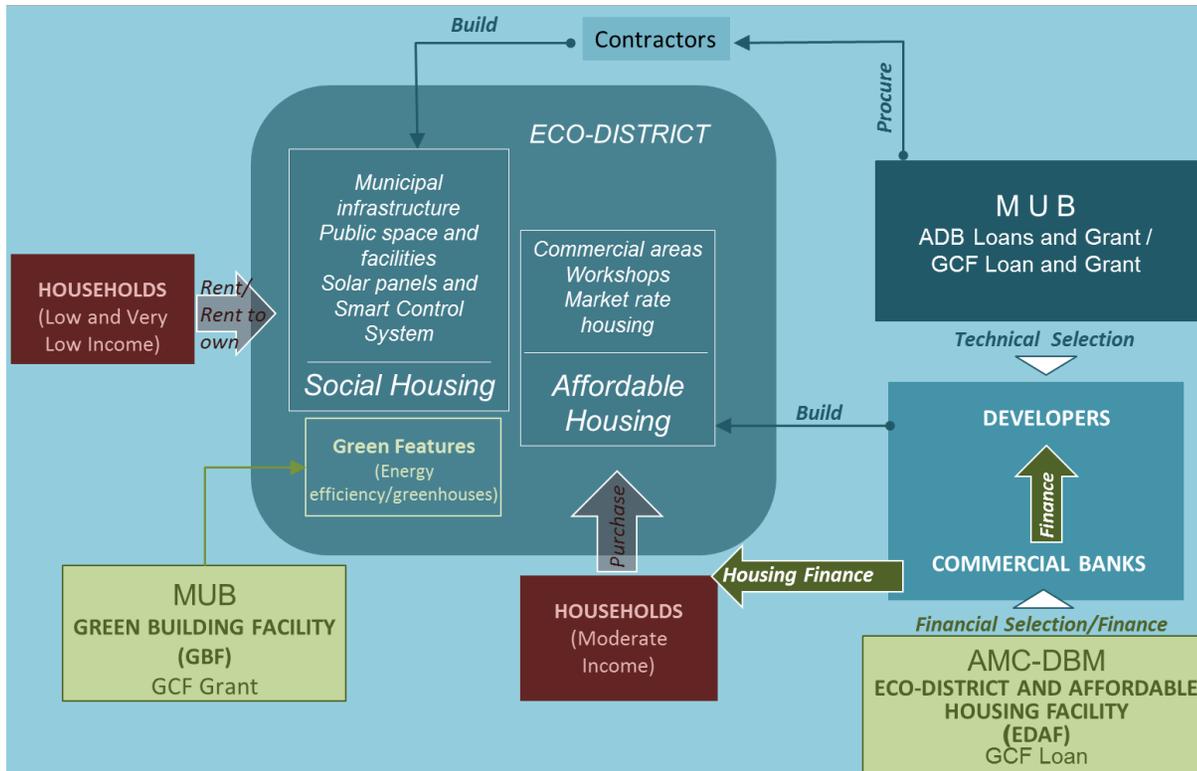
- (i) mixed-use with ample public space and public facilities,
  - (ii) mixed-income with at least 65% of combined affordable and social housing units,
- And
- (iii) **Resilient, resource efficient, and maximizing the use of renewable energy**

Improve the regulatory and enforcement framework for climate responsive urban planning, green building, and affordable housing.

## ECO-DISTRICT DESIGN PARAMETERS

- Housing units should comprise **15% social housing, 55% affordable housing, and 30% market rate** housing.
- **30% of land use is public space** (including 15% of open space and green areas)
- the ratio of m<sup>2</sup> of public amenities/facilities, commercial facilities, and entertainment areas per person correspond to average international standard, **respectively 1.2 m<sup>2</sup>/persons, 1.5 m<sup>2</sup>/persons, and 0.5 m<sup>2</sup>/persons.**
- The average density of an eco-district should be about **300 p/ha** and housing building should comprise townhouses or low-rise building of a maximum of five to six floors.
- Each building should reach an energy efficiency performance guaranteeing an **energy consumption of 150 kilowatt hours per m<sup>2</sup> per year**, indoor air filtration system, passive design, sensor in building, heating regulation system.
- **Universal and inclusive design, earthquake resistant.**
- Building and facilities should have **18% of their footprint covered with solar panels.**
- At least **10% of the eco-district surface should be covered with greenhouses** for urban farming (on the ground or on building or facilities rooftop).

# INTEGRATED FINANCING /DESIGN /INSTITUTIONAL MECHANISM



Source	Amount (USD million)
Asian Development Bank	80.0
Green Climate Fund	145.0
GCF (grant)	50.0
GCF (concessional loan)	95.0
HLT Fund (grant)	3.0
Commercial banks/DBM	111.4
Developers	131.8
Beneficiaries	63.9
Municipality of Ulaanbaatar	35.0
<b>Total</b>	<b>570.1</b>

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## KEY MECHANISMS

- **Designed Based PPPP (Public Private People Partnership)** to to deliver eco-district urban solution, using community consultation, financial, and institutional integrated mechanism that involve public sector, beneficiaries, commercial banks and real estate developers.
- **Financial intermediary** (financed by the Green Climate Fund) to leverage private sector resources (EDAF leveraging about \$300 million financing from commercial banks, developers and beneficiaries,).
- **Green Building facility** (financed by the Green Climate Fund): performance-based grants to qualified private developers for climate change mitigation and adaptation features such as passive housing design, extra isolation system, and heating regulation system to bring down the energy consumption.
- **Effective community participation**, through (a) community participation, social, and gender action plans including skills training and livelihood improvement opportunities; and (b) community-based urban farming and solid waste management

- **Voluntary Land Swapping Mechanism** that will provide housing solution to all residents for in situs redevelopment and through which the ger area population can move up to more climate resilient, low carbon, modern apartment buildings.
- **Renewable energy** in buildings, **Smart renewable energy and building performance control and monitoring system** (financed by HLT fund) will establish an energy performance monitoring system, install and provide initial O&M for solar PV, pilot small scale grid lithium-ion battery storage plant, and pilot private sector management contract for solar panels operation and maintenance.
- **Sector and Policy reform:** Green building standard (including eco-efficient materials, equipment, passive solar house design, renewable energy, and ventilation systems) and associated regulations, energy efficient construction material and techniques, tariff, efficient supply chains for renewable energy systems and energy efficiency, and comprehensive urban planning.
- **Long term program with critical mass** to remove market barrier, cost of material, increase domestic production, promote green finance, and insure linkages between constructor/developer/end-user and performant material/equipment producer

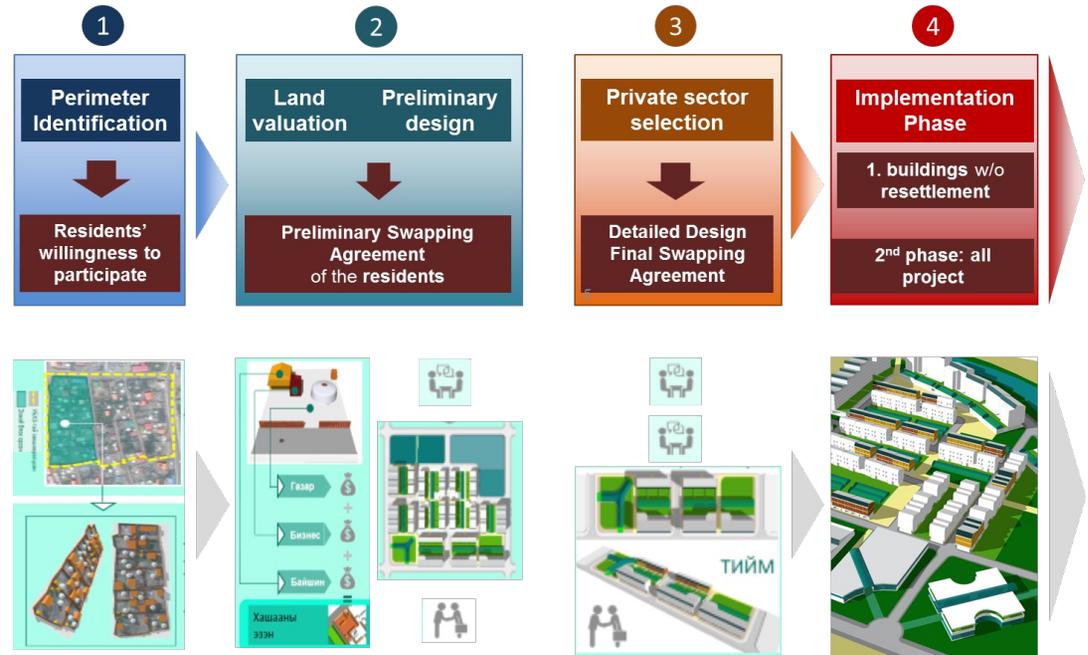
## IMPLEMENTATION STEPS AND CRITERIA

### Subprojects identification:

- Eco-district should be located in *ger* areas
- Close to main trunk Infrastructure
- Demand based

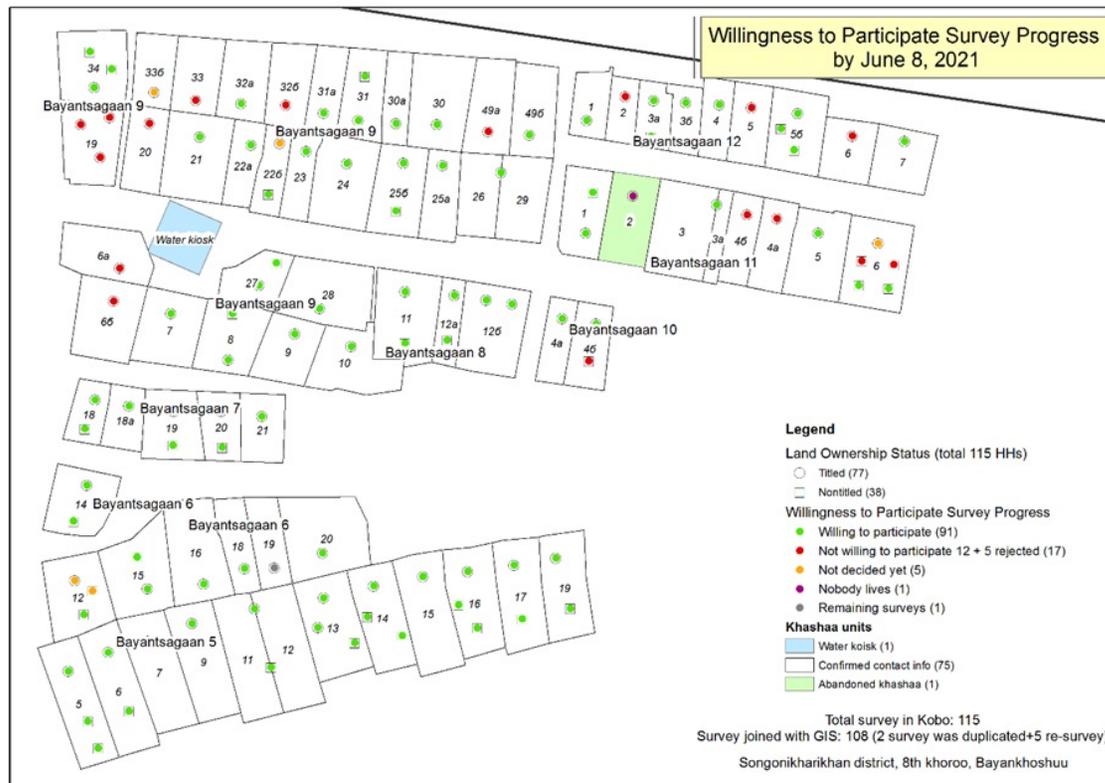
### Eco-district development:

- 100% landowner willing to participate (voluntary resettlement)
- Financially feasible
- In line with master plan





# Bayankhoshuu - Willingness to Participate (WPS)



**80% Willing**

**Planning is proceeding including NOSK site.**

# GADIP-AHURP INTEGRATION AND SYNERGIES



### Proposed Development Stages

1. Develop Area A with first Social Housing (Approx. 30 units) and first Affordable Housing (Approx. 30 units) with related social, economic and green amenities for titled and non-titled residents of Area B.
2. Relocate Area B titled and non-titled residents to completed housing in Area A.
3. Develop Area C with first Market Rate Housing and related social, economic and green amenities.
4. Develop cleared Area B Social, Affordable and Market Rate Housing and related social, economic and green amenities.
5. Relocate Area D titled and non-titled residents to completed Social and Affordable Housing and related social, economic and green amenities in Area B.
6. Develop Area D with more Social, Affordable and Market Rate Housing and related social, economic and green amenities.
7. Continue development of Area A with more Social, Affordable and Market Rate Housing and related social, economic and green amenities as demand and resources permit.

## Eco-District Complete Community Concept



26/11/2021

AHURP

Figure 22. Overall BKH Site Plan (B-15 & N-4 sites)



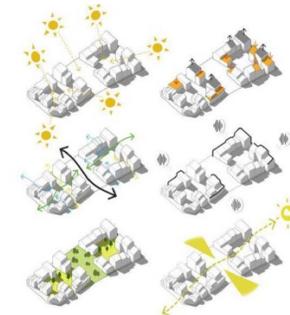
# GREEN, ENERGY EFFICIENT, INCLUSIVE AND INTEGRATED DESIGN



- Mixed use / Mixed income
- Commercial
- Park/ Plaza
- GASIP pilot housing (PII)
- Existing social facilities
- AHURP site
- Green corridor



- Eco friendly materials
  - Locally sourced
  - Low embodied energy and water
  - Recycle content and reusable
  - Healthy, low emitting
- High performance lighting bulb
  - Energy efficient
  - Daylight saving
  - Occupancy sensors
- High Performance water system
  - Rainwater harvesting
  - Automatic controls
- Urban green space
  - Green area re-creation
  - Native and adapted vegetation
  - Green house southern facade
- Activities for community
- High performance envelope
  - Thermal bridge free
  - Air tight
  - Moisture control
- High performance windows
  - Triple glazing
  - Low-e coating
- Water saving technology
- Green Eco power plug
- Accessible apartments
- Renewable energy generation (PV panel)
- Garbage sorting recycling point
- Wet garbage collection point
- Sufficient and accessible car parks
- Daylight penetration and access views
- Healthy lifestyle bicycle track



## Climate Impact and Benefits

### Transformational impacts:

- Policies and capacity building conducive to energy efficiency and resilience in buildings (EDGE Standard, urban planning, green building code);
- Efficient supply chains for renewable energy systems;
- Energy efficient construction techniques and materials;
- Green banking policies; and
- Climate responsive urban planning.

### Climate change cross cutting impacts

**Mitigation:** GHG emission reductions, Direct: 8 million tCO<sub>2</sub>e and Total (including indirect – replications effect): 39.59 million tCO<sub>2</sub>e.

**Adaptation:** 100,000 total direct beneficiaries and 1,000,000 total direct and indirect beneficiaries from reduced climate change vulnerability;

## Main Takeaways and Recommendations

- Importance of strategic development phase using in-depth climate and development assessment
- Use holistic framework to appraise development problems and formulate multi-sector and pluri-disciplinary approaches;
- Focus on development and climate strategies, mechanisms and finance solutions rather than infrastructure investments;
- Elaborate public, private, people solutions to leverage private sector investments and promote community participation; and
- Develop strong partnerships and long-term programs that align create synergies between government, development partners, civil society, and private sector initiatives.
- Complex scheme that require more capacity building, more time to be prepared and implemented



**THANK YOU**

