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NATIONAL CONFERENCE

INCLUSIVE CLEAN ENERGY SOLUTIONS IN ADB OPERATIONS

10-11 December 2024

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Chennai



Session 2.C: CROSS SECTORAL INITIATIVES WATER AND URBAN DEVELOPMENT

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WATER AND URBAN DEVELOPMENT, SECTOR OFFICE**



1 Policy and Strategy

- Regulatory Frameworks
- Policy Reform
- Institutional Strengthening
- Green Building Standards and Certification
- Knowledge Sharing and Capacity Building

2 Technical Assistance

- Energy Audits
- Project preparation
- Master planning – Green City Action Plans
- Design and Innovation

3 Financing

- Sovereign Loans and grants for Projects
- Program lending – Policy Based Lending, Results Based Lending
- Non-sovereign Lending
- Bonds - Green, Sustainability linked, Social



- **Priorities:**
 - cost efficiency and
 - speed

- **Results:**
 - repetitive block designs and
 - sub-optimal living conditions for beneficiaries

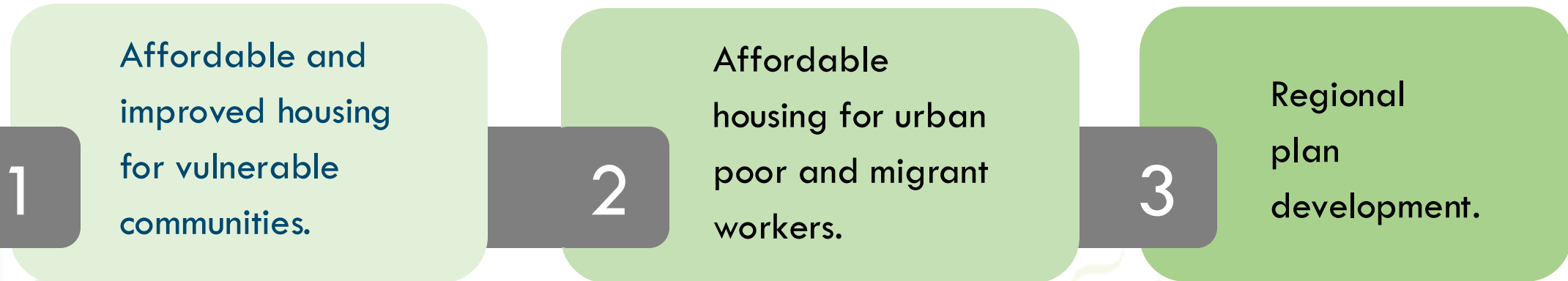
Impact

Permanent shelter with appropriate housing infrastructures and services provided for every affected household.

Outcome

Access to inclusive, safe, and affordable housing infrastructure and services for vulnerable and disadvantaged communities in Tamil Nadu increased.

Outputs



TA support

A TA (\$1.5 million) is attached to the loan and will have the following outputs:

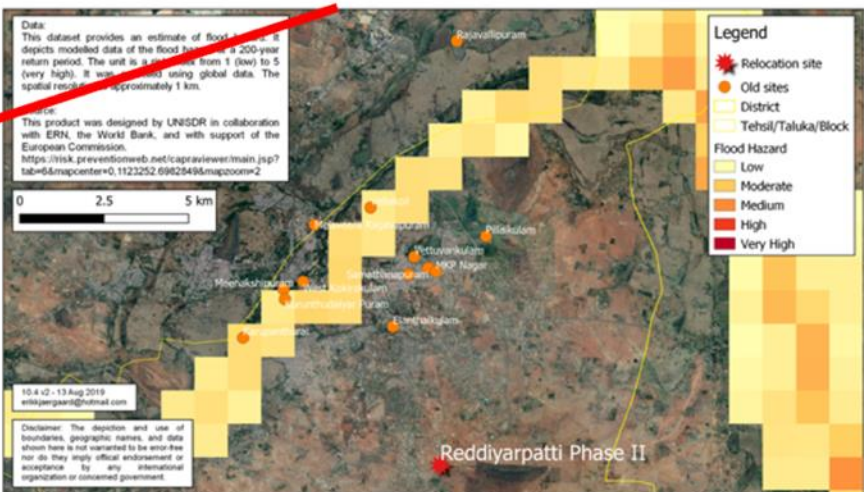
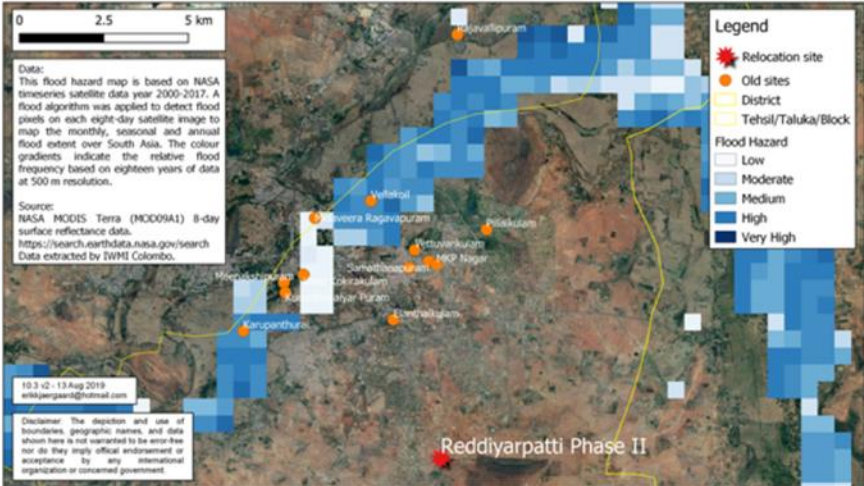
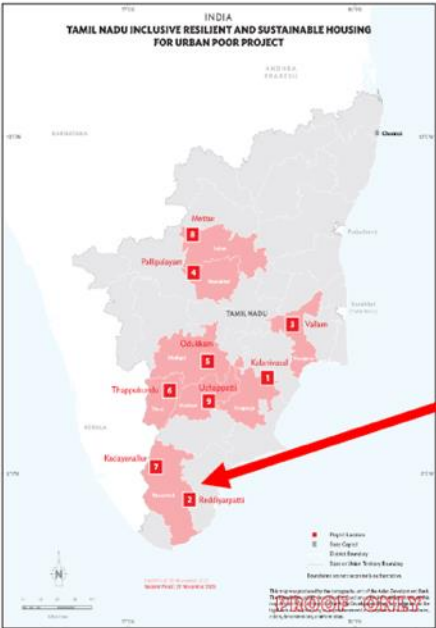
Output 1: Operations and maintenance of affordable housing assets.

Output 2: TNUHDB, TNIFMC, & DTCP institutional capacity to design and implement affordable housing

Output 3: Financial management.



Greenfield Projects (ongoing)



In-situ reconstruction and development projects (piloting)





REDESIGNING A TNUHDB LAYOUT

VALLAM, THANJAVUR
7.77 Acres; 969 Units

- Achieve required numbers with basic and minimal improvements to the site layout and block/ unit plans



RESPONSIBLE URBANISM FOR A SUSTAINABLE FUTURE

REDDIYARPATTI, TIRUNELVELI
17.15 Acres; 876 Units

- features from Vallam **PLUS**
- Introduce a vision that guides the masterplan
- Incorporate landscape concept design
- Introduce well designed social amenities



NEST CONCEPT (NURTURE, ENGAGE, STIMULATE, THRIVE)

KALANIVASAL, KARAIKUDI
11.08 Acres; 900 Units

- features from Reddiyarpatti **PLUS**
- Provide dedicated spaces for washing and water chores



PUBLIC HEALTH RESILIENCE

PALLIPALAYAM, NAMAKKAL
3.82 Acres; 520 Units

- features from Kalanivasal **PLUS**
- Use of wind, heat and daylight simulation/ energy modelling to enhance health and wellness outcomes



A GREEN CERTIFIED SUSTAINABLE COMMUNITY

UPCOMING NEW SITE

- features from Pallipalayam **PLUS**
- Use of additional modelling including Solar PV calculations, Runoff analysis, Site water calculations, Waste management, Numerical envelope flow model, Energy thermal simulations

PROGRESSIVE AND CONTINUOUS IMPROVEMENTS- from Basic Urban Design and Architecture Good Practices to Developing a Masterplan that can be Green Certified)

Source: ADB 2023. <https://www.adb.org/projects/53067-004/main>.



Points Achieved at
Concept Masterplan Stage

59

★★★
3 Star

+

Points to be Achieved
Pre and Post Construction

18

★★★★★
4 Star

+

Points to be Achieved
through
Use of Fixtures and
Appliances

11

★★★★★★
5 Star GRIHA
Rating

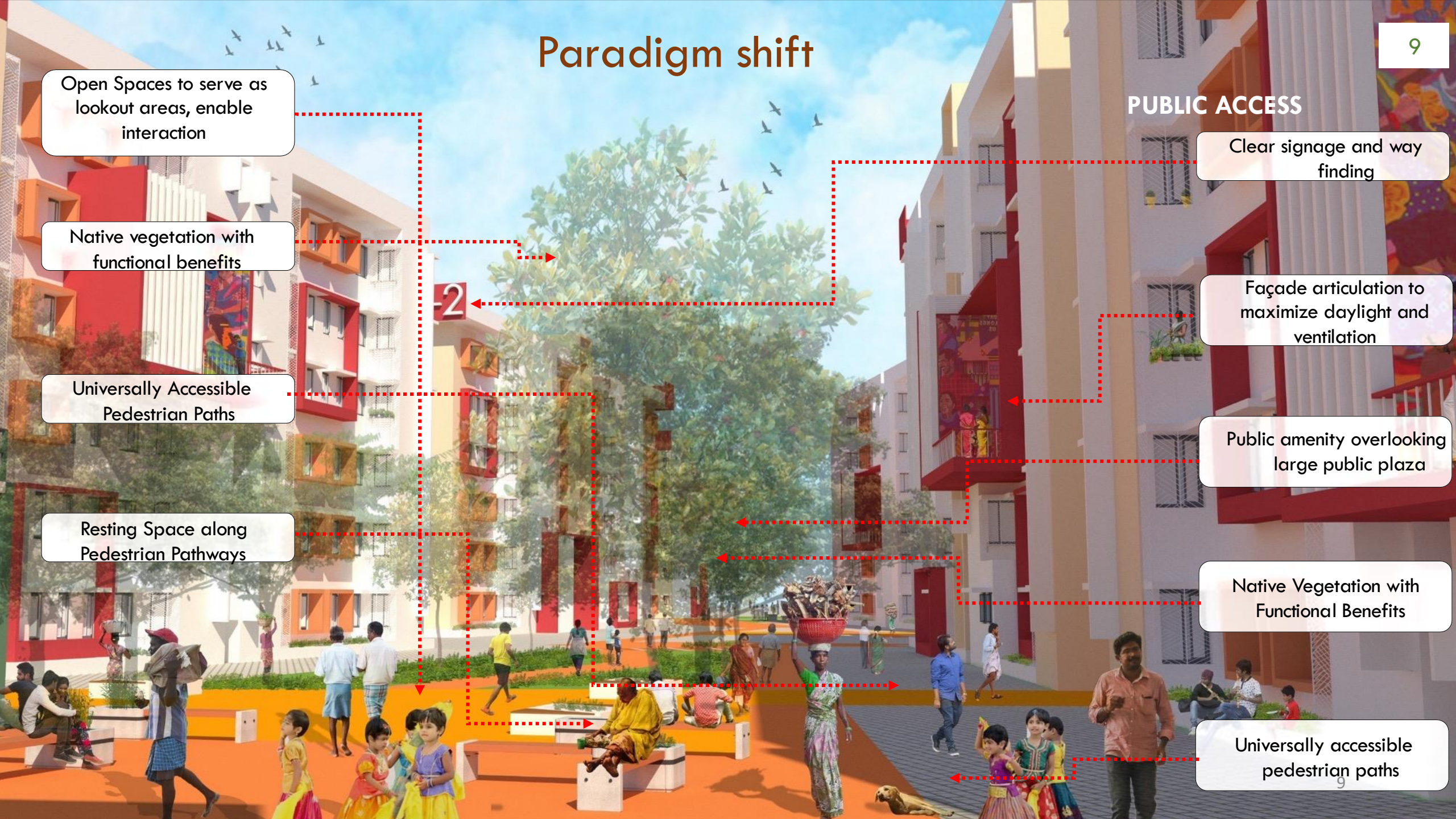
88/ 100

Source: ADB 2023. <https://www.adb.org/projects/53067-004/main>.

Project Officer: Sourav Majumdar



Paradigm shift



Open Spaces to serve as lookout areas, enable interaction

Native vegetation with functional benefits

Universally Accessible Pedestrian Paths

Resting Space along Pedestrian Pathways

PUBLIC ACCESS

Clear signage and way finding

Façade articulation to maximize daylight and ventilation

Public amenity overlooking large public plaza

Native Vegetation with Functional Benefits

Universally accessible pedestrian paths

MODELLING AND SIMULATION APPROACH

Simulation



Computational Fluid Dynamics
Understand and optimize wind patterns to increase the overall wind pressure across the site and thereby, improve outdoor thermal comfort.



Irradiation Analysis
Compute the relationship between building and solar geometry in conjunction with the solar irradiation for every hour (across the year).



Solar PV Calculation
Estimate the peak installed capacity and energy production for PV energy systems for a given area factoring in constraints at the terrace level and solar PV azimuth and inclination angle.

Numerical Evaluation

Run-Off Analysis
Understand the lay of the land and study water flow patterns in the event of extreme rainfall and flooding.



Site Water Calculation
Predict and analyze the site water demand for potable and non-potable end uses at the site and building levels.

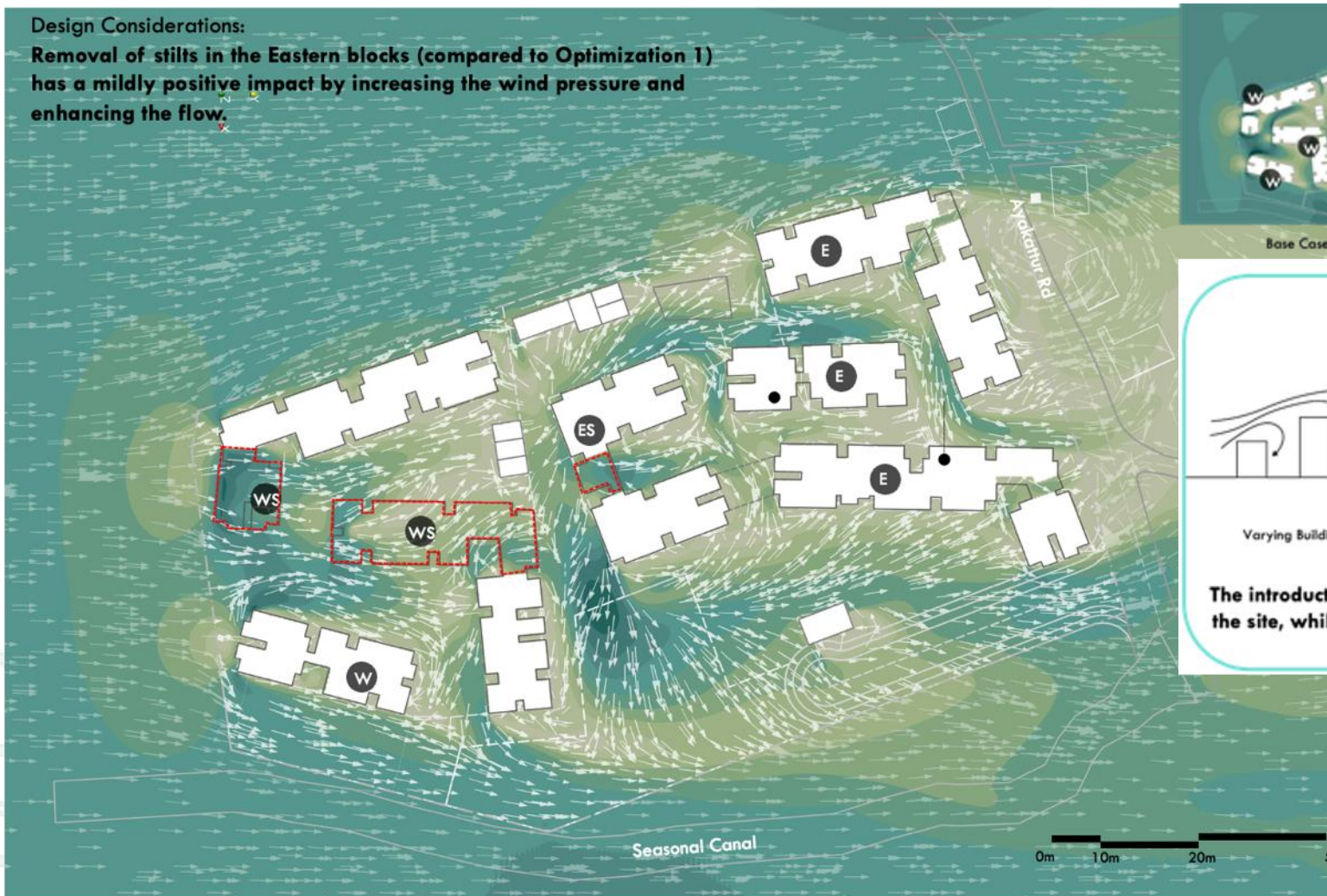


Waste Management Calculation
Predict and analyze the site waste generation.



Design Considerations:

Removal of stilts in the Eastern blocks (compared to Optimization 1) has a mildly positive impact by increasing the wind pressure and enhancing the flow.



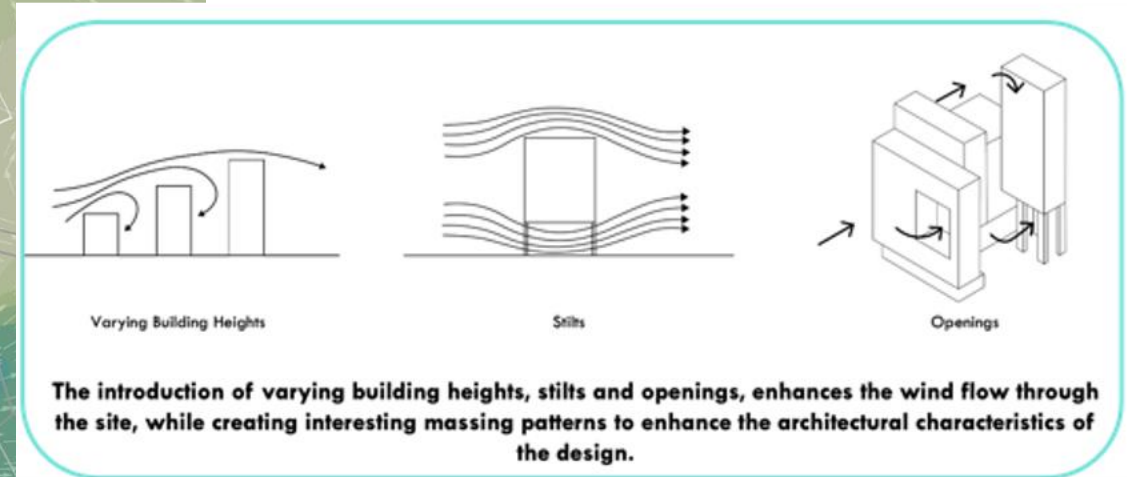
Base Case CFD Simulation

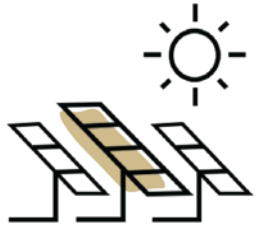


Optimization 1 CFD Simulation



Final CFD Simulation





Solar PV Calculation

Intent: Estimate the peak installed capacity and energy production for PV energy systems for a given area factoring in constraints at the terrace level and solar PV azimuth and inclination angle.

Implication: Increase the supply of renewable energy within the development towards enhanced sustainability outcomes.



Requirement:

Installation of Solar Energy System is mandatory in all non-high rise buildings- minimum terrace area for erecting solar PV is 1/3rd of total terrace area.

Assumption:

The space required for erecting solar PV is about 10 sqm for generating 1KW electricity.

PV Area Required:

3,339.78 m²

PV Area Provided:

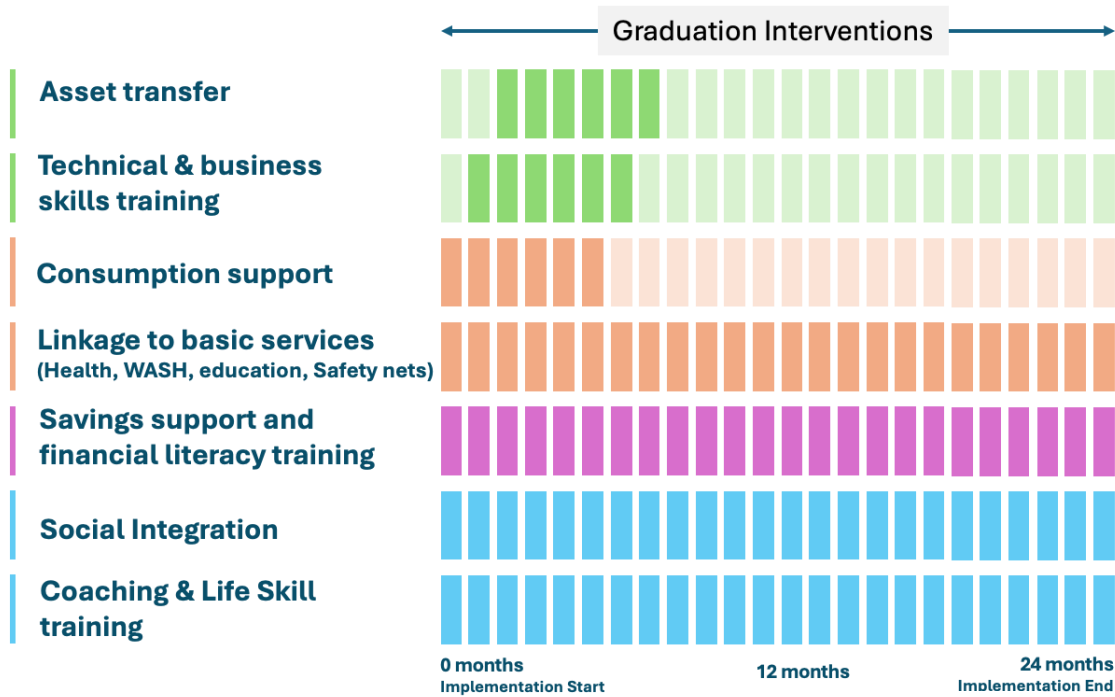
3376 m²

Solar PV locations are informed by the solar irradiation study, conducted for the terrace level in conjunction with the context like parapets, staircase headroom, water tanks and elevation features.

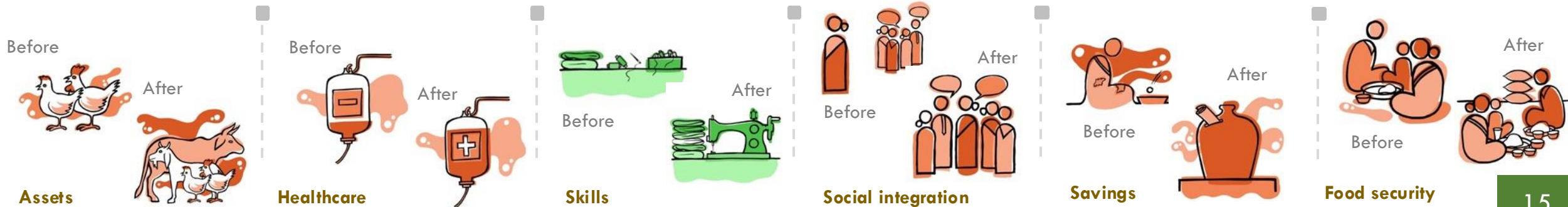
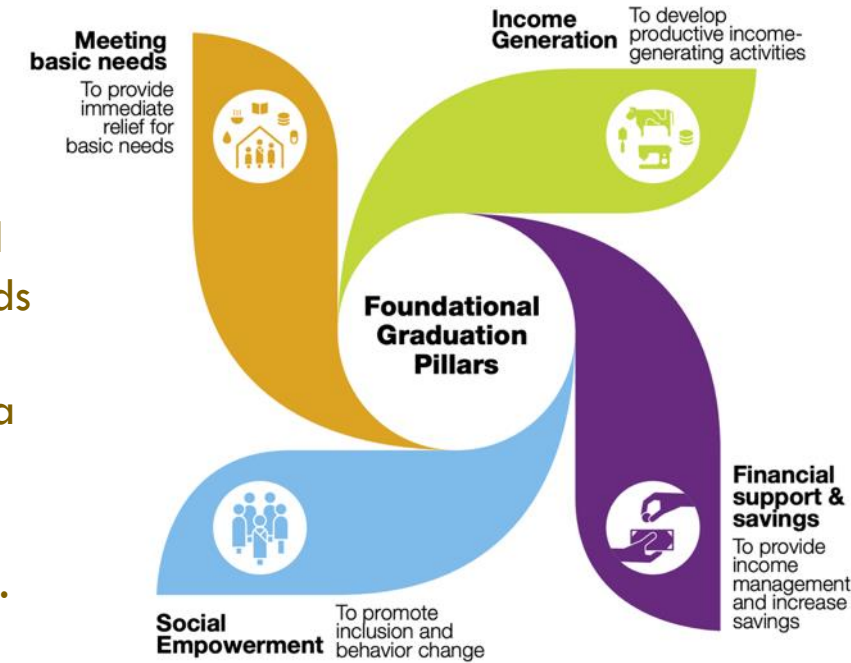
The best fit location for solar PVs are identified to avoid mutual shading from these elements.

Graduation Approach - *New Safeguards*

- A combination of **comprehensive, multi-dimensional** and **sequenced** supports that create a **'big push'** to propel the extreme poor from poverty. Often referred to as **Graduation**, cash plus, productive inclusion, economic inclusion, and other names.



- To be considered 'graduated', households meet specific social and economic thresholds referred to as graduation criteria that address the multidimensional barriers they face.



Green Measures

- Optimizes thermal comfort by placing building blocks and open spaces in a manner that maximizes wind flow while minimizing heat gain
- Densification of inner city areas for additional housing units for urban poor
- Master Planning approach to create inclusive housing and provisioning of social amenities for the housing sites
- Protection of vacated land parcels to prevent re-encroachment
- Two pilots financed through the loan with for ecological restoration



Sustainable Services

- Preservation of existing trees, enhanced green cover, use of water and waste management techniques (onsite sewage treatment facilities) – reuse of treated waste-water for landscaping, etc.
- Provision of roof-top solar panels on housing blocks



Long-term O&M of Affordable Housing Projects

- Innovative O&M mechanisms for sustainable and long-term maintenance of housing assets
- Trainings to RWAs and women on operation and maintenance of the housing sites and energy savings



Tamil Nadu Shelter Fund (TNSF) - Innovative Financing for developers to build affordable housing

- **Objective** - Improving Quality of Life, contributing to the SDGs by providing affordable dwellings thereby helping GoTN achieve its 'Housing for all' goal.
- Govt of Tamil Nadu (GoTN) promoted Tamil Nadu Infrastructure Fund Management Corporation (TNIFMC) Ltd - **Asset Management Company** for TNSF.
- GOTTN contribute about \$22 million from own source and \$70 million (\$35 mn each from ADB & WB loans)
- All projects must be **Green Building certified**, project risks are evaluated and mitigated through the Environmental, Social & Governance (ESG) framework specified by ADB and WB
- TNSF invests in sustainable affordable housing projects in Private sector and PPP projects in Rental as well as Ownership Housing across:



Rental Housing for Students, Co-Living etc.



Affordable Housing for EWS, LIG and MIG



Housing for Industrial workers etc.



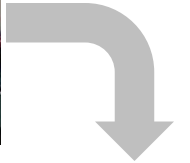
Senior and Assisted Living



Rental Housing for Working Women Co-Living etc.

- All the projects aim to secure green certification by the time it's completed, and it's estimated to achieve around **30% energy savings**.
- Cut down on the commute times for local workers, leading to a **smaller carbon footprint**.
- On completion, this project will provide affordable housing facilities for **14,800 workers** near their place of employment.
- **All eight** ongoing projects are expected to receive Green Building Certification

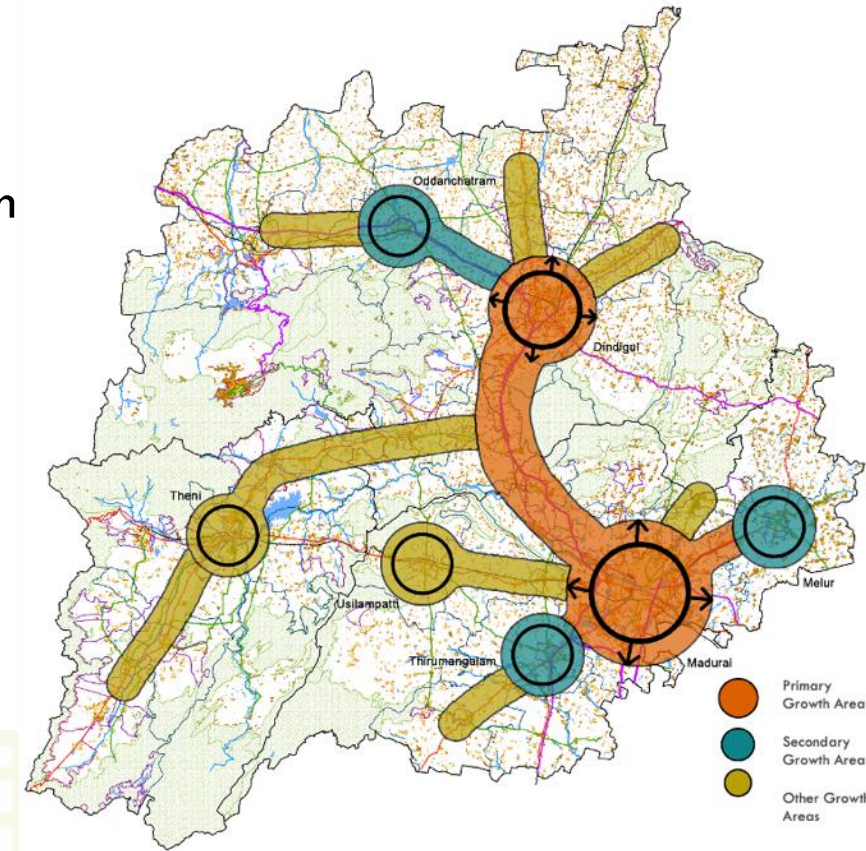




- Rental affordable housing facilities are created for working women across all economic strata.
- The three completed projects have installed solar panels for electricity consumption in the rooftops and have received Green Building Certification
- Total Emission Savings from solar panels – 190+ tonnes CO²/year



- **Objective** - is to achieve sustainable development harmonizing social, economic and infrastructure needs through appropriate planning and management of land and its resources
- As part of the Land Use Strategy Framework - develop an Infrastructure Plan that re-balances the supply and demand side and recommends interventions emphasizing critical regional issues such as water management, Solid waste and wastewater treatment facilities and flood management, renewable energy sector etc.
- Work done so far:
 - Analysis of existing environmental situation including terrestrial environment, environment sensitive areas, municipal waste, pollution, climate change issues, and disaster-prone areas
 - Developed Resilience assessment framework
 - Strategies to utilize the region's potential in renewable energy



Future Potential Growth Areas

1. Green building certification

- Green building certification process takes time
- Difficulties in convincing the developer to adhere to green building certification standards. After extensive discussions, the developers agreed to the certification requirements.
- The lack of demand from the customers due to low level of awareness for green buildings coupled with the lack of precedence for green certifications in the market, exacerbated the situation.
- Although the energy-efficient methods offered only minor benefits initially, the developers in affordable segment observed some positive effects in terms of cost efficiency and market appeal.
- Additional CAPEX costs leading to higher construction costs and making difficult for government to increase the grant

2. Design and selection

- Robust Building design and site planning principles reduces energy consumption to a large extent
- Updating of building codes for energy efficiency
- Investment Returns can be used for renovation of existing buildings

3. KPIs selection

- KPIs should be material and relevant to the business and ambitious enough
- GHG emissions reduction is priority for many investors

4. Monitoring of impact indicators/ KPIs

- Utilizing existing monitoring systems

Taskforce commenced in October 2023:

- To build on ongoing work and provide additional support to develop projects
- Cross task force members to bring multi-sector expertise
- Ensure all buildings financed by ADB comply with energy efficient and/or green building standards
- Provide a platform for sharing of knowledge and country experiences based on past and new projects as well as based on global trends
- Understand challenges faced by staff and provide guidance



Thank You

