Section 1

My City Dehradun
City Snapshot – Dehradun

DMC Area: 64.4 Sq. kms.

City Population: 569,578
City Population Density: 8633/km²
City Gender Ratio: 907

Average Literacy Rate: 88.36%

350 hectares (4.97% of the total land)

$1557 (per capita)
Working Population: 29%
Slum Population: 26%

Industrial Area

1 for 100,000 people (Primary Healthcare)
16 Engineering Colleges, 10 universities & 12 medical colleges

Social Sector: Healthcare, Education & Open Spaces

2.51 sq.km. (3.56% of the total land)

Dehradun Smart City Proposal - DRAFT
Current situation in Dehradun

Current situation of Walkable foot path

Current situation of Electrical wiring
Current situation of Drainage

Current situation of Dustbin

Current situation of Public Transport
**SWOT**

**STRENGTH**

- **Strategic location:** Dehradun, the capital city of Uttarakhand state is strategically located in the Doon valley with major air, rail and road connectivity. It serves as gateway for the key tourist destinations of state. The floating population recorded for Dehradun is 20,000 people per day.

- **It is well connected and in proximity to:**
  - Popular Himalayan tourist destinations such as Mussoorie, Chakrata, Tehri & Dhanaulti
  - Hindu holy cities of Haridwar and Rishikesh along with the Himalayan pilgrimage circuit of Char Dham
  - Industrial and Educational hub of Roorkee

- **Knowledge provider:** Also known as the ‘City of Schools’, Dehradun is the educational hub of India embracing a large number of leading schools and colleges in both government and private sector (707 educational institutions) with over 1.70 lakh students enrolled.

- **Literacy rate:** The average literacy rate is over 84% which is much higher than the national average of 74%. This has in turn augmented the quality of human resource available in the city.

- **Standard of living:** Dehradun garners a good per capita income close to $2400 (per 2012 figures: national average $800) indicating a high standard of living.

**WEAKNESS**

- **Unplanned growth:** The population density of Dehradun is 8,633 persons per sq. km. In 2001-2011, Dehradun had a growth rate of around 29.02% which is higher than the national average of 17.64% adding to the problem of congestion.

- **Inefficient Transport system:** 48.1% of roads in Dehradun are characterized by on-road parking on both the sides. Weak public transport system has led to plying of Vikrams without permits adding to the level of pollution in the city.

- **Informal Settlements:** Shortage of affordable housing options has resulted in large informal settlements in Dehradun. (26% of the city’s population is presently living in slums).

- **Low workforce participation:** In 2011, the workforce participation ratio was about 34:66. The share of main workers is 30% in the total workforce, 4% is shared by the marginal workers, and share of non-workers are 66%.

- **Ribbon development along major transport corridors:** Due to lack of forward planning and effective application of development controls, all the primary radial transit routes. This in turn leads to poor utilisation of the right-of-way, increased travel times, increased air pollution, and reduction in the efficiency of the urban economy as a whole.

- **Lack of employment opportunities:** The share of workforce in the secondary sector is low at 4.51% due to absence of enough employment opportunities in the service sector in line with the employable population of the city.
**SWOT**

**OPPORTUNITIES**

- **Leveraging the location advantage** of being a gateway to tourist destinations: Investment towards promotion and development of facilities viz. TICs, Good hotels, theme parks around shahzadhradha. In the city could serve as “Hub” for key tourist cities under Hub&Spoke model wherein the routes to the identified cities could be strengthened, promoting RRTS, implementing the Mussoorie Dehradun Ropeway, IPT system from main city to the LTP of the proposed ropeway etc.

- **Development of knowledge hub**: Given the high number of schools and educational institutions (over 700 educational institutions in the city), investments towards attracting institutions of repute to start a Dehradun center (recently Mumbai University has opened a campus in Dubai). Hospitality institutes, currently the city has only one IHM. Investment towards setting up R&D for Ayurveda & Herbal.

- **High working age population**: About 75% of the population in Dehradun is below the age of 45 years. This provides an opportunity for retaining the employable population through creation of opportunities for positive employment in the city.

- **Potential for counter magnet city**: The 4/6–laning of Delhi – Provides potential for development of the city as counter magnet city to the NCR.

**THREAT**

- **Depleting environment resources**: There is a decline in the urban green spaces in Dehradun city from 22.98% of total area in 2004 to 15.13% in 2009. Additionally, growing environmental pollution, particularly air, water and noise necessitates need for environment friendly industries. (source: http://iigeo.org/wp-content/uploads/2013/12/6-Change-Assessment-of-Urban-Green-Spaces-of-Dehradun-City-Using-Image-Derived-Parameters.pdf)

- **Ageing population**: In the next 15 years, more than 40% of the population would be dependent age group. This needs to be supported with adequate health and other facilities.

- **Crime rate**: The large section of non-working population can give rise to an increased crime rate in the city if not channelized productively.

- **Emigration**: The flight of human resource capital of the city may result in stagnating the growth potential of the envisaged opportunities of economic development due to shortage of local and relatively cheap resources.

- **Immigration**: Likelihood of large scale in migration from other cities to the city of Dehradun, which will create acute pressure on the urban infrastructure of the city.
Dehradun’s Vision

Transforming Dehradun into an
“eCity – For All”

Environmental Sustainability
Economic Resilience

By leveraging its Engaged Citizens
& infusing technology for pro-active governance
Section 2

Citizen Engagement
Citizen-Centric Smart City Development Framework

1. **DEFINE**
   - Define Key Citizen Segments of Focus

2. **UNDERSTAND**
   - Challenges, Needs & Preferences

3. **ANALYZE**
   - Quantitative & Qualitative Insights

4. **PRIORITIZE**
   - Needs & Possible Solutions

5. **DESIGN**
   - Smart Solutions to Meet Needs

6. **IMPLEMENT**
   - Implementing the Plan

**Citizens of Dehradun**
- Age more than 18 Years
- Both Male & Female
- Across Occupation
- Across Income

**Day to Day Life**
- Challenges & Issues
- City Assessment
- City Vision
- Development Model

**Responses**
- Both Online & Offline
- Discussions, Comments, etc.
- Live Talk & Chat

**Top Priority**
- Challenges & Issues
- Solutions
- Concern areas
- Zone Based Requirements

**Plans**
- Industry Experts
- Environment Friendly Solutions
- Effective & Timely Achievable
- Result Oriented

**Policies & Projects**
- Policies Implementation
- Projects Implementation
In the smart city proposal preparation process, Dehradun initiated multiple campaigns and activities to ensure huge and diverse participation from citizen’s.
Covered Demographics

Zones

- Zone 1: 25%
- Zone 2: 25%
- Zone 3: 25%
- Zone 4: 25%

Gender

- Male: 72%
- Female: 28%

Age Group

- 18-25 years: 38%
- 26-35 years: 34%
- 36-45 years: 17%
- 45+ years: 11%

Property Type

- Residential: 85%
- Commercial: 15%

Monthly HH Income

- Less than 10K: 44%
- 10K-25K: 49%
- 25K-50K: 2%
- More than 50K: 4%

Covered 70% of male and 30% of female population in face-to-face survey. Maximum number around 40% of youth, age between 18 and 25 years were participated. Nearly 15% of commercial like shops, stalls, workshops, garages, factories, etc. properties were included. Around 50% of middle income group (monthly house hold income INR 10,000/- to 25,000/-) has been covered. Face-to-Face Survey Base: n=5008
**Citizen Ratings**

### Top 5 important features for making Dehradun a smart city
- Economy and employment
- Transportation and Mobility
- Sanitation
- Health
- Waste management

### Top 5 challenges facing currently
- Cleanliness
- No jobs
- Drop in greenery in city
- Crowded and narrow roads, no space to walk
- Sewage disposition problem

### Lower Rating on current situation in Dehradun
- Waste management
- Economy and employment
- Transportation and Mobility
- Underground electric wiring
- Sanitation
Mygov opinion poll: preferred development model for making Dehradun a smart city

Preferred Development Model

Total votes 29,350

- Retrofitting Zone 1: 10% (2,928 Votes)
- Retrofitting Zone 2: 6% (1,800 Votes)
- Retrofitting Zone 3: 4% (1,209 Votes)
- Retrofitting Zone 4: 8% (2,399 Votes)
- Retrofitting Zone 4 + GreenField – Tea Estate Area: 57% (19,726 Votes)
- Redevelopment Areas of citizen choice: 4% (1,288 Votes)
Final Zone selection

Retrofit | Redevelopment | Greenfield | Mixed approach

- Retrofit - Zone 1: 15% | 26%
- Retrofit - Zone 2: 19% | 16%
- Retrofit - Zone 3: 26% | 23%
- Retrofit - Zone 4: 28% | 42%
- Retrofit - Zone 4 + GreenField - Tea Estate Area: 23%
- Redevelopment - Areas of citizen choice:
  - In case if Greenfield development is not available, then zone 4 would be preferred for Retrofitting.
Zone 4: Top 5 parameters should be worked upon

Citizens suggested most of the common parameters for each provided development option.

Citizens facing issues with these parameters in entire city and need improvement when Dehradun become Smart City.

- Economy and employment - Robust and resilient economic base and growth strategy that creates large scale employment and increase opportunities for majority of its citizens
- Health - Access to healthcare for all its citizens
- Sanitation - No open defecation and a full supply of toilets for all citizens
- Safety - Safety for all people and especially women, children, elders across age groups, at all time
- Education - Education opportunities for all children in city

Also, Transportation and mobility, Open space and Intelligent government services are also some important parameters need to be address.

Citizens who were selected Redevelopment option broadly mentioned about housing for all income groups and integration among social groups

Dehradun Smart City Proposal - DRAFT
Engaging the Industry

**Ideas Camp**
Get Industry inputs on Infrastructure Projects

**Vision Workshop**
Led by Dr. Sudhir Krisha along with other Industry Leaders.

**Finance Workshop**
Invited – Banks, PE, IFIs, PPP entities

**Technology Workshop**
Expected frugal solutions by Technology providers
Section 3

Citizen Consultation based plan of action: Timeline based action plan
## Approach & Methodology

### SHORT TERM

**0-2 years**

<table>
<thead>
<tr>
<th>1</th>
<th>Preserving &amp; Recreating the green: Tree Plantation along the medians in the street scapes (PAN city), Gandhi Park, Indira Nagar Park, all the park list of zone 4 (fund allocated for up-gradation)-Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Safety-In particular Child &amp; Women: ICT buses (GO), Pedestrian Markets</td>
</tr>
<tr>
<td>3</td>
<td>Heritage Conservation: Clock Tower (Project)</td>
</tr>
<tr>
<td>4</td>
<td>Promoting Pedestrian shopping experience: Paltan Bazar (Project)</td>
</tr>
<tr>
<td>5</td>
<td>Transforming the traffic scenario (Replacement of City Buses, Vikram replacement, Junctions, Walkways, street Lights, Traffic Surveillance &amp; Management, etc)</td>
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<td>6</td>
<td>Clearing the garbage (Waste to Energy based SWM)-Project-convergence with ongoing scheme</td>
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<td>7</td>
<td>Promoting NMTs (Walkways &amp; Cycle Tracks in V. Vihar &amp; Yamuna Colony)-Projects</td>
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<tr>
<td>8</td>
<td>Multi Utility Duct in a stretch-(Project)</td>
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<tr>
<td>9</td>
<td>Strom Water Drainage (to be converged with AMRUT)</td>
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<tr>
<td>10</td>
<td>Intelligent Poles; City wide Fibre back haul-Project</td>
</tr>
<tr>
<td>11</td>
<td>City based Mobile App (Grievances, Information, Transactions, emergency etc)-Project</td>
</tr>
<tr>
<td>12</td>
<td>City Nervous System - project</td>
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<tr>
<td>13</td>
<td>Community Toilets</td>
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<tr>
<td>14</td>
<td>Water ATMs</td>
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</tbody>
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### MEDIUM TERM

**2-5 year Work Plan**

<table>
<thead>
<tr>
<th>1</th>
<th>Master Plan Provisions to de-congest the Core of the City</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Promotion of setting up of Vocational institutes, Hospitality &amp; tourism related facilities</td>
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<tr>
<td>3</td>
<td>FOBs</td>
</tr>
<tr>
<td>4</td>
<td>River rejuvenation</td>
</tr>
<tr>
<td>5</td>
<td>Slum Rehabilitation (Convergence with Housing for ALL)</td>
</tr>
<tr>
<td>6</td>
<td>GIS based Municipal Land inventory Assessment &amp; Monetization of Land</td>
</tr>
<tr>
<td>7</td>
<td>Replication of the short term zone specific initiatives &amp; Projects to be continued on self sustained basis</td>
</tr>
<tr>
<td>8</td>
<td>Road Widening</td>
</tr>
</tbody>
</table>

### Long Term-5-10 year Work Plan

1 Planning City Extensions

2 Regional Rapid Transit Corridors

3 River rejuvenation (to be continued as policy commitment)

4 Slum Rehabilitation (to be continued as policy commitment)

5 Replication of the short term & Medium zone specific initiatives & Projects to be continued on self sustained basis

Dehradun Smart City Proposal - DRAFT
Section 4
Citizen Choice – Zone 4 Retrofitting
Dehradun City Map
Zone - 4
4303 Acres
(17.41 Sq. km)
(23.9 % of DMC Area)

Road Length - 350 km Approx.
Residential - 2083.38 Acre Approx.
Green - 765 Acre Approx.
PSP - 617.98 Acre Approx.
Commercial - 401 Acre Approx.
Deployment View of Solutions

- Pan City Sensors for Data Collection & Monitoring
- Civic Services Combined with Technology
- Power of Mobility For Delivery Of Citizen Services

Central System Zone 4 Pan City

Core Infra
Deployment View of Solutions

- **E-Buses**: Zone 5
- **SWM**: Zone 4
- **Smart Card**: Central System
- **Apps**: Zone 8
- **Kiosks**: Pan City
- **iPoles**: Zone 7
- **City Fibre**: Central System
- **311**: Zone 1
- **Smart Bldg**: Zone 3
- **PBS**: Zone 6
- **Smart Card**: Central System

**Combined with Technology**

**Power of Mobility**

**For Delivery of Citizen Services**

**Core Infra**

**Zone 4**

**Pan City**
Pan City Solutions – Interconnected Approach

P1. Fibre Backhaul (City Nervous Centre)

P2. DehradunOne (Mobile + Kiosk Solution)

P3. Intelligent Poles (Sensors, Wi-Fi, LED and BTS Module)

P4. Citizen Outreach Program (Regular Updates)

ERP System of Dehradun Municipal Corporation

Corresponding City Departments

Citizen Service Delivery

Dehradun Smart City Proposal - DRAFT
**P1-City Nervous System (CNS)** - Command and Control center & City Connectivity (Optical Fibre)

**Command & Control centre**

**Operations & Management**
- Central Admin
- Utilities
- Operators
- Transport Department & Public Address System
- Police and Fire Department
- Health Department & Nagar Nigam

**Applications Modules & Interfaces**
- GIS Application
- Smart Streetlights
- Women Safety
- Sensors
- Dehradun One
- 112 Emergency
- Mosquito Surveillance
- Crisis Management System
- City Tourism & Education Application
- Surveillance Camera
- Grievance Application

---

**Viewing Layer** - This layer will be used for viewing the different interfaces at the command center.

**Analytics Layer** - This layer will be used to analyze the situation/emergency.

**Processing Layer** - This layer will process the information and send to the respective departments.

**Decision Layer** - This layer will be situated at the department and will take the decision on the emergency situation.

**Action Layer** - This layer will be used to send the final decision to the command Centre and corresponding action to be taken.

- Optical fibre Laying
  (500 Kms) ensuring
  100% connectivity
P2: DehradunOne

Grievance
Citizen complaints related to
government services
• Lodge
• Track
• Feedback

Nagar Nigam
Municipal services
• Birth Registration
• Death Registration
• Property Tax
• Building plan approval

112 Emergency
Emergency services – Police, Fire
and Ambulance

Tourism
Plan your travel
• Popular tourist attractions
• Book hotels, accommodation
and guest houses
• Check registered travel agents
• Book travel guides
• Track on-going tourism
department projects

Smart Park
• Track parking lots
• Book Your Parking
• Pay for parking

Utility Bills
Pay your Bills
• Water Bills
• Power Bills
• Check your Consumption

Mosquito Surveillance
• Service Request Form
• Share GPS Location
• Check your aerial Climate
Conditions
• Environmental Sensor Alert

Weather
Weather updates on real-time basis

Education
Nearest Schools & Colleges
• Get Online Courses
• Jobs and Careers
• Skill Development Centre
Link
• Search for Best Schools for
particular courses

Women Safety
SOS Button for
• Medical Alert
• Emergency Alert
• Travel Alert
• Report to Police
• Personal Alert

Dehradun Smart City Proposal - DRAFT
**P3: Intelligent Poles**

**Intelligent Poles as Pan City Solution**

- Leverage on LEDification of Streetlight Policy by EESL – 30-40% energy savings
- Telecom Integration with Street Lights leads to
  - Decrease in diesel consumption by telecom towers
  - Improve the call quality and reduction in call-drops
  - Public WiFi
  - Integration of other sensors like CCTV, Garbage Bin Sensors, Pollution
  - Underground duct hence clearing of overhead wires
  - City asthetics
**P4 - Public Outreach actions**

- Urban art and graffiti to promote eco-friendly messages as well as restore blighted area walls
- Climate themed film screening
- Prime time programmes on Smart City Initiatives
- Walking festivals, cycling events/fundraisers
- City themed painting and photography exhibitions

- Engagement of Children
- Smart innovation contest
- Ward Awards for Swacch Bharat
- Green institution awards
- Community-led outreach models integrating job creation
Section 6

Zone 4 – Projects
**Area Based Projects**

A1. Clean City Goal
- A1.1: Solid Waste Processing using Plasma Gasification Technology
- A 1.2: Underground Garbage Bins across the zone
- A 1.3: Garbage Collection & Transportation
- A 1.4: 50 Community Toilets powered by Biodigester Technology from DRDO

A2. Sustainable Transport Goal
- A2.1: 50 Electric Buses
- A2.2: Public Bike Sharing Project
- A2.3: Pedestrian Market Area around paltan bazar
- A2.4: Cycle Tracks and walkways
Area Based Projects

A3. Healthy & Safe Citizens Goal
• A3.1: Park Rejuvenation of 2 Parks
  - Integrated development of Gandhi Park, pared ground and football ground behind Indira market.
  - One park in Indira nagar colony
• A3.2: Solar powered Water ATMs
• A3.2: Junction Renovation Project of 2 Junctions
  - Ghanta ghar junction

A4. City Aesthetics Goal:
• A4.1: Clock Tower Heritage & Junction
• A4.2: City Signage’s & Art

A5: City Core Infrastructure
• A5.1: Water Supply Treatment & Pipeline Project under AMRUT
• A5.2: Sewerage Network Project under AMRUT
• A5.3: City Multi-Utility Duct Project
• A5.4: Storm Water Drainage Project under AMRUT
A1. Clean City Goal

A1.1: Solid Waste Management

A1.2: Underground Garbage Bins across the zone

A1.3: Garbage Collection & Transportation

A1.4: City Sanitation, 50 Community Toilets
A1.1 Solid Waste processing Using Plasma Gasification Technology

Waste to Fuel
1. Separation, Shredding & Storage of Waste

Fuel to Gas
2. Gasification: Heating organic matter, without allowing combustion, in order to convert it into syngas
3. Syngas Plasma Polishing in Turboplasma: Heating the syngas up to 1200°C with a plasma torch, to crack and remove tars and complex organic compounds
4. Heat Recovery: Recovering heat spent in the previous steps to generate steam and cool syngas
5. Syngas Cleaning: Final cleaning of syngas to remove dust and contaminants

Gas to Electricity
6. Gas Engines: Combustion of the clean syngas to produce electricity with high efficiency
7. Steam Turbine: Steam generated in Heat Recovery is used to feed a combined cycle steam turbine and produce power
A1.2: Solid Waste Management : Smart Garbage Bins

- Real Time Fill Level Status
- Alerts For Abnormal Events (Such As High Temperature And Movement)
- Predicted Fill-up Dates
- Statistics
- Planning Tools

IOT based internet connected sensors
A 1.4: City Sanitation, Community Toilets

- No bad smell in toilets from the tanks
- Faecal matter in the tank not visible
- No infestation of cockroaches & flies
- No clogging of digester
- Effluent is free from off odour and solid waste
- Reduction in pathogens by 99%
- Reduction in organic matter by 90%
- No maintenance required
- No requirement of adding bacteria/ enzyme
- No need of removal of solid waste
A2.1: 50 Electric Buses

A2.2: Public Bike Sharing Project

A2.3: Pedestrian Market Area around paltan bazar area

A2.4: Cycle Tracks and walkways

A2. Sustainable Transport Goal
A2.1: 50 Electric Buses

Benefits

• 50 electric air-conditioned buses with ITS system and infotainment on board

• Pollution-free public transportation for Dehradun. Reduction in carbon emissions

• Air-conditioned public transport will encourage reduction in use of personal vehicles, leading to reduced road congestion, as well as pollution.

• User convenience and stress-free commuting, improving public health and hygiene
A2.2: Public Bike Sharing Project

Benefits

• Environment Friendly
• Last Mile
• City Branding
• Co-Branding Opportunity, double up as Citizen Service Center too
Strength:
   - Already Heavy Footfall
   - Provision of Parking at HNB complex

Weakness:
   - Heterogeneous Physical Character in terms of Material used, Façade & Projections

Opportunity:
   - Pedestrian friendly Movement
   - Walk & Shop Concept
   - Urban Character
   - Building

Threat:
   - Encroachments on Road
   - Un-uniform character of street

Two wheeler parking on the edge of Road

Heavy Footfall

On Street Parking

Vehicular Traffic

Encroachments on Road
**Existing Condition/ Character**

- Mix Retail
- Existing road width varies between 8.31 m to 12m with an average width of 10 M
- Vehicular Traffic creating hindrance
- No dedicated pedestrian pathway
- Lack in street furniture
- No Uniform Urban Character
- Encroachment on Roads
- Parking provisions in surrounding
- "WALK & SHOP" concept
Interventions
- Permissible time for vehicles for loading & unloading of goods will be 10 pm to 6 am.
- Unique identity creation in urban form by identical colour, & pattern in Building Façade & Signages.
- In Paltan Bazar, main stretch 900m length will have central 4m carriage way for Battery operated rickshaw and both side pedestrian walkways having average width 3m both sides with facilities of sitting areas at 50m intervals.
- LED street lights.
- green patches proposed along the sitting area.
Battery operated Special Vehicle will serve the elderly people & shoppers to move in the Bazar other than pedestrians.
A3.1: Park Rejuvenation

A3.2: Junction Renovation Project of 2 Junctions

A3.3: Solar Powered Water ATMs

A3. Healthy & Safe Citizens Goal
A3.1: Park Rejuvenation : Gandhi Park

• Gandhi park lies in the central part of city and strategically located near Clock tower, Indira market, Pared ground, Nagar Nigam and major import landmarks of the city.

• It is most important park and act as lungs for the central zone.

• Area of Gandhi park is around 12 Acre and is partially developed but not properly maintained.

• Certain portion of the park has been already taken under AMRUT for development as children park.
**Proposed Development and Activities in Gandhi Park**

- Musical Fountain, Children Boating
- Meditation & Yoga Centre
- Kids Play Zone
- Flower Bed
- Public Utilities
- Open Amp theater
- Kiosks
- Polyhouse
- Mounts
- Jogging Tracks
A3.2: Junction Renovation: Ghanta ghar junction

Proposed Activities

• Correction of Junction geometry and round about

• Provision of subway to facilitate 3 side pedestrian movement

• Provision of 60 shops in the subway to cater street vendors and act as catalyst to pedestrian to use subway

• Beautification of junction by retaining its iconic identity
A3.3: Solar powered Water ATMs at multiple location especially around Slums, Markets and Bus Stops
A4.1: City Signage

A4. City Aesthetics

A4.2: Clock Tower Heritage Project
A4.1. City Aesthetics Goal: City Signage’s
Participate in Making…
Thank You!