

**APPENDIX III  
FLEXIBLE AND SUSTAINABLE DEVELOPMENT STANDARDS  
CRITERIA, RATIONALE AND BEST PRACTICES**

**For the Size, Livability and Sufficiency of the Proposed Units**

Proposed Unit

Main Habitable Room – The main habitable room shall have 11 square meters of built-up area

Other Habitable Rooms – Other habitable rooms shall have 6.5 square meters of built-up area

Minimum Dimensions- Habitable rooms shall not be less than 2.1 meters in any horizontal dimension.

Minimum Height – A floor to the finished ceiling height of 2.3 meters for a habitable room and 2.1 meters for bathrooms (International Residential Code, 2006 and 2009)

Accessible Bathrooms - Combined bathroom – 2.8 square meters, separate bathroom – 1.4 square meters, separate Toilet/W.C. – 1.4 square meters so that the bathroom and W.C are handicapped accessible (2010 ADA Standards for Accessible Design)

Bathrooms – Combined bathroom – 1.8 square meters, separate bathroom – 1.2 square meters, separate W.C. – 0.9 square meters

Cooking area/Kitchen – The minimum size of a cooking space in a one room unit shall be 2.4 square meters with a minimum width of 1.2 meters. The minimum size of an individual kitchen shall be 3.3 square meters with a minimum width of 1.5 meters. (The Puducherry Building Byelaws and Zoning Regulations, 2012)

Based on the above, housing for the economically weaker and low income groups shall include at least a habitable room including a cooking area with a minimum area of 11 square meters with a provision for common bathroom and toilet facilities. The minimum size of a dwelling unit for the low income and economically weaker groups shall include a habitable room with a cooking area and a bathroom with either a combined bathroom or separate bathroom and toilet.

<b>Residential Rooms</b>	
Habitable Room	11 square meters
Second Habitable Room	6.5 square meters
Minimum Room Width	2.1 meters
Minimum Room Height	2.3 meters
Cooking area	2.4 square meters; width-1.2 meters
Kitchen	3.3 square meters; width – 1.5 meters
Accessible Bathroom Combined	2.8 square meters
Accessible Bathroom Separate	1.4 square meters each for bathroom and WC
Regular Bathroom Combined	1.8 square meters
Regular Bathroom Separate	1.2 square meters – bathroom; 0.9 square meters WC
Minimum Unit Size (Habitable Room + Toilet)	13.1 square meters

## Proposed Multifamily Building

Units per floor – A maximum of 12 units can be served by one staircase on every floor provided other requirements of load travel distance and minimum width of staircase are met

Maximum floor area per floor served by one staircase – 500 square meters

Staircase – A minimum width of 1 meter for the staircase and landing, a minimum 2.1 meter headroom for the staircase, maximum height between landings – 1.75

Maximum number of floors for not requiring a lift – Ground +3 or Stilt +3

Maximum Height = Ground or stilt + three stories and less than 15 meters (The Puducherry Building Byelaws and Zoning Regulations, 2012)

For a building with 500 square meters per floor, considering a maximum loading factor of 25% or 1.25 to calculate area available for units, the minimum floor area per floor available for units = 375 square meters. The minimum area per floor with 12 minimum sized units per floor is 157 (area of 12 units) x 1.25 (loading factor) = 196 square meters to 200 square meters. A building without a lift is most economical because the costs of providing a lift are eliminated. Therefore, a ground+3 or a stilt+ 3 building would be appropriate. Therefore, the maximum number of units for each building can range from 36 to 48 (3 x 12 = 36 (for a stilt+3 building) and 4 x 12 = 48 (for a Ground + 3 building).

Based on the above, a three story building with a minimum floor area of 200 square meters and a maximum floor area of 500 square meters per floor, a maximum of 12 units per floor, one staircase serving the building and either a ground+3 building or a stilt+3 building shall be appropriate for low cost and economically weaker section housing. The maximum number of units for such a building shall be 36 to 48.

## Occupancy

A maximum of 4.5 persons per dwelling unit shall be used for calculating the occupancy of the proposed units (MOUD, 2004). According to a recent survey, the average number of persons in a dwelling unit in India is 4.8 (NHFS-3, MOHFW, 2007). The average number of persons in a household is 5.3 and the range of persons in a household range from 1 to 15. On an average more than 6 persons are in a household consisting of one or two rooms (Census India 2001).

Based on these, it is evident that there is overcrowding in lower income households. Most of the housing programs for the economically weaker and lower income groups do not specify household size. Since the minimum size of a dwelling unit is a single habitable room, the maximum number of persons per household shall be 4 persons for a single habitable room and the minimum sized unit to ensure a healthy and adequate living environment for the occupants. This number can be increased based on additional square footage and/or additional rooms provided to a maximum of 6 persons per dwelling unit to avoid overcrowding.

Based on the above, the population generated by a multifamily residential building with 36 to 48 units shall be 144 to 288 based on the following:

Considering 4 persons per unit, for 36 units –  $4 \times 36 = 144$ , for 48 units –  $4 \times 48 = 192$

Considering 6 persons per unit, for 36 units –  $6 \times 36 = 216$ , for 48 units –  $6 \times 48 = 288$

<b>Multifamily dwelling</b>	
Multifamily Development Plot	264 to 594 square meters
Each Floor Square Footage	200 to 500 square meters
Each Floor Number of Units	Maximum 12
Number of stories	Ground + 3 or stilt + 3
Number of units	36 to 48
Number of Staircases	One
Occupancy	4 to 6 persons per unit

### **For Adequate Day Light, Ventilation and Air Circulation for the Proposed Units**

#### Individual Units

Windows - All habitable rooms shall have an aggregate opening area of a minimum of 8 % of the floor area of such rooms through windows, doors, louvers or other openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. Bathrooms, toilets and other similar rooms shall be provided with aggregate opening area of a minimum of 0.3 square meters. The required openings shall open directly onto a street or public alley, or a yard located on the same plot as the building.

Doors - All units shall be provided with a means of egress through at least one egress door. The minimum dimensions of the egress door shall be 0.8 meters wide and 1.9 meters high measured from the floor for a clear height of 1.9 meters. The egress door can also serve as the entrance door and shall be readily open able from inside the unit without the use of a key. The means of egress shall provide egress from the unit to the exterior of the unit. (International Residential Code, 2006 and 2009)

The above regulations provide minimum standards for adequate day lighting, ventilation and air circulation for dwelling units. Based on the above, for a minimum sized unit, the minimum window area shall be 1.05 square meters, the minimum door area shall be 1.52 square meters.

#### Multistory Buildings

Windows – Opening area of a minimum 1.5 square meters for staircases

Building Entrance - Ramp shall be provided with a minimum width of 1.8 meters, maximum gradient of 1:12 and maximum length of 9 meters for handicapped access. Entrance landing with minimum dimensions of 1.8 meters x 2 meters adjacent to the ramp shall be provided. Access road connecting the abutting road to the building entrance shall be a minimum of 3.5 meters in width.

Setbacks - Setback means an open space at ground level between the building on a plot and the property line of the plot or other buildings on the plot that is unoccupied and unobstructed to provide light, ventilation and air circulation to the building through the various openings in the building. (The Puducherry Building Byelaws and Zoning Regulations, 2012)

For a Ground or stilt+3 building, the minimum front and rear setback shall be one meter so that the height of the building does not exceed one and half times the width of the abutting road (considering a road width of minimum 6 meters). For building above 12 meters in height, an additional setback of 0.3 meters shall be provided for every meter of increase in height on all sides. (The Puducherry Building Byelaws and Zoning Regulations, 2012)

The above regulations provide minimum standards for adequate day lighting, ventilation and air circulation for multistory residential buildings. Based on the above, for a ground or stilt + 3 multistory residential building with a maximum of 12 dwelling units shall require one staircase and building entrance and setbacks according to the above standards.

Doors	1.52 square meters
Windows	1.05 square meters
Setbacks – individual plots	Front, Rear – 1 meter; sides – 0.5 meters
Setbacks - Row Houses	Front, Rear – 1 meter
Setbacks - Multifamily Residential Unit	All sides – 1 meter
Staircase	Width - 1 meter; headroom – 2.1 meters; height between landings – 1.75 meters; Window – 1.5 square meters
Entrance	Ramp width - 1.8 meters; maximum gradient - 1:12; maximum length - 9 meters; Entrance landing - 1.8 meters x 2 meters; Access road width - 3.5 meters

### **For Adequate Services for Health, Hygiene and Sanitation**

#### Plumbing

A minimum sized dwelling unit shall have the following minimum plumbing and sanitary facilities:

- a water supply tap and sink or wash area in the cooking area or kitchen
- a water supply tap and shower area in the bathroom
- a water supply tap and a wash basin with a tap or two water supply taps and a water closet for a combined bathroom and a tap and shower area in the bathroom
- a water closet and a water supply tap for toilets

All plumbing facilities shall be connected to a public or private water supply system and all sanitary facilities shall be connected to a public sewage system or other alternative systems. Appropriate sanitary and stormwater drains shall be provided.

#### Water Supply

A minimum of 135 liters is required per person per day for EWS/LIG Housing (The Bureau of Indian standards, 1993). This is based on adequate requirements for drinking, cooking, washing, cleaning and flushing. The basic water requirement for drinking, cooking, sanitation and bathing is 50 liters per person per day (Water International, 1996). An underground or overhead water tank with a capacity of 200 liters per person shall be provided for adequate water supply. Clean water connection shall be allowed only for drinking, cooking, sanitation and bathing needs. For

other purposes, like flushing and gardening, recycled waste water and/or provision of ground water can be made with dual piping system (The Puducherry Building Byelaws and Zoning Regulations, 2012).

### Water Conservation

Water conservation can be achieved by one or all of the methods listed below:

- Using low capacity cisterns
- Water harvesting through storage of water run off including rainwater for buildings with a minimum terrace area of 100 square meters and plots with a minimum area of 200 square meters
- Recycling of waste water for all buildings having a minimum discharge of 10,000 liters per Day (The Puducherry Building Byelaws and Zoning Regulations, 2012).

### Disposal of polluted and unpolluted water

Separate drains shall be provided for disposal of polluted water (water coming out of toilets, bathrooms, water closets and kitchens) and unpolluted water (storm water and unpolluted subsoil water) (The Puducherry Building Byelaws and Zoning Regulations, 2012)

Based on the above requirements, the following minimum standards shall be developed based on the occupancy of the residential building:

- a minimum clean water consumption requirement per person per day must be provided.
- A minimum waste water reuse and recycled water requirement per person per day must be provided for other purposes like flushing and gardening
- Dual piping systems to handle the minimum consumption requirements must be provided
- Dual drainage systems for polluted and non polluted water
- Appropriate water storage facilities
- Appropriate water reuse infrastructure
- Appropriate number of plumbing fixtures

### Sewage disposal

If the proposed units are not connected to a public sewage system, a sewage system or a septic tank with up-flow filters shall be provided for a minimum of 75 units assuming a square footage of 50 square meters per dwelling unit. (The Puducherry Building Byelaws and Zoning Regulations, 2012)

Based on the above requirements, an appropriate sewage disposal system shall be provided based on the proposed number of dwelling units in a multifamily residential building (plots, row housing or multifamily development). The maximum number of dwelling units in a multistory building shall be 36 to 48. Therefore, an appropriate sewage disposal system shall be provided on site for 36 to 48 units for individual buildings, when not connected to a public sewage system.

### Solid Waste Disposal and Management

Approximately 300 to 800 grams of solid waste is generated per person per day in urbanized areas in India. Solid waste disposal includes the following:

- Control of waste at source (includes education regarding reducing the use of waste

- generating materials like plastic, paper etc.)
- Waste segregation (separation of waste into recyclable inorganic waste and decomposable organic waste)
- Collection and transportation (both inorganic and organic waste has to be collected and transported separately for final disposal of organic waste and conversion to reusable and recycled materials for inorganic waste).
- Final Disposal (includes methods like composting, sanitary landfills, incineration and refuse derived fuel) (Directorate of Environment, 2008)

Based on the above, the solid waste generated in a multifamily residential building is:  
 Minimum based on 4 persons per unit = 36X800X4 = 115 kilograms per day  
 Maximum based on 6 persons per unit = 48X800X6 = 230 kilograms per day

Facilities for solid waste to be disposed on-site with composting and recycling etc. shall be provided on site so that the burden on sanitary landfills is reduced. Waste disposal on site also reduces the expenditure of transportation of waste for final disposal. Appropriate solid waste disposal facilities on site shall be provided for disposing the solid waste generated on site based on number of persons per unit and number of units in the development. Since the maximum number of units in a residential building is 36 to 48, solid waste disposal facilities shall be provided based on the occupancy of the units.

### Energy Conservation

Energy conservation strategies shall be developed so that at least 20% of the power requirements are from renewable energy sources and at least 5% of the renewable energy requirement is from solar renewable energy (The Puducherry Building Byelaws and Zoning Regulations, 2012). The above requirement seems adequate for energy conservation given the small size of the dwelling units and shall be used as minimum standards for energy conservation. In addition, energy saving fixtures and materials shall be utilized to reduce the need for energy.

### Green Buildings

The objective of green buildings is to reduce the overall impact of the built environment on human health and natural environment by efficiently using energy, water, other resources and reducing waste, pollution and environmental degradation. Indian Green Building Council had developed a suite of rating systems for the design, construction, operation, and maintenance of various types of buildings. The proposed minimum standards already attempt to efficiently use energy, water and other resources and meet the objectives of the green buildings. Therefore, to the extent feasible, the proposed housing shall try to comply with the various criteria and try to meet the minimum rating system.

Plumbing	Minimum fixtures for cooking area, bathroom & WC
Water Supply	Dual piping for clean water and waste water reuse
Water Conservation	Low capacity fixtures, water harvesting, water recycling
Disposal of Polluted & Unpolluted Water	Separate drains for polluted and nonpolluted water
Sewage Disposal	Appropriate facility for 36 to 48 units
Solid waste disposal & management	Appropriate facility for 115 to 239 kgs waste per day

Energy Conservation	20% from renewable energy; 5% of the 20% from solar
Green Buildings	Appropriate certification level to the extent feasible

### Open Space, Roads, Street Lighting

A minimum of 25% of the total area of a development shall be reserved for civic amenities, parks and open spaces, subject to a minimum of 15% for parks and open spaces (BBMP, 2003). A minimum open space of 1 square meter shall be provided at the local level per person (Government of Hong Kong, 1995).

Since a single multifamily residential building generates a population of 144 to 288 based on the requirement of one square meter open space per person will require an open space of 144 square meters to 288 square meters. The minimum area for a multistory residential building with 200 square meters to 500 square meters is 264 square meters to 594 square meters considering a one meter setback on all sides. Therefore, an open space requirement based on open space per person requirement will result in an open space area that is equal to 50% of the plot area for a multifamily residential building. Therefore, a percentage of the plot area to be reserved for open space seems more appropriate for a single multifamily residential development.

Since the population generated by housing for the lower income and economically weaker sections is quite large compared to market rate housing, the open space requirement shall be 15% of the plot area for a single multifamily development.

The area of the proposed roads shall be 10 to 20% of the area of the development (MOUD, 2004). A single multistory building can have access from an adjoining road and will not require any internal roads but a development consisting of two or more buildings may require an internal road. Therefore, the road requirement for smaller developments shall be a maximum of 10% of the plot area.

Adequate street lighting with street lights adequately spaced for safety and illumination shall be provided. Energy conservation methods shall be utilized for street lighting including solar powered lighting.

Open Space	15% of plot area for a development
Roads	10% of plot area for a development
Street Lighting	As appropriate with solar and other energy conservation methods

### **For Appropriate Housing Densities**

#### **For the Minimum Size of a Housing Development**

Based on the above analysis, the minimum size of a housing development shall include a single multifamily residential unit. Therefore, the minimum size of a housing development shall be a plot that can accommodate a multistory residential building with stilt or ground + 3 floors with a maximum number of units ranging from 36 to 48 and with a floor area ranging from 200 to 500 square meters per floor, one staircase serving the building and a minimum one meter setback on all sides. In addition, 10% of the plot area shall be used for roads and 15% of the plot area shall be used for parks/open space.

## Area

The minimum area for a multistory residential building with 200 square meters to 500 square meters shall be 264 square meters to 594 square meters considering a one meter setback on all sides. 10% of this area for roads shall be 26.4 to 59.4 square meters and 15% of this area for parks will be 39.6 to 89.1 square meters.

The minimum plot area for a single multifamily residential development shall be 330 square meters and the maximum area shall be 742 square meters based on the following:

Minimum area – 264 (for building and setbacks) + 26.4 (for roads) + 39.6 (for open space/parks) = 330 square meters

Maximum area – 594 (for buildings and setbacks) + 59.4 (for roads) + 89.1 (for open space/parks) = 742.5 square meters

## FAR

The maximum FAR (Floor Area Ratio) for a ground +3 or a stilt+ 3 multifamily development shall be 2.4 to 2.7 based on the following:

Considering 200 square meters per floor for a ground+ 3 development =  $200 \times 4 = 800 / 330$  (minimum area) = 2.4

Considering 500 square meters per floor for a ground+ 3 development =  $500 \times 4 = 2000 / 742.5$  (maximum area) = 2.7

## Ground Coverage

The maximum ground coverage for a ground +3 or a stilt+ 3 multifamily development shall be 60% to 67% based on the following:

Considering 200 square meters per floor =  $200 / 330$  (minimum area) = 60%

Considering 500 square meters per floor =  $500 / 742.5$  (maximum area) = 67%

## Density

A maximum net density of 121 units/acre is specified for low income housing (MOUD, 2004). Net Density generally excludes area of roads, amenities and openspace. The rationale for this maximum density has not been explained.

The minimum residential density for individual and small housing developments shall be 196 units per acre and the maximum residential density shall be 588 units per acre based on the following:

For a 36 to 48 unit multifamily residential building,

Minimum density =  $36$  (no. of units) /  $742.5$  (plot area) = 196.2 units per acre

Maximum density =  $48$  (no. of units) /  $330$  (plot area) = 588.6 units per acre

Rounding off the above numbers, the minimum density shall be 196 units per acre and the maximum density shall be 588 units per acre.

## For the Minimum Size of a Housing Layout

If larger areas are available for providing housing for the lower income and economically weaker sections, facilities for community development, environmental preservation and sustainable development can be provided. Provisions for facilities like schools, shopping centers, clinics, bus stops, transit facilities etc. can be made. Based on the above, a minimum population 5,000 is required for providing schools, clinics etc. Therefore, a minimum population of 5,000 shall be considered for providing schools, clinics, shopping centers etc.

A population of 5,000 can be generated by a maximum of 17 (based on 288 persons per building) to 34 (based on 144 persons per building). A housing layout may have different types of residential buildings (stilt +3 and ground +3) or may have different types of units in each building (minimum sized units, one room units etc). To accommodate a variety of residential buildings and to provide flexibility with respect to the range of units proposed (minimum sized units and larger units), the minimum density will be worked out with 36 units per building and the maximum density will be worked out with 48 units per building.

Based on the above, the following are required:

10,000 square meter area for a school with a playground for a population of 5,000 as follows:

5,000 square meter area for a park/open space based on one square meter per person

5,000 square meter area for a school, clinic, shopping etc.

Minimum plot area for the multifamily developments=  $330 \times 34 = 11,220$  square meters

Maximum plot area for multifamily developments =  $742.5 \times 34 = 25,245$  square

Maximum 20% of plot area (multifamily development area + 10,000 square feet for park and

school, clinic, shopping) for roads = minimum requirement =  $0.20 \times 21,220 = 4,244$  square meters and maximum requirement =  $0.20 \times 35,245 = 7,049$  square meters

The minimum area for a housing layout for 5,000 people shall be 6.28 acres and the maximum area shall be 10.44 acres based on the following:

Minimum area for plots = 11,220 square meters

Minimum Road area = 4,244 square meters

School, Clinic, Shopping = 5,000 square meters

Playground/Park/Open Space = 5,000 square meters

Total = 25,464 square feet = 6.28 acres

Minimum area for plots = 25,245 square meters

Minimum Road area = 7,049 square meters

School, Clinic, Shopping = 5,000 square meters

Playground/Park/Open Space = 5,000 square meters

Total = 42,294 square feet = 10.44 acres

The minimum density for a housing layout for a population of 5,000 shall be 123 units per acre and the maximum density shall be 281 units per acre based on the following:

Minimum with 34 multifamily residential buildings with 36 units each =  $1224 \text{ (units)} / 10.44 \text{ (maximum area for plots)} = 119 \text{ units/acre}$

Maximum with 34 multifamily residential buildings with 36 units each =  $1632 \text{ (maximum units)} / 6.28 \text{ (minimum area for plots)} = 259 \text{ units/acre}$

The minimum density will generate a maximum population of 7,344 based on a occupancy of 6 persons per unit and the maximum density will generate a maximum population of 6,528 based

on a occupancy of 4 persons per unit. Since a layout will have different types of buildings, the average population generated will be approximately 5,000.

<b>Housing Development</b>	
Area	330 to 742 square meters
FAR	2.4 to 2.7
Ground Coverage	60% to 67%
Roads	Maximum 10% of plot area
Open Space	Minimum 15% of plot area
Density	196 units/acre to 588 units/acre
<b>Housing Layout</b>	
Roads	20% of plot area
Open Space	1 square meter per person
For Residential Development	11,220 sq.mts (2.78 acres) to 25,245 sq.mts (6.23 acres)
Schools, Clinic, Shopping	5,000 square meters
Total Plot Area	25,464 sq.mts (6.28 acres) to 42,294 sq.mts (10.44 acres)
Minimum Density	119 units/acre
Maximum Density	259 units/acre

### **For Adequate Amenities and Facilities for Overall Health and Development**

An amenity includes roads, streets, open spaces, parks, recreational grounds, play grounds, gardens, utilities, services and conveniences. Good quality, well managed, accessible and well-designed green spaces for active and passive recreation are amenities with sustainable benefits that contribute to the overall health and development of a community.

#### Open Space

A minimum open space of 3 square meters per person and one shop for 250 persons shall be provided per person in a development (MOUD, 2004). A minimum open space of 1 square meter shall be provided at the local level per person (Government of Hong Kong, 1995). A minimum of 25% of the total area of a development shall be reserved for civic amenities, parks and open spaces, subject to a minimum of 15% for parks and open spaces (BBMP, 2003).

Based on the above, depending on the scale of development, amenity space can include community centers, retail and parks and open space can be provided. At a minimum, open space shall be provided for parks. The minimum open space area can be combined with other open space requirements (for example, a playground for a school can serve as a shared amenity as a park and as open space for the community). When the required open space can be combined with other open space, park, playground requirements, the open space per person requirement can be used to develop a park or playground of adequate size.

For a housing layout, the open space requirement shall be one square meter per person for the total population generated by the development.

## Roads

The area of the proposed roads shall be 10 to 20% of the area of the development (MOUD, 2004). Roads between 240 meters to 400 meters in length shall be 9 meters wide ((The Puducherry Building Byelaws and Zoning Regulations, 2012). Roads 100 to 200 meters in length shall be 9 meters wide (BBMP, 2003). A housing development for the lower income and economically weaker sections must be able to accommodate large vehicles like public transit vehicles, trucks for moving and emergency vehicles, loading and unloading, pedestrian space for access and walkability. A 9 meter wide road is sufficient to accommodate carriageways for a two-way traffic and pedestrian space like footpaths and walkways and can be at least 200 meters in length. Therefore, a 9 meter road will be adequate for a housing layout. The design and layout of the road network and the circulation patterns shall be designed in such a way that the proposed road area does not exceed 20% of the area of the development. For a housing layout, the road requirement shall be a maximum of 20% of the plot area of the development or layout.

## Street Lighting

Adequate street lighting with street lights adequately spaced for safety and illumination shall be provided. Energy conservation methods shall be utilized for street lighting including solar powered lighting.

Open Space	1 square meter per person for a housing layout
Roads	20% of plot area for a housing layout
Street Lighting	As appropriate with solar and other energy conservation methods

## **For Community Development and Sustainable Development**

Adequate spaces for community gathering and recreation shall be provided. The proposed open space shall be used as a multipurpose space for community gathering and recreation when separate spaces for community development cannot be provided. If multistory buildings on stilts are proposed, the stilt area can be utilized for parking and community spaces.

## Community Amenities

A 1,000 square meter area shall be for a nursery school and four shops are required for a population of 1,500 (MOUD, 2004). A 10,000 square meter area including a playground is required for a primary and middle school for a population of 5,000 and a 20,000 square meter area shall be required for a high school for a population of 15,000, a clinic of 1,000 square meters shall be required for a population of 5,000 (Zoning Regulations, Anekal, 2012).

Appropriate telecommunication facilities shall be provided. Based on the population of the proposed housing development, adequate areas can be provided for schools, clinics, shopping etc. if existing facilities are not available in the vicinity of the housing development.

## Transportation

Access to safe and reliable public transportation shall be encouraged to discourage dependence on private vehicles and promote sustainability. The proposed housing developments shall be provided within walking distance of a transit (within 500 meters of a transit facility like a bus stop, transit station etc.).

Adequate area for a bus stop, a loading and unloading area for larger vehicles and parking for emergency vehicles shall be provided within the housing layout to the extent feasible. Parking for non-motorized transportation like bicycles shall be provided. Walkability and bicycling shall be encouraged and parking for cars and two wheelers shall be discouraged.

Community Amenities	Population 1,500 - 1,000 square meters nursery school and 4 shops; population 5,000 - 10,000 square meter area school including a playground and clinic 1,000 square meters Appropriate telecommunication facilities
Transportation	Bus stop, transit within 500 meter radius of development

**For Environmental Preservation and Growth Management**

Tree Preservation

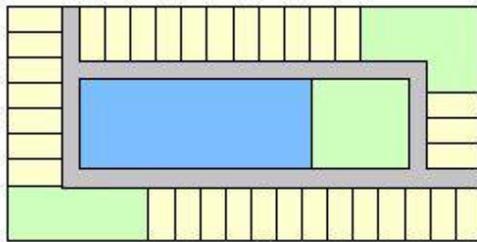
Sustainability strategies like tree planting, tree preservation, use of native landscaping materials, use of low water requiring plants etc. shall be used for environmental preservation. Existing natural features shall be preserved to the extent feasible.

Housing Developments Location

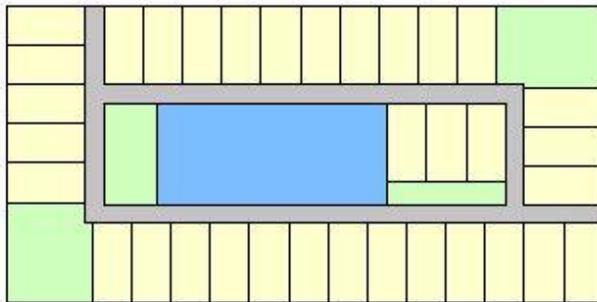
The housing developments shall be strategically located along with market rate housing developments whenever feasible. An appropriate percentage of land in market rate housing developments shall be allocated for housing for lower income and economically weaker sections so that the common infrastructure facilities like public transportation etc. can be accessible to all income groups. Underutilized and vacant sites within the urban areas shall also be used for these housing developments.

Growth management can be achieved by developing a maximum population density and proposing the required facilities and amenities for the target population. This way compact developments served by public transportation can be developed to avoid sprawl.

Tree Preservation	Tree planting, preservation, native species, low water usage
Housing Developments Location	Along with market rate units close to infrastructure



Plots: 330sq m X 34 = 11220 sq m  
 Road: 4492 sq m (16.8%)  
 Park/ Open: 5472 sq m  
 School: 5472 sq m  
**Total: 26656 sq m = 6.58 acres**



Plots: 742.5sq m X 34 = 25245 sq m  
 Road: 5446.5 sq m (12.8%)  
 Park/ Open: 5472 sq m  
 School: 5971.1 sq m  
**Total: 42282 sq m = 10.45 acres**

FIGURE SHOWING HOUSING LAYOUTS FOR A POPULATION OF 5,000 USING MINIMUM AND MAXIMUM PLOT SIZES, ROADS AND COMMUNITY AMENITY SPACES

THE MINIMUM AND MAXIMUM PLOT SIZES ARE FOR A MULTIFAMILY RESIDENTIAL DEVELOPMENT WITH A GROUND OR STILT+ 3 BUILDING WITH A MAXIMUM OF 12 UNITS PER FLOOR AND THE TOTAL NUMBER OF UNITS RANGING FROM 36 (FOR A STILT+3 BUILDING) TO 48 (FOR A GROUND+3 BUILDING)

### ILLUSTRATION OF HOUSING LAYOUTS