

## SUSTAINABLE TOWNSHIP: A MODERN NEED TO CITY

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**Abstract** - Sustainable Township is Building Cities for a Healthy Future. Generally, developmental experts agree that a sustainable city should meet the needs of the present without sacrificing the ability of future generations to meet their own needs.

So, we adopt this idea and concept of sustainable township and design the whole new township near the village "Bhatha" at Surat city. We add various amenities and facilities that use natural source. The amenities such as like rainwater harvesting that collect and store the rainwater. Also, we add solar plates at particular house and at parking area of township that produces the electricity.

We also add wastewater treatment plant in our townships that collect all the liquid waste from all house and filter it. that water can be use in gardening and water bodies of township. We also concert the solid waste in to fertilizer that use in farming ,by achieving these two methods we make sure the minimum waste will produce in township. We restrict the fuel consumption vehicle in township and use electronic vehicle in township to maintain the healthy environment in township.

**Key Words:** *Town Planning,*

*Township Design,*

*Self-Sustainable Township,*

*Urban Planning ,Sustainable*

*Township Surat.*

### 1. INTRODUCTION

A traditional list of immediate "Basic needs" is food (including water), shelter and clothing. A housing unit, or dwelling unit, is a structure or the part of a structure or the space that is used as a home, residence, or sleeping place by one person or more people who maintain a common household. Township refers to various kinds of settlements in different countries. While a township may be associated with an urban area, there are many exceptions to this rule.

Sustainable development is the process of development, which meets the needs of present generation without reducing the ability of future generation to meet their own needs. Sustainable development is the organizing principle for meeting human development goals while simultaneously sustaining the ability of natural systems to provide the natural resources and ecosystem services upon which the economy and society depend.

#### 1.1 Need of project

Because of following parameters there is need of planning of industrial region.

Sustainable Township was defined as livable places, which meet the diverse needs of the community, both now and in the future. It also mentioned that the basis on the concept of sustainable development is the balanced approached to addressing the environmental.

Due to rapid urbanization, people are getting attracted towards the city and urban area where they are hoped to get more and more facilities and amenities to survive in better living condition. As a result of trend, the limit of the city increases day by day.

Due to this, more development happens and need to fulfil their demand for every sector and planning like housing, commercial and employment facilities as well as institutions and the health facilities. Increase in demand and development are dispersing and sprawling everywhere and which are not seen to

be properly managed. So have thesis for proper planning and proper management in urban areas.

### 1.2 Objectives

- To refer guidelines literature related to sustainable township.
- To analysis the existing condition of selected study area.
- To prepare a proposed in term of planning for selected study area.

### 2. Study Area Profile

Our selected site for the sustainable township is located at the BHATHA village near Surat. This selected site is entirely owned by the urban authorities of the Surat city.

Present condition of the site is very poor and not properly develop. The level of the selected site is improper and the road networking are also not done well.

The selected site is located at the river bank of the river "TAPI", and other side is surround by the farms and a plotted society namely "TAPOVAN FARMS"

The level of selected site forms the river is about 7 meter (average). The surface consists the clayey soil on the selected site.

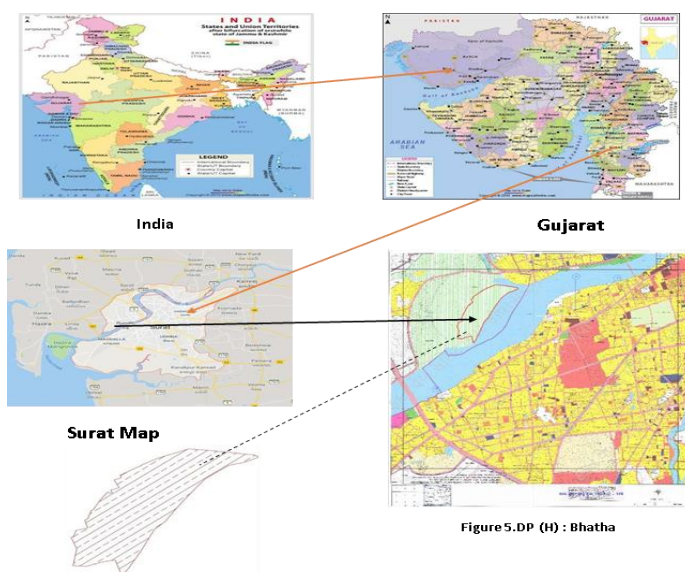


Fig -1: Study area profile.

(Source: Goggle maps and Surat city DP plan.)

Surat City is in Gujarat state, India. Which is developed on the river bank of Tapi, Surat is situated south - east

part of Gujarat. The location of Surat as per SMC is Latitude of 21.112°N and Longitude of 72.814°E. Surat City is the second largest city of Gujarat in terms of Area and Population. As per census 2011 population of Surat is 44,66,826 and density is 13,680 Persons/Sq.kms.

We selected an area near Bhatha village, which is owned by SUDA (Surat urban development authority), the area of selected land is 965516 m2.

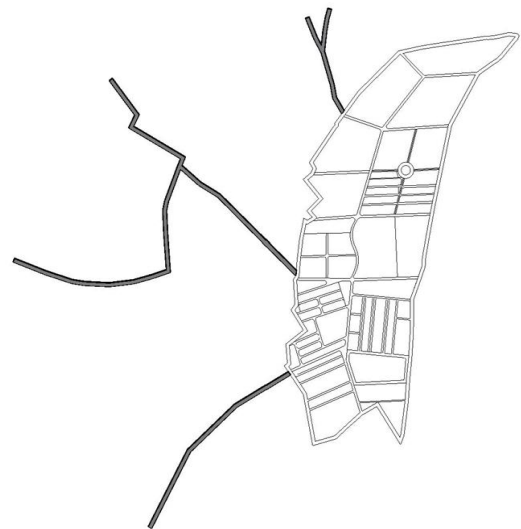


Fig -2: Road connectivity

### 2.1 Connectivity

#### Existing Road Linkage

- Directly connected to Hazira-Adajan road.
- Less than 10km away from Pandit Dindayal Upadhayay Cable Stay Bridge.
- 7km away from ONGC Bridge.

#### Air Connectivity

- Close proximity (8.6 km) to Surat International Airport.

### POPULTION FORECASTING

- In the order to planning a township, the most essential factor for planning is the population. It is just because, the key users of any township are local residences.
- To obtain the accurate population data we have to collect the population data of that area where there is our selected land is located , not

only the selected site's area but also the surrounded area of it.

- We collected the population data from the official website of Surat municipal corporation. To calculate the future population, we use various standard methods for population forecasting, the methods for instance Arithmetic increase method and incremental increase method.

The population forecasting data is giving as follow.

| YEAR | POPULATION | INCREASE | INCREAMENTAL |
|------|------------|----------|--------------|
| 1981 | 3584       | -        | -            |
| 1991 | 4459       | 875      | -            |
| 2001 | 11165      | 6706     | 5831         |
| 2011 | 36107      | 24942    | 18236        |

$$x^- = 875 + 6706 + 24942 / 3 = 10841$$

$$y^- = 5831 + 18236 / 2 = 12033.5$$

#### METHOD 1 ARITHMATIC METHOD

$$P_n = P_o + nx^-$$

$$P_{2021} = 36101 + (1 * 10841) = 46948$$

$$P_{2031} = 46948 + (1 * 10841) = 57789$$

$$P_{2041} = 57789 + (1 * 10841) = 68630$$

#### METHOD 2 INCREAMENTAL INCREASE METHOD

$$P_n = P_o + nx^- + n(n+1)/2 y^-$$

$$P_{2021} = 36107 + (1 * 10841) + 1(1+1)/2 * 12033.5 = 58981.5$$

$$P_{2031} = 36107 + (2 * 10841) + 2(2+1)/2 * 12033.5 = 93889.5$$

$$P_{2041} = 36107 + (3 * 10841) + 3(3+1)/2 * 12033.5 = 140831$$

Average population the from result of arithmetic method and incremental increase method is given below

For 2021 population is **52,964.5**

2031 population is **73,839.25**

2041 population is **139,045.5**

After calculating population forecasting, we decided to planning the township for minimum for 10,000 people.

### 5. Planning Proposal and Recommendations

To initiate with, there is continuous increase of population and urban migration in Surat city, due to this the shortage of natural resources and basic need such as housing are increasing day by day. For the solution of this problem we proposed a planning of sustainable township. The township planning is located near Bhata village, Surat. In township our main focus is on housing, we included various types of housing plans which are based on different income groups such as LIG, MIG & HIG. Moreover, we also included various amenities, for instance hospital, school, library, fire station, club house and commercial building. Lastly, for to make sustainable township we included various facilities like solar power plant, rain water harvesting with help of pervious concrete blocks, water treatment plant and urban farming.

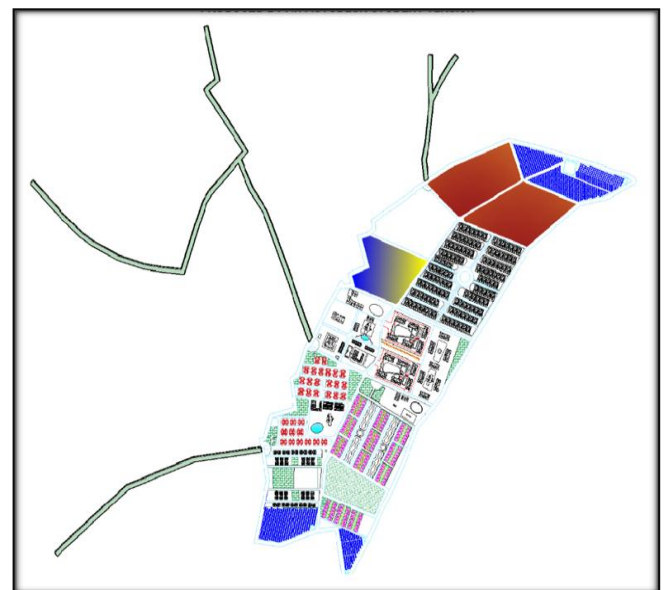


Fig -3: Planning Proposal

#### HOUSING FACILITIES

The housing is basic need of human life. In our township we will provide a simple and affordable house with all modern facilities.

In development of Sustainable township housing accommodation is the main. Bungalow and flat system are provided as per their budget and categories.

Bungalow:-

In the bungalows we will provide personal land and a house with private garden. This is more luxurious types of house and includes all modern facilities and amenities.

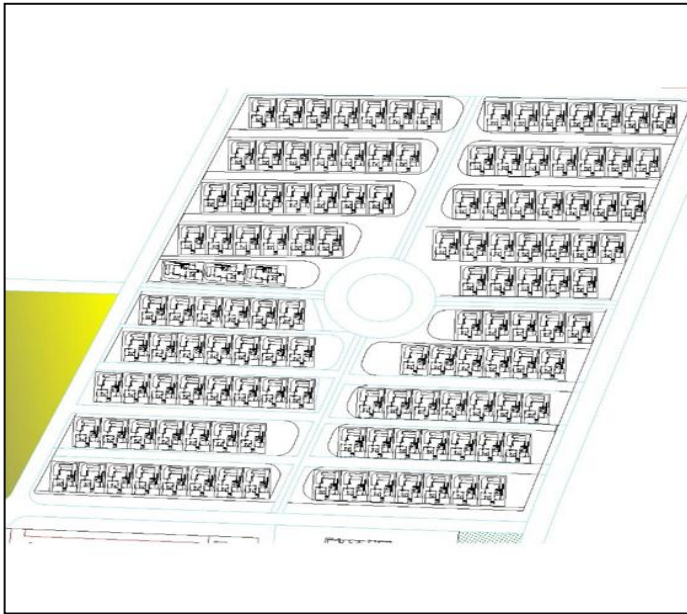


Fig -4: LAYOUT PLAN of BUNGALOW(HIG)

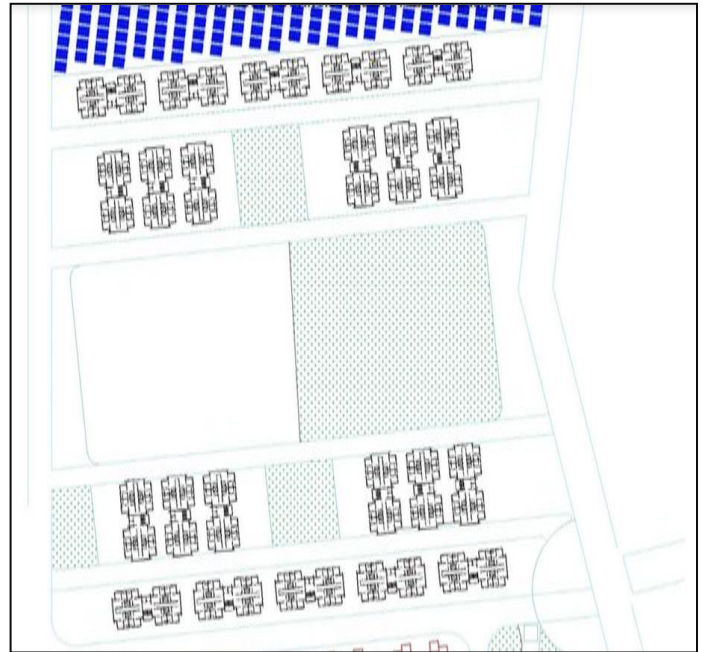


Fig -6: LAYOUT PLAN FOR FLAT (LIG)

Flats:-

In the flat system we will provide an apartment which includes numbers of flats in it. It is not more species and luxurious with compare to bungalows. It also includes some of the facilities and amenities.

As per the increase in pollution and due to industrial area near the land affordable housing is provided in this planning .

Each housing plan is divided as per the income group of the family.

- E.g.:- High income group (HIG).
- Middle income group (MIG).
- Low income group (LIG).



Fig -7: LAYOUT PLAN of BUNGALOW(MIG)

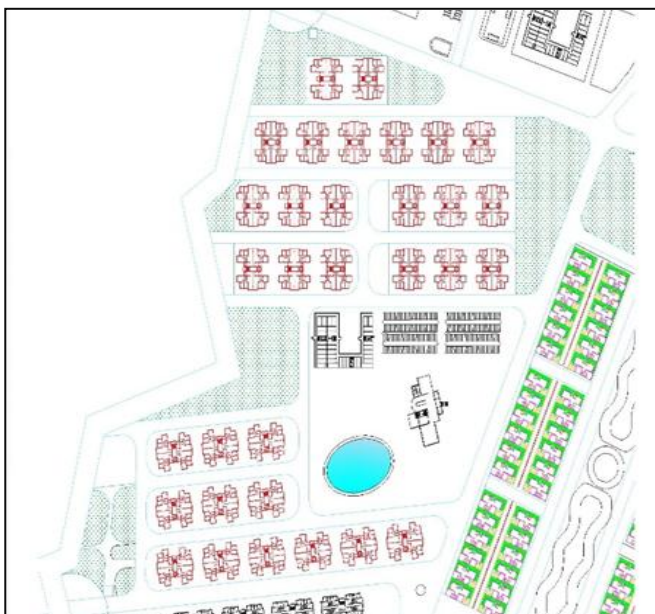


Fig -5: LAYOUT PLAN FOR FLAT (MIG)

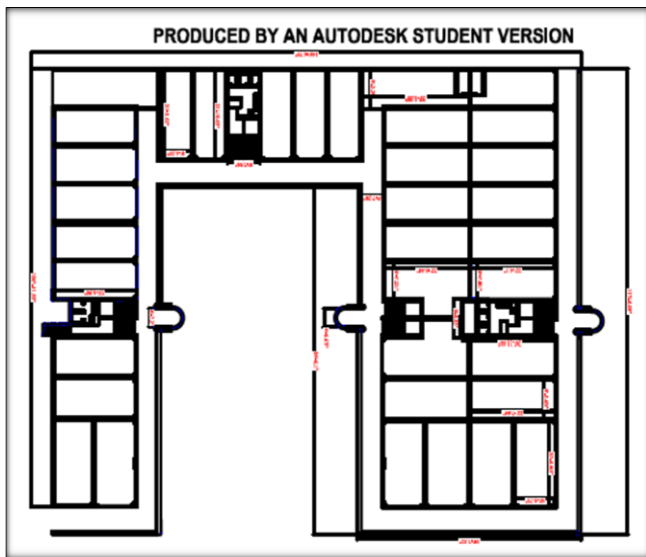


Fig -8: COMMERTIAL HUB

**COMMERTIAL FACILITIES**

Commercial building is added for the employment as well as public facility so that they can found house old item easily and rapidly.

Commercial area includes

- shopping mall
- stores
- restaurants
- super markets

**RECREATIONAL AREA**

A recreation area is a type of pro tested area designated in some jurisdictions. These places have special natural, cultural, or historic significance. They offer a variety of activities, and many are free.

It includes:-

- Club house
- swimming pool
- garden
- party plots
- play grounds and outdoor sports like.
- skating
- volley ball
- box cricket
- badminton
- long tennis
- basket ball



Fig -9: RECRATIONAL AREA (1)

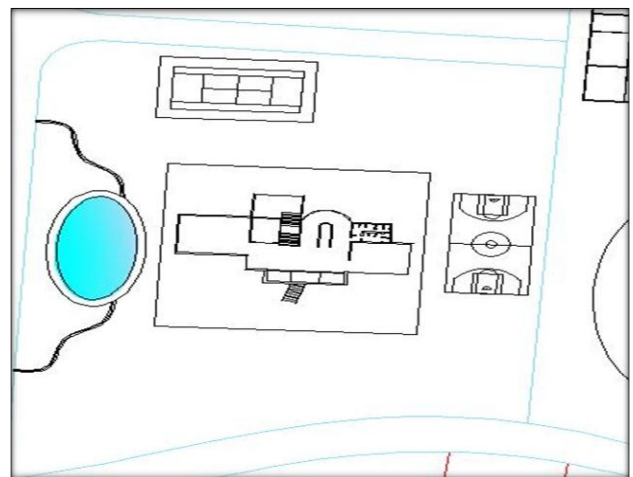


Fig -10: RECRATIONAL AREA (2)

**EDUCATINAL AREA**

- A pic of land is allotted to School and library building which is use for the
- Education area it is also an essential facility that we are planning to provide in our township. For the education purpose we created mainly two plans 1.The structure of Primary school and 2.The Public library
- Firstly, we created plan for school and it is located at eastern corner of township. The total is of school is 240' x 167' ft2. In which we include various classrooms form play group to 8 standards. Furthermore, the school also have a separate paly ground which is located along side of it.

Secondly, we created a public library which is placed at lower side of the school. The total area of library is 170' x 84' ft2. Moreover, the library can be used for academic purposes or as publicly by the people of township.

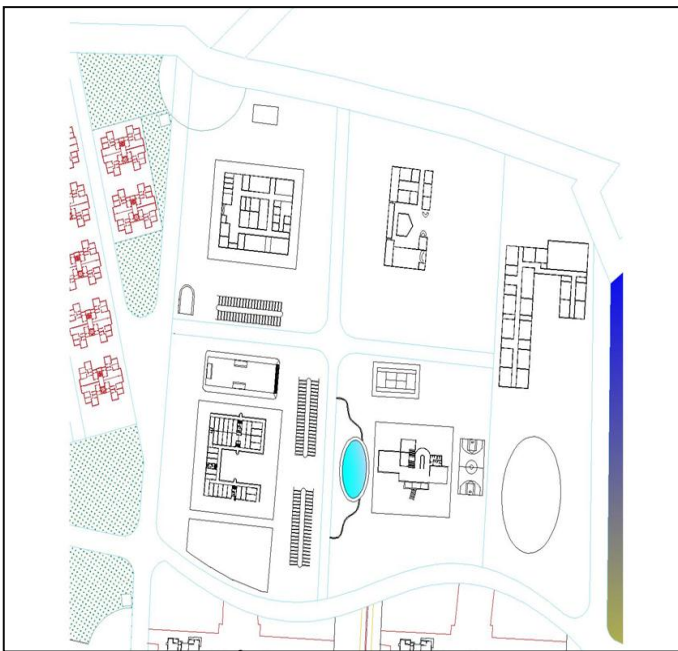


Fig -11: EDUCATINAL AREA

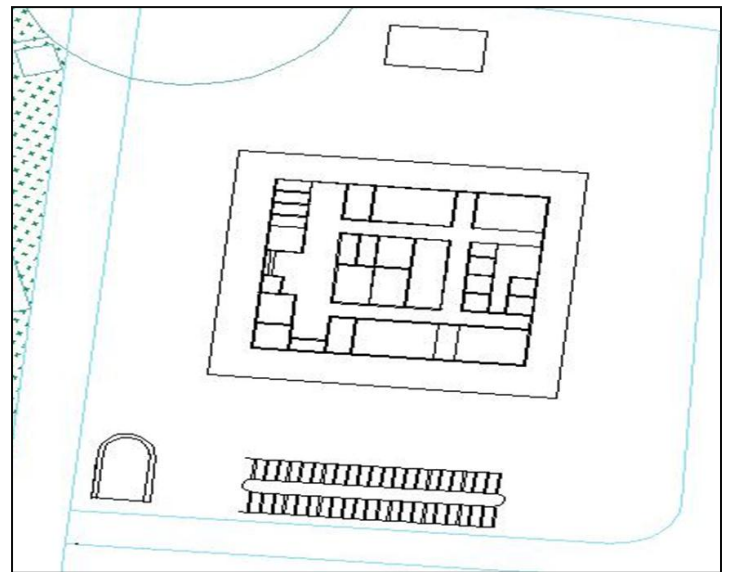


Fig -12: MEDICAL FACILITIES

### MEDICAL FACILITIES

- In our township we provided several amenities and services. Medical service is one of them.
- For the service We build a structure of Hospital. The structure of Hospital is located in eastern-central side of township and also it is very close to one entry point of township, therefore it can be easily accessible for every individual who will live in township .
- The total area of Hospital is 128' x 143' ft2 . In hospital there are 4 general words , operation theatre, x-ray room , dispensary room and other essential facilities.
- Moreover, in a plot of Medical service it also has a medical store which is located near its border. And it is the only facility in township that can be available for 24/7

### SOLAR POWER PLANT

- In our township we aiming to provide a solar system which will produce the electric power. And this electricity will be consumed by the houses and other usage in township.
- Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Photovoltaic cells convert light into an electric current using the photovoltaic effect.
- Photovoltaics were initially solely used as a source of electricity for small and medium-sized applications, from the calculator powered by a single solar cell to remote homes powered by an off-grid rooftop PV system. Commercial concentrated solar power plants were first developed in the 1980s. The 392 MW Ivanpah installation is the largest concentrating solar power plant in the world, located in the Mojave Desert of California.

Size of per panel is 990 mm X 1956 mm.

1solar plate generate = 330 watt

plate = 1 kw

20,130 plate X 330 watt

= 6.7 Mg. Watt / day. It required special land.



Fig -13: SOLAR POWER PLANT

**PREPARED WATER METER**

- Water meters are installing in each and every house and flat so that it can indicate the use of water.
- 4 months survey is done before applying water meter so that an average use of water computed with the result of survey.
- An average amount is taken from the house owner and the water limit is set, after exceeding water limit extra charges will be taken.
- By implementing this equipment, we can spread awareness among people, hoe to use water in a parsimony way.



Fig -14: PREPAED WATER MEATER

**FIRE STATION**

- For the safety purpose of residence of township, we also included a fire station in it which can be useful in haphazard circumstances.
- For the purpose of adding the fire station our township, we refeed the guidelines of Gujrat integrated township policy and National building code 2005
- The fire station is placed near the second entrance of the township which is located in left-central side of township. The total area of fire station is
- The fire station is located close to main road; therefore, the faire safety service can be easily going anywhere in the township without any trouble.
- The structure of fire station is in rectangular shape and it have no extra floors it only has ground floor. And the station is also surrounded by small garden.
- For prevention of fire , we included various tools and equipment’s in fire station. The equipment for instance, rescue tools , ground ladder, power saws, fire house, hand tools, supply house, water pumps, fire extinguisher etc.



Fig -15: FIRE STATION

**FIRE SAFETY HOUSING FACILITES and COMMERTIAL BUILDINGS.**

- We also included the fire safety in each and every housing facility like every flat, every bungalow and other public structure for example school, library, shopping malls, the club house and hospital.
- In every single structure, we have put fire extinguisher equipment, combustibile materials to control small fires.
- The plotting of every housing facilities has been done in such manner that , the fire emergency services can easily reach the fire affected area and plotting is also done is spacious area by aid of it the escape made effortless.

**CONCLUSION**

To conclude, nowadays population increasing at rapid pace and the resources are getting limited. It is become a serious concern. And it is duty of today's generation to converse the resources for the future generation. For the solution of it, we have proposed a plan of sustainable township at vacant land near Bhatha village, Surat.

Our entire project is a planning for sustainable township. In future by adapting of referring this planning the government can make sustainable township

We have planned a township for 10,000 people as per the data we got from population forecasting.

We have planned various things in township but our main focus was housing facilities. For housing facilities, we have planned in three types. These types are based on income group. These types are LIG, MIG and HIG.

| TYPE OF GROUP | TYPE OF HOUSE     | TOTAL NUMBERS |
|---------------|-------------------|---------------|
| LIG           | FLATS             | 655           |
| MIG           | FLATS AND BUNGLOW | 3290          |
| HIG           | FLATS AND BUNGLOW | 4400          |

Moreover, we have also planned commercial, recreational and educational area.

There are total 2 commercial buildings, 2 club houses, gardens , various sports courts and 1 school and library in township. we have also planned 1 hospital and 1 fire station for emergency situations in township.

To create self-sustaining township, we added various facilities which are entirely rely on natural resources. Facilities for instance, Solar power plant, Rain water harvesting with help of previous concrete block and urban farming.

We have provided over 95400.26 sq. ft, for solar power plant. Which includes 20,130 plates and these plates have capability to produce 6.7 Mg. Watt electricity per day.

By building Sustainable township, it will offer better livelihoods, increase economic growth , improve social inclusion, promote the decoupling of living standards and economic growth from environmental resource use, project local and regional ecosystems.

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**GUIDELINES: -**

1. Urban and regional development plans formulation and implementation (URDPFI) Guidelines (Volume 1) 2015
2. Sustainable development guidelines of Gujarat state government
3. Gujarat integrated township policy

**WEBSITES: -**

1. Surat Municipal Corporation Official Website
2. Google Earth & Google Maps
3. My Estate Point Android Application

**APPLICATIONS:-**

1. AutoCAD
2. Revit
3. Sketchup
4. Twinmotion