Application of Smart City Concepts to a Township Project

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Abstract **- Our urban communities need "knowledge" to become Smart Cities, particularly, as the greater piece of the total populace will live in urban communities by 2050. However, how does this insight occur? There are numerous issues a Smart City needs to manage in regard to its digitalization. There is a requirement for the estimations of viewpoints, for example, city construction and administration, correspondence, portability and traffic, transport and co-ordinations, energy and asset foundation, water, wellbeing, climate and environment, security and schooling. The project reflects on the challenges for urban planning posed by the emergence of smart cities in network societies. In particular it reflects on reductionist tendencies in existing smart city planning. Rapid urbanization of Pune and nearby city area creates complex pressure on infrastructure systems and services as well as citizens and the environment, triggering the need for innovative, sustainable solutions to urban development challenges. Introducing the concept of smart city and the challenges faced due to lack of infrastructure and basic amenities. In this project we have selected the area near Hadapasar, which is reserved as ITP development area by PMC, PUNE. We have selected total 300 acres of land nearby the Ram Hill Industrial area to develop our township project. Data is collected for selected site based on some criteria like development of site and nearby area in past 10 years, population growth in past 30 years, industrial growth, transportation facilities available, natural resources available, case study is done for township projects in Pune & nearby area. The collected data is studied and analysed for the development of the project. Selected site area is mainly distributed in three parts like residential area, commercial area and green zones. In residential area zoning is done according to Byelaws as HIG, MIG & EWS. In commercial area the zoning is done as SEZ & common commercial area. And also, the planning for public facilities like water distribution system, electricity supply system, sewage system is done. Application of smart city concepts is done in planning & in 3D modeling of the city which is made up with the help of Google Sketch-Up software. Also, the use of AI & IoT is introduced. In this project the main part of smart city component application is the electricity generation & distribution. We have conceptualized & simulated the Power Generation from Treated Sewage Water. In this plant we can generate 15KW of electricity through one unit of Propeller type turbine with 12MLD-21MLD of treated sewage water. In this plant there will be four units of turbines so we can make up to 60-105KW of electricity.**

Index Terms **- smart city, IoT applications, smart city technologies, waste treatment.**

1.INTRODUCTION

There is no universally agreed-upon definition of a smart City definitions vary from city to city and country to nation, depending on the degree of improvement, willingness to change and change, assets, and ambitions of the inhabitants. To administer urban areas in the Mission, some definitional restrictions are required. The idea of a shrewd city in the thoughts of any city dweller in India incorporates a list of things to get of foundation and administrations that represents their level of desire. In an ideal world, metropolitan planners aim to build up the entire metropolitan eco-framework, which is handled by the four pillars of thorough advancement institutional, physical, social, and financial framework. According to the most recent Joined Countries estimates, India

has a population of 1.35 billion people as of May 20, 2018. Seventy percent of the total population lives in towns, while thirty percent resides in cities. The allocated metro urban areas in India are Mumbai, Chennai, Delhi, Kolkata, Hyderabad, Bangalore, Pune, and Ahmedabad. As is clear, India's urban population is under 30%, and personal happiness in the country's cities is consistently low. However, with 2/3rds of India's GDP previously created in urban areas and provincial to metropolitan mobility patterns speeding up, the country faces a fundamental test: coping with this rapid urbanisation in a way that improves the rationality of India's metropolitan environments. With so many people living in cities, the country urgently needs to improve the quality of life for its citizens in both metropolitan and provincial areas.

Complex authority frameworks, land valuation issues, capability gaps, and subsidising setbacks are all necessary for the metropolitan test that is keeping India away from another round of emotional monetary development. India must also handle the existing concerns of rising great foundation, strong waste removal, flood the board, storm water and sewage infrastructure, and so on, which are causing metropolitan rot, traffic gridlock, and, as a result, a declining quality of life for a significant number of its citizens. The rapid urbanisation that is sweeping India tackles both one of the country's most significant opportunities and one of its most serious challenges. The majority of urban regions in Europe and America were built in the nineteenth century, when land, gas, and water were all readily available. India is a latecomer, and it is certainly more crowded and complicated as a result. As a result, India requires an unquestionably more productive and cost-effective solution for redeveloping urban areas, and it can reap the benefits by employing innovation to learn from best practices from around the world. As a result, India is charting a road for creating magnificent urban places, including elite, self-sufficient natural environments with low levels of pollution, extreme recycling, increased energy supply, and efficient public transit.

2. OBJECTIVES

1. Data collection on smart city concept and various components / techniques.
2. Planning a township project at suitable site in Western Maharashtra.
3. Development of entire project with suitable software.
4. Application of feasible smart city techniques to planned project.

3. STUDY AREA OF THE PROJECT

With an expanding population and rapid growth of places, wiser approaches to handle complexities, increase efficiency, and improve quality of life have been apparent in recent years. This has necessitated the creation of cities that monitor and integrate infrastructure in order to better optimise resources while providing the best possible service to their residents. The project considers the issues that the emergence of smart cities in network societies poses to urban planning. It mirrors, in particular, reductionist trends in current smart city planning. Rapid urbanisation in Pune and the surrounding city region puts a strain on infrastructure systems and services, as well as inhabitants and the environment, necessitating the creation of innovative, long-term solutions to urban development problems. The notion of a smart city is introduced, as well as the obstacles that come with a lack of infrastructure and basic utilities.

In this project we have selected the area near Hadapasar, which is reserved as ITP development area by PMC, PUNE. We have selected total 300 acres of land nearby the Ram Hill Industrial area to develop our township project.

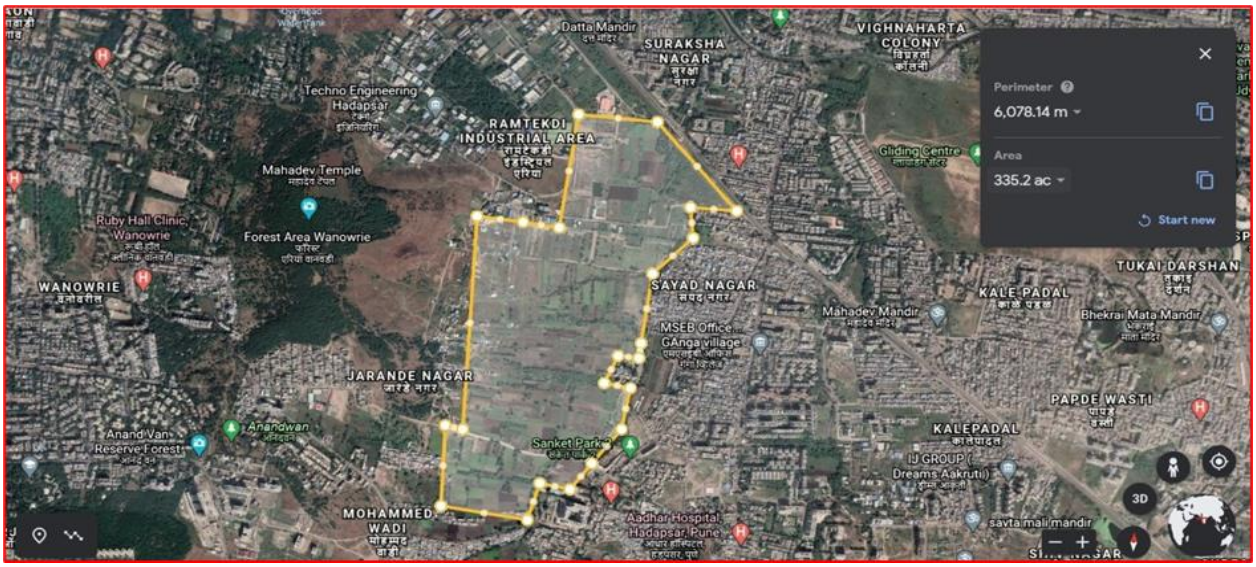

Fig.1 Proposed site of project

4. METHODOLOGY

Fig.2 Process chart for methodology

4.1. Survey:

First off, all the survey is done for site selection in Western Maharashtra Region is done. For this survey the cities in the region as Sangli, Kolhapur, Satara, and Pune are chosen. The survey is done with the help of GIS, QGIS and Google Earth software. Along with this resource survey, development survey and natural resource survey are done for the selected site.

- Site selection survey for Western Maharashtra Region.
- Resource Survey for selected site.

Fig.3. Resource survey on GIS

4.2. Data Collection:

Data is collected for selected site based on some criteria like development of site and nearby area in past 10 years, population growth in past 30 years, industrial growth, transportation facilities available, natural resources available, case study is done for township projects in Pune & nearby area. For the site study purpose the topo-sheet & development sheet of the site is collected from PMC's official website. For planning purpose, the DCR Rules, ITP Rules & Regulations are collected and studied accordingly. Also, to implement the smart concepts the data collection and study is done on smart city components such as AI, IoT, Ambient Technology is done.

- Case study done on Nanded City.
- Topo-sheet
- Population Data collected from Census department.
- DCR rules & ITP (Integrated Town Planning) Rules & Regulation
- Case Study on Malkapur Water Treatment Plant, Karad & Hanuman nagar STP Plant, Sangli.

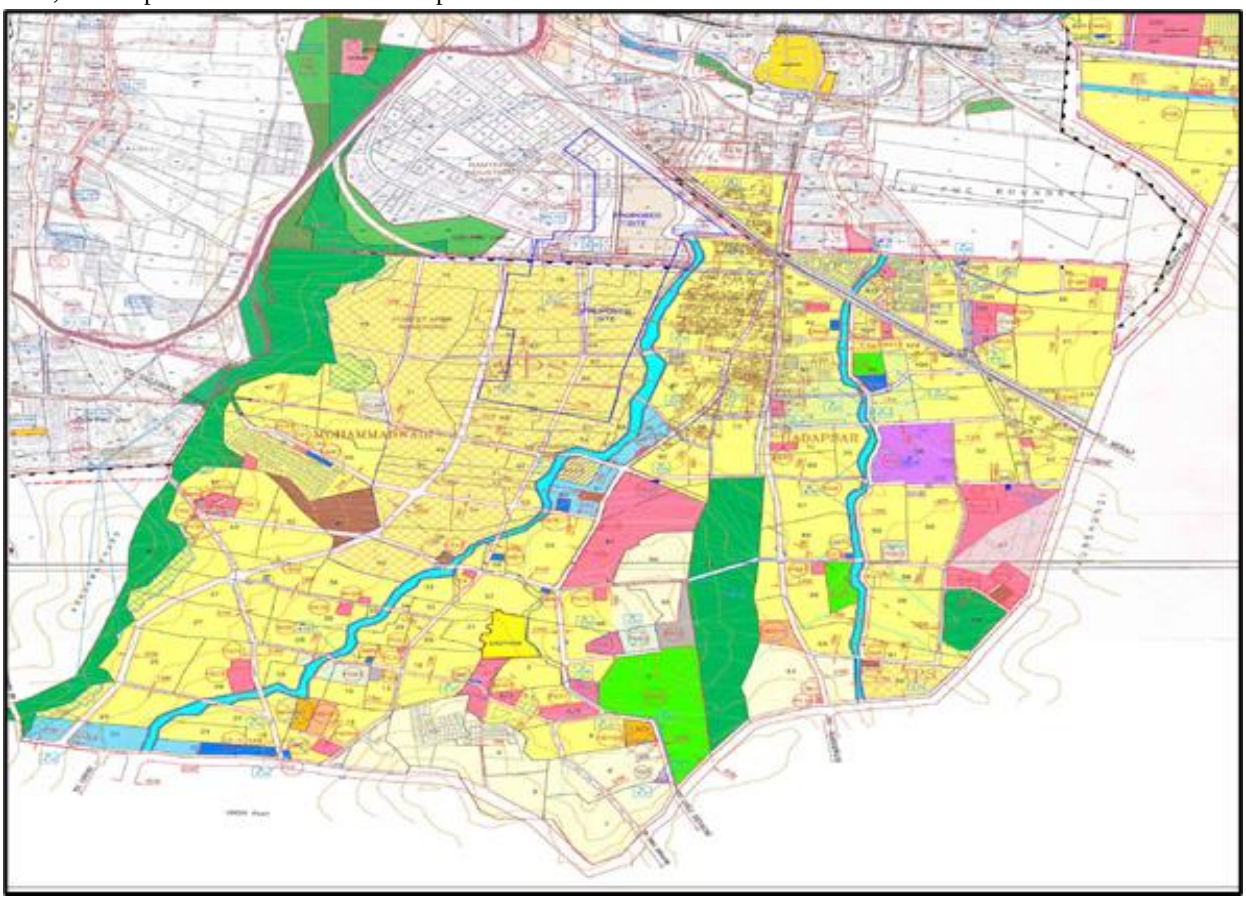

Fig.4. site marked on dp

4.3. Analysis

The collected data is studied and analyzed for the development of the project.

- Identifying the existing pattern of land use & characteristics of undeveloped land.
- Analysis of area for zoning & plotting in accordance with Bye Laws.

Selected site area is mainly distributed in three parts like residential area, commercial area and green zones. In residential area zoning is done according to Byelaws as HIG, MIG & EWS. In commercial area the zoning is done as SEZ & common commercial area. Percentage of each section is done according to ITP Rules and Regulations. Further plotting and planning is done for each section. And also, the planning for

4.4. Planning

public facilities like water distribution system, electricity supply system, sewage system is done.

- Area Distribution in accordance with ITP Rules & Regulation.
- Zoning & Plotting according to Bye-Laws.
- FSI Determination
- Scheduling a plan, Green Zones, Residential buildings, Commercial buildings, Public Utilities
- Provide transportation facilities to regulate the traffic flow in city.
- Scheduling plans for water distribution system, electricity supply system, sewage system.

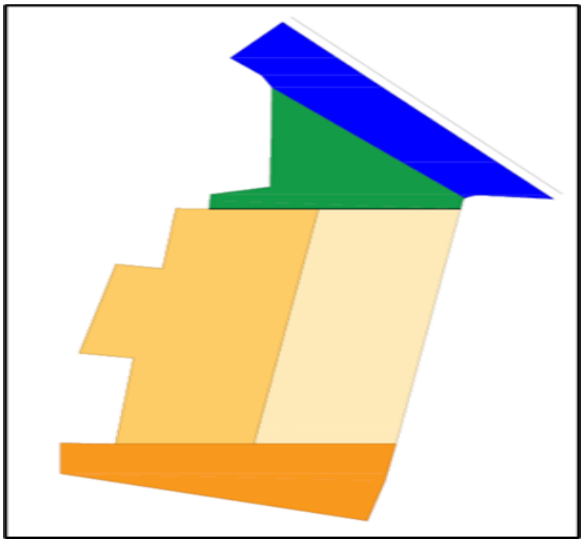

Fig.6. Zonning of the selected site.

Fig.7. Planning of Township on site.

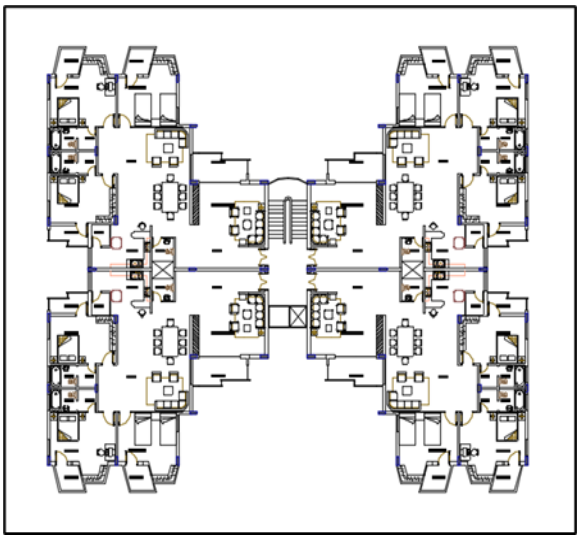

Fig.8. Floor Plate plan of HIG section I

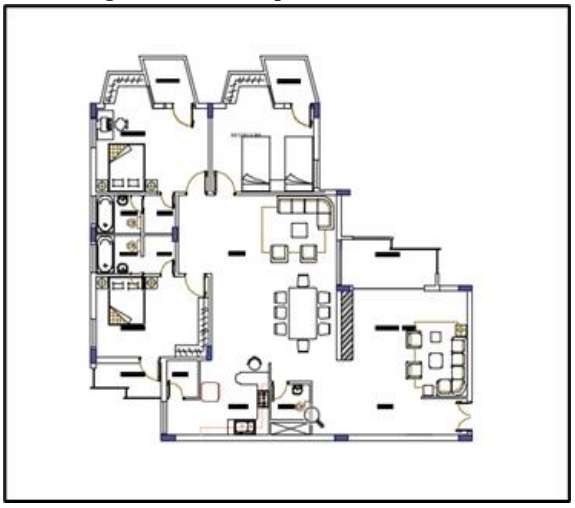

Fig.9. 200 SQ.M. Plan for HIG section I

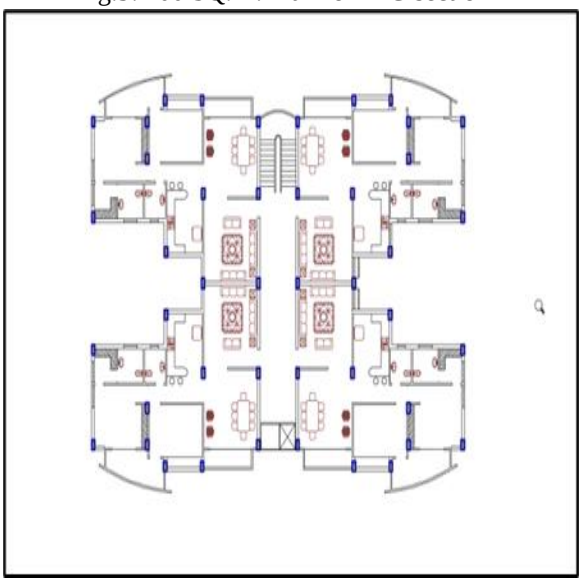

Fig.10. Floor Plate plan for HIG section II

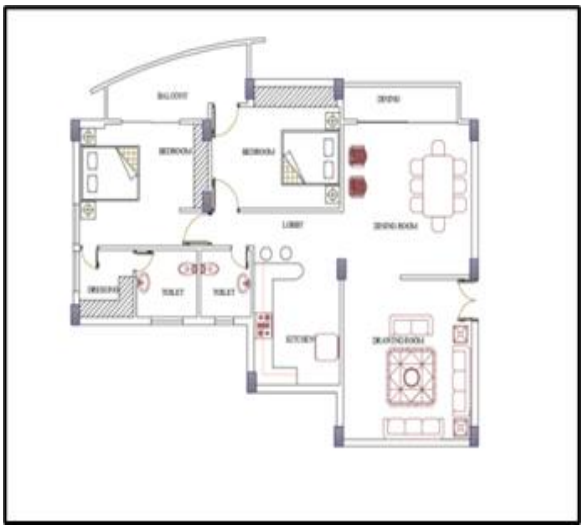

Fig.11. 120 SQ.M. Plan for HIG section II

Fig.12. Floor Plate plan for MIG section

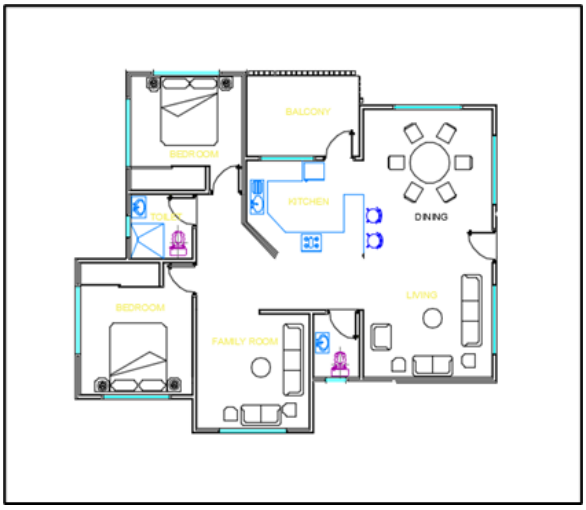

Fig.13. Plan for MIG section

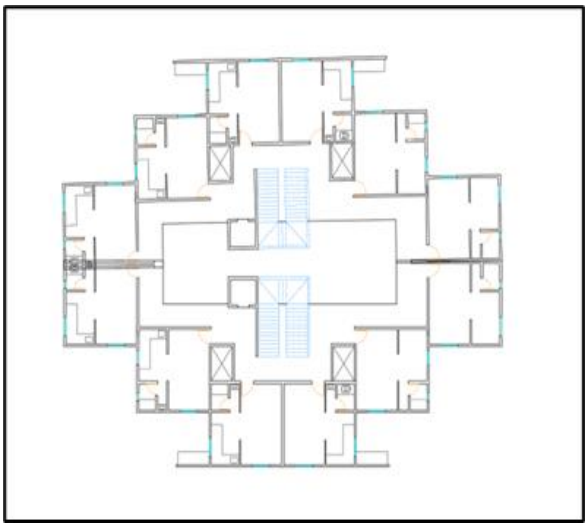

Fig.14. Floor Plate plan for EWS section

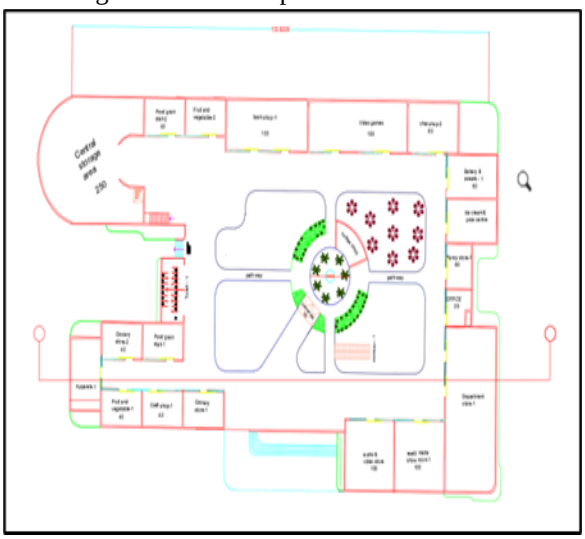

Fig.15. Floor Plate plan for mall

Fig.16. floor plate plan for bank

Fig.17. Floor Plate Plan for IT Park

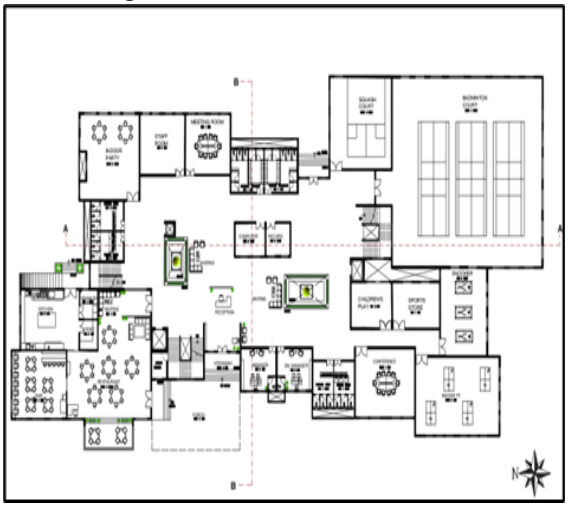

Fig.18. Floor Plate plan for Club house

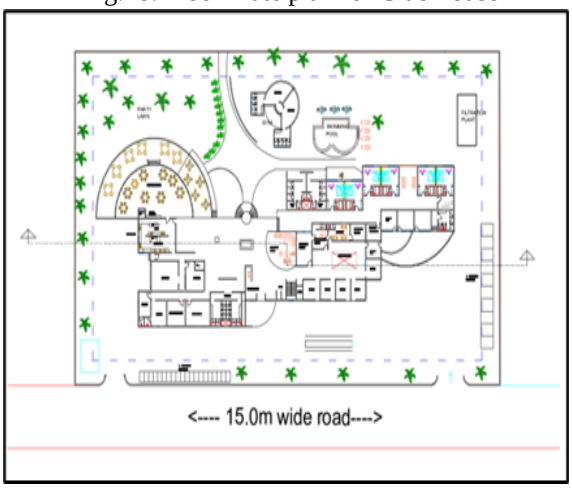

Fig.19. Floor Plate Plan for resort

Table.1. Area Distribution Table

ZONE	REQUIRED AREA (SQ.M.)	PROVIDED AREA (SQ.M.)
Total area	-	1189756
Garden / Parks	57251.5	61120
Playground	91680	95741
school	5000	7320.84
Hospital	10000	35386
Market	2000	2045.93
Town hall	10000	10953.29
Mall	10000	11685
SEZ	10000	16455.69
WTP	4000	5841
Fire Brigade Station	3000	5276
SWMP	4000	7521
Cremation Ground	2000	9181
Burial Ground	2000	11561
Bus Station	4000	4709
Electric Substation	3000	3062
Public Transport Facilities	3000	8135
Social Housing	11001	96945
HIG	31171	326048
MIG	31171	102748

4.5. Application

Application of smart city concepts is done in planning & in 3D modeling of the city which is made up with the help of Google Sketch-Up software. Also the use of AI & IoT is introduced. In this project the main part of smart city component application is the electricity generation & distribution. We have conceptualized & simulated the Power Generation from Treated Sewage Water. In this plant we can generate 15KW of electricity through one unit of Propeller type turbine with 12MLD-21MLD of treated sewage water. In this plant there will be four units of turbines so we can make up to 60-105KW of electricity.

- Application of feasible smart city concepts to the planned project.
- Power generation from treated sewage water.

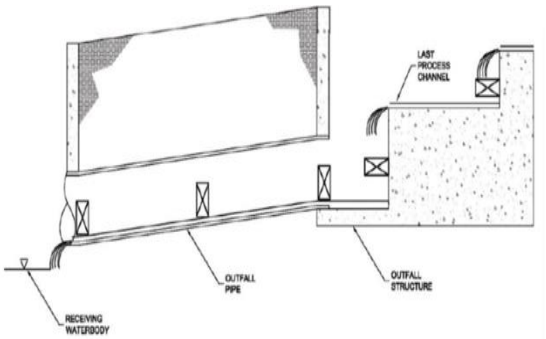

Fig.20. Possible Positions of turbines

Table.2. A summary of turbine/generator parameters, practical ranges to address the STP market, and the design targets for the experimental system.

Parameter	Range	Prototype Design Target	Units
Fluid	Water with debris, aeration, turbulence	Water with debris, aeration, turbulence	
Head	1 – 20	10 – 12	feet
Volumetric Flow Rate	5 – 100	5 – 20	MGD
Rotational Speed	400 – 800	600	rpm
Turbine Efficiency	75 – 95	> 90	%
Output Power	1 – 200	15	kW

5. RESULTS & CONCLUSION

1. Promotion of mixed land usage resulting in higher efficiency and reduced wastage of land.
2. Expanded housing opportunities.
3. Efficient use of public transport facilities & reduced congestion, air pollution and resource depletion.
4. Treatment of wastewater
5. Maximum utilization of renewable energy sources.
6. Maximum engagement of citizens.

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