

# Suitability Analysis of Solid Waste Collection Station-A Case Study of Pratap Nagar, Jaipur

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**Abstract:** This study is carried out to find the suitable location for collection of waste in Jaipur city. Therefore one sector of Pratap Nagar is selected and survey has been conducted to assess the feasibility of route for waste collection. In this study GPS and GIS are used to find the suitable location for waste dispose point by household and collection by municipal department.

**Keywords:** GIS, GPS, Solid waste

## I. INTRODUCTION

Solid waste management is an important social problem throughout the world. In India it takes the shape of alarming dimension which has to be addressed urgently. It includes the collection and disposal of garbage, or municipal solid waste, compounded by increasing consumption levels [1].

Waste quantities are increasing and municipal authorities are not able to upgrade or scale up the facilities required for proper management of such wastes. In many cities and towns, garbage is littered on roads and foot-paths. Citizens are also not familiar to use the available storage facilities (dust bins) set up by the authorities.

The key issues relating to management of MSW in the country are, there is no comprehensive short and long term plan with municipal authorities to handle MSW in accordance with the MSW Rules, 2000, Majority of the municipal authorities do not have preparedness to set up waste processing and disposal facilities, Waste management is being looked either for making wealth or generate revenue; or otherwise is allowed to decay in cities/towns and Cities and towns, in future, will not get wastelands for further dumping of wastes [2]. In fact, there will be a need to go for 'total' recycling and re-use of waste and aim for negligible or 'Zero Waste' for land-filling.

Therefore, collection stations are important for the disposal as well as collection of solid waste by Municipal Corporation. So collection stations are established by the help of GIS Tools and Geographical Survey.

## II. STUDY AREA

Pratap Nagar is one of the largest residential areas in Jaipur, India. It is located on NH 8. It is one of the fastest growing areas in Jaipur.

It is 8 km away from Jaipur International Airport and 9 km away from nearest railway station (Durgapura railway station). Pratap Nagar is an area of interest for Rajasthan Housing Board and JDA (Jaipur Development Authority) for constructions and development.

Our study area is related to sector 10 of Pratap Nagar which Latitude and Longitude are 26.7979769 and 75.81925780000006 respectively.

Mean Sea Level of Jaipur city is 1417ft. as per geographic department of India.

A satellite map of sector 10 of Pratap Nagar Jaipur is shown below:



Figure 1: Study Area (Source- Google Maps)

## III. ANALYSIS AND METHODOLOGY

In the beginning road network data are created using base map of Jaipur city. Sector boundary map is prepared to estimate the area of Sector covered in all routes. The Sector wise population data (census data of 2001) are used to estimate population covered in LPG supply routes. Population data are projected for 2013 to know the current population of each Sector using growth rate during 2001-2011.

## IV. BUFFERING OF THE ROUTES

With the help of GIS tool MapInfo new alternative routes are found between the source and destination. The area of each ward from which the route is passing is calculated with the help of MapInfo. Buffer of each route is created to know the actual population covered in occurrence of complete collection with in a 1km along both side of the collection route.

The area ratio method is used to calculate this population. Using the Equation 1 coverage population of the routes calculated as follows:-

$$P = Pi ( Abi/Azi) \text{-----} (1)$$

Where P = coverage population, Pi = ward section population, Abi = area of route i.e. buffered area and Azi = ward area.

V. OBSERVATIONS OF STUDY AREA

During the planning of routes for economic collection of solid waste from proposed area, therefore a need of geographical data in the form of latitude and longitude of end point of all corners of study area is generated. By the help of Geographical Positioning System Device, following observations are taken.

(TABLE I: GEOGRAPHIC DATA OF STUDY AREA)

| S. N. | X        | Y        | Place   | Altitude |
|-------|----------|----------|---------|----------|
| 1     | 75.82185 | 26.79543 | Point 1 | 362.7m   |
| 2     | 75.82269 | 26.79743 | Point 2 | 364.8m   |
| 3     | 75.82127 | 26.79955 | Point 3 | 369.8m   |
| 4     | 75.82028 | 26.80071 | Point 4 | 368.1m   |
| 5     | 75.81785 | 26.79912 | Point 5 | 374.3m   |
| 6     | 75.81605 | 26.79803 | Point 6 | 370.4m   |
| 7     | 75.81868 | 26.79654 | Point 7 | 367.2m   |

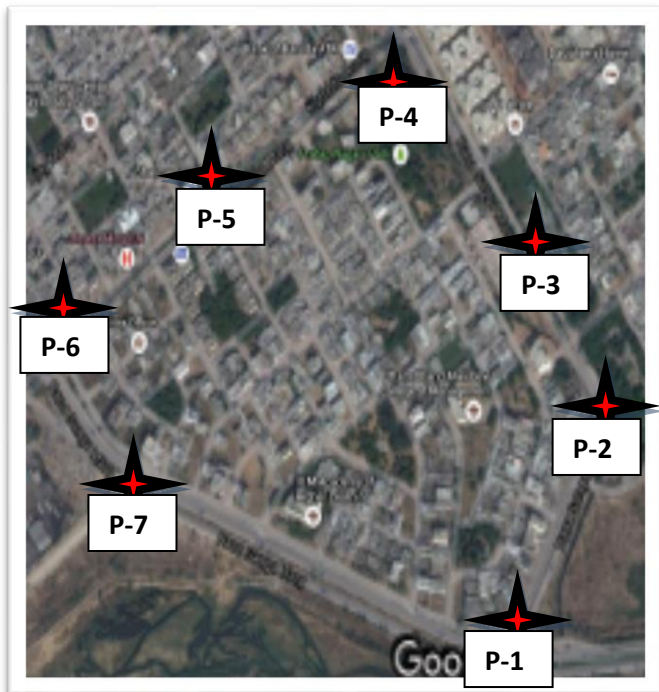


Figure II: Observation Points of Study Area

VI. RESULT AND DISCUSSION

For getting easy conveyance from source of generation of solid waste, collection points are needed. Therefore some collection points are established with the help of GIS Tools.

Based on conveyance of people and cost of collection of solid waste, there is two major analysis of collection Station for collection of solid waste.

A. Collection Station at 50m Distance:

According to need of people and the reliability of disposal point of solid waste, several points are established.

In below figure, several collection stations are established on which people will discharge their household waste, then it will collect by Municipal Corporation according to collection points. In this figure, Collection stations are established according to household location near by 50 meter distance or 50 meter buffer areatherefore it will create a good link between the collection stations by which we can make effective collection from society but it will consume much time and also need more human resource as well as mechanical power.

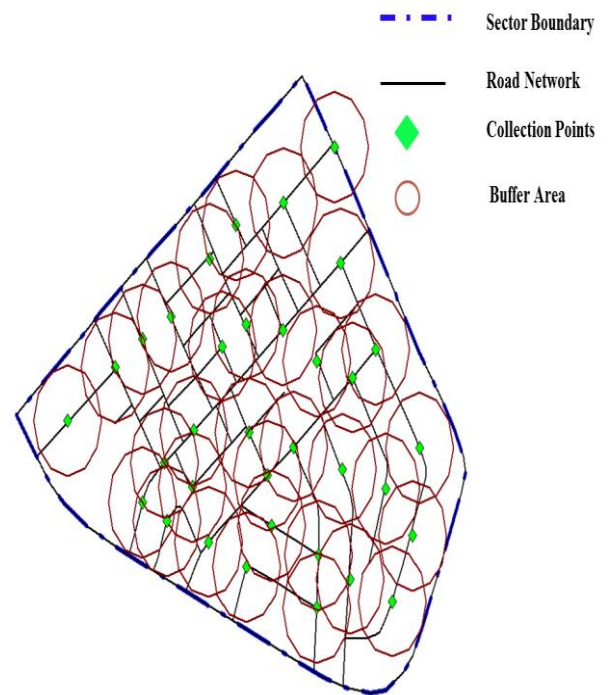


Figure III: Analysis of Collection Point at 50 Meter Distance

B. Analysis of Collection Station at 200 Meter:

In below diagram, several gathering stations are established on which people will discharge their household waste, then it will collect by Municipal Corporation according to collection points. Collection stations are established at 200m buffer area from people households. This buffer area will increase rate of collection of solid waste and also helpful for reduction of human as well as mechanical power.

200 meter buffer area will also build more efficient collection system for the easy conveyance from house hold and they have to travel 200m for disposal of solid waste.

Collection stations are established as per figure shown below, it is denoted by green symbol and it also denotes buffer area or collection range of station.

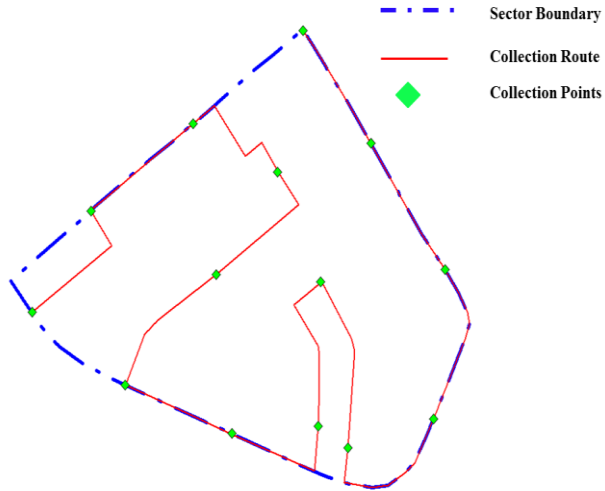


Figure IV: Analysis of Collection Point at 200 Meter Distance

## REFERENCES

- [1] SWM System - Municipal Department, Kolkata.
- [2] Report on SWM - Municipal Department, Delhi