

Estimation of Undeveloped & Developed Area in Mumbai City: A Case Study

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Abstract : *The Mumbai, financial capital of India covers 437.71 square kilometres, is facing major problem of city development because of existing slum area. Mumbai had seven island cities during Portuguese Rule then it came under British Rule and currently Financial Capital of India divided into 24 wards of Municipal Corporation Greater Mumbai. The Slum dwellers are important contributors to the development of the city by rendering their services to the citizens & organizations. The horizontal topographical growth of Mumbai is being restricted for development due to shortage of land and major problem for vertical growth is the present slum area in Mumbai. This study is carried out to find the existing undeveloped area in each ward of the City. This research aims to find ward wise area in which different types of structure and make data available for the further research in strategic planning for effective development of Mumbai City. This research will be summarised by finding out the undeveloped residential areas in each ward of Mumbai city.*

Keywords: Developed Area, Mumbai, Total Wards, Undeveloped Area.

I. Introduction

1. History of Mumbai

Mumbai, The financial capital of India and the capital city of Maharashtra. It has population of 12.44 million as per census 2011 survey conducted by Government of India.

Constitute of Mumbai was consisting seven islands were home to communities of fishing colonies. The islands were under the control of successive indigenous empires for many centuries before being surrendered to the Portuguese and subsequently to the British East India Company when in 1661 King Charles II married the Portuguese Catherine of Braganza, and as part of her dowry Charles received the ports of Tangier and seven islands of Bombay. During the mid-18th century, Bombay was reshaped by the Hornby Vellard project, which undertook reclamation of the area between the seven islands from the sea. Along with construction of major roads and railways, the reclamation project, completed in 1845, transformed Bombay into a major seaport on the Arabian Sea.



Figure 1. Seven Islands of Mumbai

Now, The Mumbai is divided into South Mumbai (Island City), Eastern Suburbs & Western Suburbs. The South Mumbai extends from Colaba in the south to Mahim and Sion in the north. The Eastern Suburbs are also known as the Central Suburbs because the area is served by the Central Line. The Eastern Suburbs consist of Bhandup, Ghatkopar, Kanjurmarg, Kurla, Mulund, Nahur, Powai, Vidyavihar and Vikhroli. To the south-east lie the suburbs of Chembur, Govandi, Mankhurd and Trombay. These suburbs are sometimes not considered as part of the Eastern Suburbs and are often referred to as the Harbour Suburbs. The Western Suburbs consist of Andheri, Bandra, Borivali, Dahisar, Goregaon, Jogeshwari, Juhu, Kandivali, Khar, Malad, Santacruz and Vile Parle. These three major divisions are further divided into 24 wards by Municipal Corporation of Greater Mumbai.

2. Economic Growth of Mumbai

Mumbai is India's largest city (by population) and is the financial and commercial capital of the country as it generates 8.5% of the total GDP as per HRD. It serves as an economic hub of India, contributing 33% share in tax collection of India, 60% share in custom duty collection, 20% share in central excise collection and 40% share in foreign trade as mentioned in Mumbai Human Development Report 2009.

Until the 1970s, Mumbai owed its success largely to textile mills and the seaport, but the local economy has since then diversified to include finance, engineering, diamond

polishing, healthcare and information technology. The key sectors contributing to the city's economy are: finance, gems & jewellery, leather processing, IT and ITES, textiles, and entertainment. Nariman Point and Bandra Kurla Complex (BKC) are Mumbai's major financial centers. Despite competition from Bangalore, Hyderabad and Pune, Mumbai has carved a niche for itself in the information technology industry. The Santacruz Electronic Export Processing Zone (SEEPZ) and the International InfoTech Park (Navi Mumbai) offer excellent facilities to IT companies.

3. Population Growth of Mumbai

As result of economic growth of Mumbai, It had lot of job opportunities for all class of people. In search of job and for personal growth people from all over India had started migrating from their home towns to Mumbai. Day by day the lot of people migrated to Mumbai and started leaving hear. People who can afford to live in apartments have purchased it or rented it. Who cannot afford to buy or rent apartment, they have started living on streets or by making huts on the open spaces. And that's how the growth of slum has been founded in Mumbai. Right now the horizontal growth of Mumbai has been reached its maximum level as it's an island city. In the result of tremendous growth of population and lack of proper management to handle the population and provide proper organized space for residents of slum the city currently has major part of undeveloped residential areas in form of slum and chawls. The only way of further development of Mumbai is vertical development by using area under slums and chawls.

II. Data Collection and Analysis

1. Types & Areas Covered under Residential Structures of Mumbai

Currently the ward wise residential areas covered under different types of structures as per Existing Land Use Survey conducted by Municipal Corporation of Greater Mumbai in 2012 and revised in 2013 is mentioned in following tables.

The below mentioned Table 1 shows categories and sub categories of Mumbai with its code for further reference.

Table 1 Categories and Subcategories of Different Types of Residential Structures in Mumbai

Zone	Categories	Sub Categories	Code
Total Residential Areas	Individual Housing (R1)	Primary Residential Zone Individual Housing	R1.1
		Individual Housing with Commercial	R1C
	Apartments / Multifamily (R2)	Primary Residential Zone Multifamily Apartments	R2.1
		Multifamily Apartments with Commercial	R2C

		Multifamily Apartments with Shopping	R2S
Government / Municipal Staff / Quarters / Housing (R3)		Primary Residential Zone Government	R3.1
		Government Housing with Shopping	R3S
Chawls (R4)		Chawls Predominantly Residential	R4.1
		Chawls with Shopping	R4S
		Chawls with Commercial	R4C
		Chawls with Industrial	R4I
Slums / Clusters (R5)		Slum predominantly residential	R5.1
		Slum with Commercial	R5C
		Slum with Industrial	R5I

The above mentioned table 1 contains the classification of different types of residential structures in Mumbai with its code for reference of further proceedings of this paper.

The table 2, 3 & 4 contains details of ward wise areas of each sub categories of residential zone in island city, western suburbs and eastern suburbs. Whereas, Table 5 contains total area under different residential category of Mumbai City.

The above mentioned data of areas under different categories of residential structures in Mumbai is being taken from Existing Land Use Survey conducted by Municipal Corporation of Greater Mumbai in 2012 and revised in 2013. This data is available on website of the by Municipal Corporation of Greater Mumbai.

Table 2 Ward wise areas of different residential categories for Island City of Mumbai

Residential Category	Area in Wards of Island City of Mumbai (Hectare)									Total
	A	B	C	D	E	F/N	F/S	G/N	G/S	
R1.1	0.00	0.00	0.00	21.90	1.71	3.12	0.74	2.45	0.98	30.90
R1C	0.00	0.04	0.00	0.04	0.17	0.77	0.00	0.04	0.10	1.16
R2.1	34.38	3.30	12.56	183.44	60.12	113.55	69.03	89.21	68.84	634.43
R2C	12.22	17.73	32.46	29.50	27.68	26.55	3.55	12.75	10.52	172.96
R2S	18.27	15.48	30.77	75.96	32.36	40.53	32.18	48.40	23.82	317.77
R3.1	12.45	4.05	0.62	38.55	32.11	79.22	51.77	17.83	36.63	273.23
R3S	1.77	0.65	0.24	2.59	1.72	2.73	5.04	1.43	9.62	25.79
R4.1	0.66	0.00	0.29	5.11	7.22	3.76	8.39	12.31	9.62	47.36
R4S	0.00	0.00	0.21	4.49	4.98	1.23	6.68	10.96	12.17	40.72
R4C	0.18	0.19	0.04	0.06	1.47	5.90	0.64	1.33	3.13	12.94

R4I	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.11
R5.1	0.25	2.33	0.05	11.21	8.19	64.64	32.43	4.96	29.12	153.18
R5C	0.65	0.72	0.00	4.39	7.69	60.59	23.37	15.16	16.36	128.93
R5I	0.00	0.00	0.00	0.58	7.32	0.00	0.00	0.00	0.00	7.90
Total	80.83	44.49	77.24	377.82	192.85	402.59	233.82	216.83	220.91	1847.38

Table 3 Ward wise areas of different residential categories for Western Suburbs of Mumbai

Residential Category	Area in Wards of Western Suburbs of Mumbai (Hectare)									Total
	H/E	H/W	K/E	K/W	P/N	P/S	R/C	R/N	R/S	
R1.1	4.42	31.27	9.07	51.11	108.30	16.26	107.56	5.74	26.91	360.64
R1C	0.00	0.38	0.53	6.19	13.34	0.05	2.31	0.10	8.33	31.23
R2.1	96.34	260.17	275.51	452.14	253.98	172.96	263.36	140.74	200.02	2115.22
R2C	2.22	16.95	12.17	31.62	10.77	9.27	19.09	6.84	12.81	121.74
R2S	28.23	51.91	84.96	96.33	99.85	47.11	98.14	69.78	72.67	648.98
R3.1	38.24	16.27	23.20	19.74	11.57	28.73	11.87	11.87	15.42	176.91
R3S	0.86	0.09	1.05	0.82	0.08	0.00	0.10	0.21	0.56	3.77
R4.1	1.89	1.80	5.33	4.81	25.95	17.29	15.28	6.44	5.13	83.92
R4S	0.29	0.82	1.48	1.20	77.42	21.19	3.53	0.08	6.41	112.42
R4C	0.02	0.46	3.17	14.39	6.58	17.22	3.10	0.84	7.40	53.18
R4I	0.00	0.00	0.00	0.00	1.39	3.89	0.00	0.02	0.00	5.30
R5.1	84.56	29.44	44.86	22.81	103.01	73.83	25.14	95.25	92.42	571.32
R5C	25.69	12.17	216.86	122.74	291.24	82.89	76.97	72.55	163.74	1064.85
R5I	0.00	0.00	7.25	1.20	23.71	8.39	0.00	6.35	2.13	49.03
Total	282.76	421.73	685.44	825.10	1027.19	499.08	626.45	416.81	613.95	5398.51

Table 4 Ward wise areas of different residential categories for Eastern Suburbs of Mumbai

Residential Category	Area in Wards of Eastern Suburbs of Mumbai (Hectare)						Total
	L	M/E	M/W	N	S	T	
R1.1	9.01	22.75	40.67	4.17	5.26	22.53	104.39
R1C	1.70	0.00	0.60	0.13	0.04	2.56	5.03
R2.1	165.76	102.61	147.99	181.99	165.14	203.62	967.11
R2C	5.26	1.55	8.26	24.04	7.68	17.35	64.14

2. Developed and Undeveloped Area

In present study, the area which is already constructed once is being taken as developed areas. Those developed areas are R1.1, R1C, R2.1, R2C, R2S, R3.1 & R3S as per their category code mentioned in above Table 1. The areas which have not being developed once those areas are being considered as undeveloped area. Those undeveloped areas are R4.1, R4S, R4C, R4I, R5.1, R5C & R5I as per their category code mentioned in above Table 1.

R2S	35.02	23.51	21.14	38.87	31.87	52.33	202.74
R3.1	11.18	106.36	38.71	58.44	15.43	23.07	253.19
R3S	0.24	0.21	1.45	2.72	0.05	0.11	4.78
R4.1	9.74	1.29	2.02	9.60	7.69	8.21	38.55
R4S	2.66	0.41	0.38	0.46	0.90	3.33	8.14
R4C	0.35	0.71	0.05	0.51	7.42	1.23	10.27
R4I	0.00	0.00	0.00	0.23	0.00	0.00	0.23
R5.1	105.19	27.60	28.00	41.69	21.76	14.97	239.21
R5C	196.55	283.94	102.44	187.00	339.56	56.87	1166.36
R5I	2.25	0.18	0.23	0.23	19.81	0.74	23.44
Total	544.91	571.12	391.94	550.08	622.61	406.92	3087.58

Table 5 Areas of different residential categories for Greater Mumbai

Residential Category	Total Area of Greater Mumbai (Hectare)			
	Island City	Western Suburbs	Eastern Suburbs	Total
R1.1	30.90	360.64	104.39	495.93
R1C	1.16	31.23	5.03	37.42
R2.1	634.43	2115.22	967.11	3716.76
R2C	172.96	121.74	64.14	358.84
R2S	317.77	648.98	202.74	1169.49
R3.1	273.23	176.91	253.19	703.33
R3S	25.79	3.77	4.78	34.34
R4.1	47.36	83.92	38.55	169.83
R4S	40.72	112.42	8.14	161.28
R4C	12.94	53.18	10.27	76.39
R4I	0.11	5.30	0.23	5.64
R5.1	153.18	571.32	239.21	963.71
R5C	128.93	1064.85	1166.36	2360.14
R5I	7.90	49.03	23.44	80.37
Total	1847.38	5398.51	3087.58	10333.47

As the study is concentrated on finding developed & undeveloped residential areas of Mumbai City, It can be easily calculated by the taking sum of areas under developed categories and sum of the areas under undeveloped categories.

In following Table 6 shows ward wise developed area of Mumbai City. It indicates total developed area in Island City, Western Suburbs and Eastern Suburbs is 1456.24, 3458.49 and 1601.38 hectares respectively. And, Table 7 shows ward wise undeveloped area of Mumbai City. It indicates total undeveloped area in Island City, Western Suburbs and Eastern Suburbs is 391.14, 1940.02 and 1486.20 hectares respectively.

Table 6 Ward wise Developed Areas for Mumbai City

Wards		Residential Categories under Developed Areas						Total Developed Area (Hectare)	
		R1.1	R1C	R2.1	R2C	R2S	R3.1		R3S
Island City	A	0.00	0.00	34.38	12.22	18.27	12.45	1.77	79.09
	B	0.00	0.04	3.30	17.73	15.48	4.05	0.65	41.25
	C	0.00	0.00	12.56	32.46	30.77	0.62	0.24	76.65
	D	21.90	0.04	183.44	29.50	75.96	38.55	2.59	351.98
	E	1.71	0.17	60.12	27.68	32.36	32.11	1.72	155.87
	F/N	3.12	0.77	113.55	26.55	40.53	79.22	2.73	266.47
	F/S	0.74	0.00	69.03	3.55	32.18	51.77	5.04	162.31
	G/N	2.45	0.04	89.21	12.75	48.40	17.83	1.43	172.11
	G/S	0.98	0.10	68.84	10.52	23.82	36.63	9.62	150.51
	Sub Total		30.90	1.16	634.43	172.96	317.77	273.23	25.79
Western Suburbs	H/E	4.42	0.00	96.34	2.22	28.23	38.24	0.86	170.31
	H/W	31.27	0.38	260.17	16.95	51.91	16.27	0.09	377.04
	K/E	9.07	0.53	275.51	12.17	84.96	23.20	1.05	406.49
	K/W	51.11	6.19	452.14	31.62	96.33	19.74	0.82	657.95
	P/N	108.30	13.34	253.98	10.77	99.85	11.57	0.08	497.89
	P/S	16.26	0.05	172.96	9.27	47.11	28.73	0.00	274.38
	R/C	107.56	2.31	263.36	19.09	98.14	11.87	0.10	502.43
	R/N	5.74	0.10	140.74	6.84	69.78	11.87	0.21	235.28
	R/S	26.91	8.33	200.02	12.81	72.67	15.42	0.56	336.72
	Sub Total		360.64	31.23	2115.22	121.74	648.98	176.91	3.77
Eastern Suburbs	L	9.01	1.70	165.76	5.26	35.02	11.18	0.24	228.17
	M/E	22.75	0.00	102.61	1.55	23.51	106.36	0.21	256.99
	M/W	40.67	0.60	147.99	8.26	21.14	38.71	1.45	258.82
	N	4.17	0.13	181.99	24.04	38.87	58.44	2.72	310.36
	S	5.26	0.04	165.14	7.68	31.87	15.43	0.05	225.47
	T	22.53	2.56	203.62	17.35	52.33	23.07	0.11	321.57
Sub Total		104.39	5.03	967.11	64.14	202.74	253.19	4.78	1601.38
Total		495.93	37.42	3716.76	358.84	1169.49	703.33	34.34	6516.11

Table 7 Ward wise Undeveloped Areas for Mumbai City

Wards		Residential Categories under Undeveloped Areas						Total Undeveloped Area (Hectare)	
		R4.1	R4S	R4C	R4I	R5.1	R5C		R5I
Island City	A	0.66	0.00	0.18	0.00	0.25	0.65	0.00	1.74
	B	0.00	0.00	0.19	0.00	2.33	0.72	0.00	3.24

	C	0.29	0.21	0.04	0.00	0.05	0.00	0.00	0.59
	D	5.11	4.49	0.06	0.00	11.21	4.39	0.58	25.84
	E	7.22	4.98	1.47	0.11	8.19	7.69	7.32	36.98
	F/N	3.76	1.23	5.90	0.00	64.64	60.59	0.00	136.12
	F/S	8.39	6.68	0.64	0.00	32.43	23.37	0.00	71.51
	G/N	12.31	10.96	1.33	0.00	4.96	15.16	0.00	44.72
	G/S	9.62	12.17	3.13	0.00	29.12	16.36	0.00	70.40
Sub Total		47.36	40.72	12.94	0.11	153.18	128.93	7.90	391.14
Western Suburbs	H/E	1.89	0.29	0.02	0.00	84.56	25.69	0.00	112.45
	H/W	1.80	0.82	0.46	0.00	29.44	12.17	0.00	44.69
	K/E	5.33	1.48	3.17	0.00	44.86	216.86	7.25	278.95
	K/W	4.81	1.20	14.39	0.00	22.81	122.74	1.20	167.15
	P/N	25.95	77.42	6.58	1.39	103.01	291.24	23.71	529.30
	P/S	17.29	21.19	17.22	3.89	73.83	82.89	8.39	224.70
	R/C	15.28	3.53	3.10	0.00	25.14	76.97	0.00	124.02
	R/N	6.44	0.08	0.84	0.02	95.25	72.55	6.35	181.53
R/S	5.13	6.41	7.40	0.00	92.42	163.74	2.13	277.23	
Sub Total		83.92	112.42	53.18	5.30	571.32	1064.85	49.03	1940.02
Eastern Suburbs	L	9.74	2.66	0.35	0.00	105.19	196.55	2.25	316.74
	M/E	1.29	0.41	0.71	0.00	27.60	283.94	0.18	314.13
	M/W	2.02	0.38	0.05	0.00	28.00	102.44	0.23	133.12
	N	9.60	0.46	0.51	0.23	41.69	187.00	0.23	239.72
	S	7.69	0.90	7.42	0.00	21.76	339.56	19.81	397.14
	T	8.21	3.33	1.23	0.00	14.97	56.87	0.74	85.35
Sub Total		38.55	8.14	10.27	0.23	239.21	1166.36	23.44	1486.20
Total		169.83	161.28	76.39	5.64	963.71	2360.14	80.37	3817.36

III. Conclusion

The findings of this paper clearly indicates that in Mumbai 6516.11 hectares area can be considered at developed residential area and 3817.36 hectares area are undeveloped residential areas. In which Island City, Western Suburbs and Eastern Suburbs consist of 1456.24, 3458.49 and 1601.38 hectares of developed area and 391.14, 1940.02 and 1486.20 hectares of undeveloped area respectively. Developing the undeveloped residential area will contribute to the overall development of Mumbai City. And, it will also help in accommodating existing population of Mumbai as well as the people migrating to Mumbai daily in search of opportunity of their personal development in terms of wealth and lifestyle in better way.

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