



KOLKATA ENVIRONMENTAL IMPROVEMENT PROJECT

PROJECT MANAGEMENT UNIT

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION REPORT OF SHAMPA MIRZA NAGAR RESETTLEMENT HOUSING COLONY OF CANAL BANK DWELLERS

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KOLKATA MUNICIPAL CORPORATION

CONTENTS

- I. INTRODUCTION**
 - A. Background and Purpose
 - B. Extent of the IEE
- II. DESCRIPTION OF THE PROJECT**
- III. DESCRIPTION OF THE ENVIRONMENT**
 - A. General Consideration
 - B. Physical Resources
 - C. Ecological Resources
 - D. Human and Economic Resources
- IV. FORECASTING ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**
 - A. Impact Assessment
 - B. Mitigation Measures
 - C. Summary of Impacts and Mitigation Measures
- V. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PLAN**
 - A. Institutional Arrangements
 - B. Monitoring Plan
 - C. Summary of Monitoring Programme
- VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE**
- VII. FINDINGS AND RECOMMENDATIONS**
- VIII. CONCLUSIONS**

List of Tables

- Table 1.** Population figures of Maheshtala Municipality
- Table 2.** Summary of Impacts and Mitigation Measures
- Table 3.** Summary of Impacts, Mitigation Measures and Monitoring Programme

List of Figures

- Figure 1.** Location of Shampa Mirza Nagar Housing
- Figure 2.** Lay out of Shampa Mirza Nagar Housing

Abbreviations

ADB	Asian Development Bank
amsl	above mean sea level
As	Arsenic
bgl	Below ground level
BOD	Biochemical Oxygen Demand
Cd	Cadmium
CBD	Canal Bank Dwellers
Cl	Chloride
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CPCB	Central Pollution Control Board
Cr	Chromium
Cu	Copper
DSC	Design and Supervision Consultants
DWF	Dry Weather Flow
EIA	Environmental Impact Assessment
F	Flouride
GoI	Government of India
GoWB	Government of West Bengal
IEE	Initial Environmental Examination
IMD	India Meteorological Department
IST	Indian Standard Time
I & W D	Irrigation and Waterways Department
KEIP	Kolkata Environmental improvement Project
KMDA	Kolkata Metropolitan Development Authority
KMC	Kolkata Municipal Corporation
KMWSA	Kolkata Metropolitan Water and Sanitation Authority
Mg	Magnesium
MoEF	Ministry of Environment & Forests
MSW	Municipal Solid Waste
Na	Sodium
NATMO	National Atlas and Mapping Organisation
NGO	Non Governmental organization
Ni	Nickel
NOx	Oxides of Nitrogen
OHSP	Occupational health and Safety Plan
O & M	Operation and Maintenance
Pb	Lead
PMU	Project Management Unit
RPM	Respirable Particulate Matter
R & R	Relocation and Resettlement
S&D	Sewerage and Drainage
SDU	Social Development Unit
SIEE	Summary Initial Environmental Examination
SO ₂	Sulphur Dioxide
SO ₄	Sulphate
SPM	Suspended Particulate Matter
SS	Suspended Solids
SWF	Storm Water Flow
TDS	Total Dissolved Solid
T-P	Tollygunge-Panchannagram
WBPCB	West Bengal Pollution Control Board
Zn	Zinc

I. INTRODUCTION

A. Background and Purpose

1. The Kolkata Municipal Corporation (KMC) with financial assistance of the Asian Development Bank (ADB) has embarked on the Kolkata Environmental Improvement Project (KEIP), with an objective to implement a sustainable urban environmental infrastructure and management program for achieving improvement in the environment of Kolkata. Kolkata being situated in a high rainfall deltaic region a network of canals provides the drainage of the area. The efficacy of these canals has gradually diminished over the years and they now require urgent desilting to sustain an efficient dispersal system for storm water and other effluents from the KMC area. However, rehabilitation of the canals is difficult because of large-scale encroachment by informal CBDs. R&R of CBDs is thus a pre-condition of the proposed canal rehabilitation under KEIP but is a sensitive environmental and social issue, which needs to be addressed before the implementation of any canal rehabilitation work.

2. The purpose of this Initial Environmental Examination (IEE) report is to provide a glimpse of the environmental issues, which need to be addressed before R&R of families residing in stretches of the Monikhali canal system, at a site in Shampa Mirza Nagar in Maheshtala Municipality. The key objective of this IEE is to identify and present to the stakeholders details of potential environmental impacts, and mitigation and monitoring measures, of the Shampa Mirza Nagar Housing Project of the KEIP.

B. Extent of the IEE

3. The IEE is based on consultation of the published accounts on general environmental conditions observed and reported on Kolkata by Government Departments, Academic, Professional and Scientific Institutes and on primary data generated for one season by the project proponent. The IEE has been prepared in accordance with ADB's environmental policy [Environmental Policy (2002)] and guidelines [Environmental Assessment Guidelines (2003)].

II. DESCRIPTION OF THE PROJECT

4. The proposed resettlement housing scheme is to be implemented at Shampa Mirza Nagar in Maheshtala Municipality located on the western border of the KMC area (Figure 1). The available area is 11030.36 m². The land is devoid any vegetation excepting patches of grass. No tree is present in the plot of land. It is now lying vacant.

5. It is proposed to construct 11 blocks of buildings (Figure 2). Each block will have 32 dwelling units, i.e., 8 flats in each floor. The total number of units will thus be 352. The total built-up area at the site will be 2650 m² (24.2%). Roads and pavements will cover about 1050 m² (9.52%) and open space will occupy about 7340.36 m² (66.54%).

6. Each flat will have 1 bed room, dining area, verandah and a separate toilet. The source of water supply will be two deep tube wells tapping ground water from a depth of 100 to 160 meter below ground level. About 90 kilolitres of ground water will be pumped out each day to meet the water demand of about 50 litres per capita per day. Each block of house will be provided with a septic tank to treat the sewage from 32 households. Effluent from the septic tank will discharge into the soak well. Open storm water drain will run along both sides of internal roads. The storm water will discharge into near-by canal.

7. Household solid waste will be collected under Maheshtala Municipality system from door to door and will be taken to two storage points for transportation to the disposal site of Maheshtala Municipality. Street lighting will be by solar energy. About 160 KW of electricity will meet the demand of power of the households.

III. DESCRIPTION OF THE ENVIRONMENT

A. General Consideration

8. A brief description of environment in and around the R&R site at Shampa Mirza Nagar is presented in this chapter. However, components of the environment, which are of relevance to this site, have only been considered.

B. Physical Resources

1. Geography.

9. The R&R site at Shampa Mirza Nagar is located to the west of Kolkata city in the Maheshtala municipality area (Figure 1). The area is mostly flat and generally sloping from WNW to ESE with elevations in the range of 1.5-3.0 m Above Mean Sea Level (AMSL).

2. Surface Geology-Geomorphology

10. Regionally, the study area forms a part of the composite Ganga-Bhagirathi-Hugli delta developed during the Holocene period. Therefore, the geomorphology and surface geology of the study area is related to disposition of unconsolidated fine-grained sediment laid down by deltaic processes during the period. Regional subsoil data covering a large area in and around Kolkata reveals a six-fold succession of strata up to a depth of about 50 m below ground level. It is intercepted, at quite a few locations, by deposits of the recent river system, some of which are now extinct.

11. Bore hole strata log at Shampa Mirza Nagar brings out that the local stratigraphy up to 30 m is similar to the regional stratigraphy of Kolkata region. Contrasting engineering property of the strata is evident across 18 m depth from the surface. The N value increases abruptly beyond this depth and the strata are below this depth is somewhat more consolidated and oxidized.

3. Seismology

12. Maximum intensity observed at Kolkata is VII on EMS/MSK Scale that was recorded from both the near source earthquake of 1964 and distant earthquakes of 1897 and 1934. From this evaluation of intensity, an average peak velocity of 8-12 cm/sec and acceleration of 0.10-0.15 g (100-150 cm/sec²) can be expected at Kolkata due to distant and near source earthquakes. A recent estimate also indicates that Kolkata could expect earthquake inflicted PGA values in the range of 0.08-0.13 g, in next 50 years with 10% probability. In revised seismic zones map of India (IS 1893; Part 1, 2002) eastern part of Kolkata falls in Zone IV, which is equivalent to VIII of Comprehensive Intensity Scale (MSK 64).

4. Soil

13. Pedologically the Kolkata and neighboring areas may be divided into two soil types, Entisols and Alfisols. The Entisols are present at the western part of the area and other part is represented by Alfisols. Although such a general distribution pattern of soil types in the

Kolkata area is perhaps valid, extensive filling of land over the areas does not allow preparation of a standard soil map of Kolkata and adjoining areas. Both the Entisols and Alfisols are typical deltaic alluvial soils (belonging to the Gangetic alluvium group of soils) with low infiltration capacity but rich in calcium. The soil profile typically shows low to medium levels of organic matter and medium levels of available phosphate and potash.

14. The results of physico-chemical and chemical analysis of canal silt of Monikhali canal near Shampa Mirza Nagar are presented bring out that although the silt is somewhat charged high chromium⁺³, zinc and some times lead, such concentrations are not hazardous as per limits set under Hazardous Waste (Management and Handling) Rule 1989 as amended from time to time.

5. Surface Water

15. There are two major groups of surface water bodies around the Shampa Mirza Nagar site – the drainage canal system and large pond, *bheri*, *jheel*, etc. Monikhali, Jinjhira and Begore are the three major surface water bodies close to the project site. Heavy siltation and continued disposal of municipal waste have deteriorated the water quality of these canals. As per study conducted in April 2005, DO level in Monikhali canal water ranges between 0-2 mg/l, BOD 27-299 mg/l, COD 84-590 mg/l, Ammoniacal N 4.5-6 mg/l, NO₃ 0.4 – 0.8 mg/l, Ortho Phosphate 0.8 – 1.3 mg/l, E. Coli 5-12/100 ml and total salinity between 156 – 226 mg/l.

6. Geohydrology

16. As mentioned earlier the near surface stratigraphic sequence around the Shampa Mirza Nagar site could be grouped into two horizons. The upper horizon extends about 15-16 m below ground level. The second horizon (about 20 m thick) comprises two clay layers separated by a predominantly cohesion less layer that has been generally recognized as water bearing. Below the basal clay layer a stratum of brown/light brown, silty fine to medium sand of more than 10 m is present which is definitely water bearing. This intercalation within 45 to 50 metres depth is underlain by beds of medium to coarse sand down to the depth 180 m. The sand beds are on the whole interconnected and behave as a single aquifer system. The principal productive aquifer generally occurs between 80 to 120 m depth. Ground water in Shampa Mirza Nagar and surrounding areas, therefore, occurs principally under confined conditions. However, in most parts of the area, shallow aquifer with low yield occurs within 10-12 m bgl as thin lenses and ground water there occurs under unconfined condition.

17. The ground water level (piezometric surface) in and around Shampa Mirza Nagar as reported is variable through time and space. The pre-monsoon water level in April is at about 10 m bgl while the post monsoon water level in November is at 7-8 m bgl.

18. Although the quantity of dynamically available ground water is quite substantial, the rapid urban growth in and adjoining areas has already resulted in declining trend in ground water level both in pre and post monsoon period over the last 5-6 years. However, at present a scientifically designed tube well of 300 mm/150 mm size can yield water to the tune of 80 to 100 m³/hour for economic draw down. Nevertheless any large scale ground water withdrawal in the Shampa Mirza Nagar area requires judicial selection of aquifers and

rational ground water management plan to prevent a dent in the overall ground water regime of the area.

7. Land Use

19. The site and its immediate surroundings south of Monikhali canal (that flows by the northern side of the site) is more or less leveled but low lying open ground with tall grasses and bush. There is no cultivation and habitation within the site. The open areas are in the process of being converted into residential areas but at present there are only a few scattered houses that have come up. North of the Monikhali canal the area along the Budge Budge Road is occupied by large ware houses, garment manufacturing units, packaging godowns and other industrial units.

20. The land use around 2-3 km radius of the Shampa Mirza Nagar resettlement colony consists predominantly of semi-urban to semi-rural settlements, rural settlements and industrial units including storage godowns and also arable land and minor orchards. Typical urban settlement is also present and is fast replacing the semi-urban ambience of the area.

8. Noise

21. The urbanized area in Shampa Mirza Nagar area is somewhat noisy while the semi-urban and rural part is rather quiet. Obviously noise level is on a high along roads (for example Budge Budge Road) where traffic density is high. Day time noise level is on an average high compared to the night noise level.

9. Meteorology

22. The climate of the area is humid and tropical. It is characterized by a hot and dry summer typical in the months of April and May, a monsoon or rainy season typical in the months of July, August and September and a cool pleasant winter typically in the months of December and January. Climate data was collected from the nearest meteorological station maintained by India Meteorology Department (IMD) at Alipore, Kolkata, located about 10 km from the Shampa Mirza Nagar site and the data recorded at this station has been used to describe the climatology of the area.

23. Temperature. Maximum temperature was recorded in May (mean max. 35.2 OC) while minimum temperature was recorded in January (mean min. 14.1 OC). The average mean maximum temperature during summer (pre-monsoon) was 34.5 C and average mean minimum temperature during winter was 15.8 C.

24. Cloud Cover, Rainfall and Relative Humidity. The mean monthly data reveals that the cloud cover is minimum during the winter months of November, December, January and February and maximum during the rainy season comprising the months of June, July, August and September. The average annual rainfall is about 1919.0 mm. Rainfall peaks from July (about 440 mm) to September (about 372 mm) with the four monsoon months (June to September) contributing 89% of the total rainfall. Average number of rainy days is about 146 days per annum. Humidity is high during the monsoon months as expected, particularly July to September and ranges from 83 to 86%. Humidity is lowest during the dry summer months of March to May when it ranges between 72-75% in the morning and 53-70% in the evening.

25. Atmospheric Pressure. The diurnal variation of atmospheric pressure reveals that the barometric pressure is highest during early morning and gradually decreases as the earth's surface starts warming up through absorption of solar radiation to reach a minimum at or immediately after sunset. This diurnal variation has been observed to be true, irrespective of the season. As regards seasonal variation, it has been observed that barometric pressure is lowest in July and highest in December, the highest and lowest values are 1017 mb and 999 mb at 0830 IST and 1013 mb and 997 mb at 1730 IST.

26. Evaporation Rate. The evaporation rate in mm per day as a monthly average is revealed that the evaporation rate is lowest during the months of July to October when the relative humidity is the highest.

27. Wind Speed and Wind Direction. Wind is light to gentle with maximum average speed 7.22 km/hr recorded in May. The post-monsoon and winter months (October-February) experience very light wind. The average wind speed during pre-monsoon and monsoon are 6.10 and 5.03 km/hr respectively. The mean annual wind speed is 4.28 km/hr. It is observed from the wind rose, the prevalent wind direction is from SW during most of the time in the year, except winter when the N direction becomes significant

10. Ambient Air Quality

28. WBPCB has one permanent station at Behala Chowrasta that is nearest to the site for generating daily AAQM data. The data give an idea of ambient air quality prevalent towards east of the Shampa Mirza Nagar site.

29. It was observed, from AAQM data corresponding to 24-hourly values obtained from the Daily Ambient Air Quality Information Page of the WBPCB, for the period from April 2005 to March 2006, that SO₂ concentration was very low and hence never exceeded the limiting 80 µg/m³ concentration prescribed for residential area. SPM and RPM concentrations in the ambient air exceeded the residential area limiting concentrations of 200 and 100 µg/m³ respectively for more than 5% of the time during the 12-month period. NO_x concentration also exceeded the limiting 80 µg/m³ concentration prescribed for residential area more than 5% of the times during the 12-month period. Therefore, SPM, RPM and NO_x concentrations in the three stations do not meet the air quality standard prescribed for residential areas based on 24-hourly determinations.

30. The monthly average data bring out that the months of November, December, January, February, March and April during 2005-2006 had comparatively high concentrations of SPM, RPM, and NO_x in the chosen station. There was a sharp fall in concentrations of SPM and RPM in May, although a declining trend could be noticed from third week of March. Similarly, there was a dramatic rise in concentrations of these pollutants in later part of November.

31. Ambient air quality monitoring was carried out twice a week from 7.3.2004 to 6.4.2004 around the Shampa Mirza Nagar site. The data on SPM and RPM bring out that 24-hourly values in all stations from 8.3.04 to 2.4.04 exceeded 200 µg/m³ and 100 µg/m³ respectively only twice. The data also shows that there was a general distinct falling trend in particulate matter concentration from middle of the month of March, 2004. SO₂ concentration

was low varying between 1.8-6.4 $\mu\text{g}/\text{m}^3$ and was mostly below 5 $\mu\text{g}/\text{m}^3$. NO_x concentrations were mostly between 28-39 $\mu\text{g}/\text{m}^3$. CO concentrations were low mostly < 0.001 $\mu\text{g}/\text{m}^3$.

C. Ecological Resources

32. Significant ecological and natural resources are not present at the Shampa Mirza Nagar site and immediate surrounding areas. The surrounding areas of Shampa Mirza Nagar site, as a whole, are under the phyto geographical region of moist tropical deciduous vegetation with fresh water aquatic plants. With continuous expansion of human habitation and heavy population pressure to the east of Kolkata city that includes the Shampa Mirza Nagar site, the nature of vegetation is changing fast. In the few undisturbed land along canal banks, road side and small orchards within the residential area offer better situation for appearance of different types of vegetation. There is no demarcated forest patch.

33. In the surrounding areas of the site fruit tree species commonly met within the residential area include Mango (*Mangifera indica*), Jam (*Syzygium cumini*), Guava (*Psidium guajava*), Jackfruit (*Artocarpus integrifolia*), Tamarind (*Tamarindus indica*), Banana (*Musa sapientum*), Kul (*Ziziphus mauritiana*) Pepe (*Carica papaya*), Bel (*Aegle marmelos*), Nona (*Anona reticulate*), Ata (*Anona squamosa*). Big non fruit trees generally found along road sides and canal banks include Arjun (*Terminalia arjuna*), Jhaun (*Casuarina equisetifolia*), Bot (*Ficus benghalensis*), Ashwatha (*Ficus religiosa*), Radhachura (*Delonix regia*), Nim (*Melia azedarch*), Akashmoni (*Acacia moniliformis*), etc. Palm species like Tal (*Borassus flabellifer*), Narikel (*Cocos nucifera*), etc, thorny plants like Babul (*Acacia Aabica*) and bamboo species like baash (*Bambusa arundinaceae*), Shrubs like Tagar (*Tabernaemontana coronaria*), Jaba (*Hibiscus rosa sinsis*), Kanchan (*Bauhinia acuminata*), Kamini (*Murraya exotica*), Karabi (*Nerium oleander*), Gandha Raj (*Gardenia jasminoides*), etc are common. Many common herbs like Bon-tulsi (*Croton bonplandianum*), Tulasi (*Octimum sanctum*), Hogla (*Typha elephantine*), Thankuni (*Centella asiatica*), Parthenium (*Parthenium hysterophorus*), Kachuripana (*Eichhornia crassipes*) are ubiquitous. Climbers and grass species are found at suitable locations. A few of the species like Nim, Tulasi, Thankuni, etc also qualify as medicinal plants. Tomato (*Lycopersicon lycopersicum*), Carrot (*daucus carota*), Cabbage (*Brassica oleracea*), Bhendi (*Abelmoschus esculentus*), Begun (*Solanum melongena*), etc are vegetables that are commonly grown in kitchen gardens and in open lands. Rice (*Oryza sativa*) is grown only in very few large open lands on the western side of EM Bypass falling in borough VII.

34. Common jungle cat, Common Fox, House rat, Mouse etc are the wild life that are present. Among the reptiles Garden Lizard, snake, krait are common. The avifauna found in the area includes house crow, house sparrow, pigeon, etc. Amphibian like Indian bull frog, annelids like earth worm and arthropods like cockroach, butterflies, ants, etc. are common.

35. Non anchored free floating and submerged hydrophytes can be seen in the abundant open water bodies like pond. Anchored and floating and/or submerged and/or emergent hydrophytes co-exist with them. The open water bodies under favourable circumstances also have several fish species like Rohu (*Labeo rohita*), Catla (*Catla catla*), Bata (*Labeo bata*), etc.

D. Human and Economic Resources

1. Population and socio-economic conditions

36. The site is a part of Maheshtala Municipality falling in South 24 Parganas district. The population characteristics in respect of the Municipality as per Census of India, 2001 is presented in Table 1.

Table 1. Population figures of Maheshtala Municipality as per Census, 2001

	2001	
	Total	0-6 age group
Population	389214	43839
Decadal increase	-	
Area (km ²)	44.18	
Density of population (person per km ²)	8810	
Male	204734	22318
Female	184480	21521
Sex ratio	901	964
Literacy rate %		77.21
Literacy rate male %		82.78
Literacy rate female %		70.98

2. Industry

37. There are a number of important industries located around the project area such as Hindusthan Lever, Garden Reach Ship Builders & Engg, Kesoram Rayon etc. There is also some small scale industries (manufacturing, packaging, garment making, etc.) located around the project area. Treated effluent from these industries is discharged to the river.

3. Institutions

38. The agencies with important roles in and around the Project area are the Kolkata Municipal Corporation (KMC) and Maheshtala Municipality in providing the basic civic services in the area including water supply, regulation of construction of buildings and provision of public health & sanitation facilities, conservancy, solid waste management and urban amenities

4. Aesthetic Resources

39. Aesthetically the area has a semi-urban to semi-rural ambience in parts, industrial in part, typical urban in some other parts. In limited area somewhat rural ambience can still be seen. The semi-urban area presents unplanned look with unpleasant shanties located along canal banks. On the whole the scenic quality of the area is not of a high order although in patches where rural ambience is still preserved it presents an aesthetically pleasing landscape.

IV. FORECASTING ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Impact Assessment

1. General Consideration.

40. The housing project at Shampa Mirza Nagar is to be viewed as a measure aimed towards removing impediments for conveyance of canal water establishing efficient drainage condition by relocating canal bank dwellers. In the process the resettlement plan at the Shampa Mirza Nagar site through provision of housings to these people will allow them to have an improvement in the quality of life of persons to be relocated from the canal bank. Therefore, the overall impacts on components of environment due to the proposed project are expected to be substantially beneficial with respect to prevailing condition bringing in a marked improvement in environment in and around the area where the canal rehabilitation work will be taken up.

2. Location and design aspects and phase

41. Involuntary resettlement impacts on the canal bank dwellers. The modalities of relocation and resettlement of CBD's have been adequately worked out and reported under the approved revised Resettlement Plan, and will be implemented accordingly. Hence those mitigation measures are not reiterated here to avoid duplication. Proper relocation and rehabilitation of canal bank dwellers, and all affected people under the Project, will be carried out prior to commencement of any civil works.

42. Land Use. The resettlement sites will see a change in land use from almost open space to a built environment. However, planned housing with adequate open space will usher in an acceptable change in land use. The overall environmental quality will not deteriorate.

3. Construction Phase

43. In the construction phase of the housing complex at Shampa Mirza Nagar, however, there could be minor adverse impact on air, noise and surface water quality due to general land preparation and construction activities. These will be in the nature of increase in dust concentration, flooding, increase in suspended load of surface water bodies and increase in noise level. These are transient in nature and will disappear once the construction is completed. Appropriate measures will be taken during such activities to abate any temporary inconveniences.

4. Operation Phase

44. Air Quality. The present level of concentration of pollutants in ambient air of the relocation and resettlement sites is satisfactory over most parts of the year. However, there could be addition of SPM and RPM in the ambient air due to various household and related transport activities. Particularly, burning of fossil fuels (soft coke in particular) for cooking will add pollutants to the ambient air. Such addition is expected to be insignificant and is to be accepted for considerable gains on other fronts. However, with progressive switch from soft coke to kerosene and ultimately to LPG as cooking fuel seen even in low-income groups, this minor adverse impact will disappear.

45. The present settlements are in the form of unorganized slums with minimum ventilation within and between individual households. Therefore, the indoor air quality is quite adverse. The new planned housing colonies and flats at Shampa Mirza Nagar will have better ventilation and adequate open space, which are likely to bring in better indoor air quality creating a healthy ambience.

46. Surface water quality. The canal bank dwellers have been polluting the canal water through open defecation and discharge of raw sewage. In contrast, the new resettlement colonies will have proper water supply, sanitation facilities and treatment of domestic wastewater through septic tank, soak pit and chlorination chamber thereby making the same innocuous. Such effluent can be safely led to the recipient water body, i.e. the canal flowing beside the site. Storm water will be discharge through the surface water drains in to canal. Elimination of open defecation and provision of proper toilet and sanitation facilities will improve the quality of surface water. De-silting of the canal systems will add to the improvement in the surface water hydrology.

47. Geohydrology. The resettlement colonies will draw groundwater for various household uses. Only hand pumps will be used to lift water and no large scale withdrawal by use of electric pumps has been provided. There is, therefore, very little possibility of accelerated drop in the ground water level (piezometric surface) in the area. Expected regional temporary fall in ground water surface during dry months will recoup itself during wet months through natural recharge. Because of the natural presence of thick clay layer, the pollutant from surface water reaching the aquifer at depth is of remote possibility.

48. Community Health. At present the canal bank dwellers along the selected canal stretch live in a very unsanitary environment - with no access to safe drinking water supply and sanitation facilities. There is nearly a total absence of any civic facilities in the vicinity. The condition to say the least is unhygienic and the quality of life is at its lowest level. The new resettlement colonies and flats at Shampa Mirza Nagar will provide basic housing facility with adequate ventilation, assured supply of drinking water, proper toilet facilities, recreational area and other civic amenities. Therefore, there will be marked improvement in the quality of life and is expected to be reflected positively on the health of the affected persons. Health related expenses are likely to be minimized. A significant positive impact is, therefore, expected be seen on this component of environment.

49. Ecology. The resettlement colonies in Shampa Mirza Nagar will be built on sites with very sparse vegetation. No tree may have to be felled during site preparation. However, a number of trees will be planted in different parts of the resettlement area to improve the ecological aspects of the landscape. The pond within the site will be retained as such. The ecological status is likely to improve in the long run.

50. Socio-economics. There will be considerable gain in socio-economic front in the form of improved quality of life. The improved quality of life is expected to be reflected in improvement in general health of the habitants facilitating an urge for greater productivity. The overall environmental improvement on socio-economic front will be on a high level, although initially there may be some hesitation in moving to an unknown area. In case this assumes a serious nature, proper counseling will be arranged so that the fear psychosis is removed. Other socio-economic impacts are discussed in detail in the Resettlement Plan. Hence they are not reiterated here to avoid duplication.

51. Noise. The noise at the resettlement site is on a low level. The addition of new households may slightly increase the noise level at times and are expected to be within limits. No adverse situation is likely to develop.

52. Scenic Quality. The scenic quality of the canal bank will considerably improve as ugly and haphazard encroachment of informal settlements will be removed from the scene. The resettlement sites will be aesthetically pleasing with neat rows of the house, planned internal road and open space. The type of houses being planned will merge seamlessly with the surrounding semi-urban landscape.

B. Mitigation Measures

1. Construction Phase

53. The impacts of the construction stage on the environment would be transient in nature and are expected to disappear gradually on completion of the construction work. In order to mitigate such impacts, as indicated earlier, and restrict them within tolerable limit the following measures will be adopted:

- Implementation of necessary drainage facilities inclusive of soak pits for the drainage of construction wastewater, prior to discharge. Such systems would prevent the formation of stagnant pools of water within the project site, which generally create unsanitary conditions and promote the breeding of mosquitoes.
- Initiation of a landscaping including planting of flowering plants and trees in the open space of the site. Peripheral plantation is also recommended for controlling fugitive dust and dampening of noise levels, in addition to improving the scenic quality of the site.
- Regular sprinkling of water in the working zone and road surface will be undertaken to reduce dust in the project site.
- In order to ensure that health and safety of the worker and labor working at the site remains in good state, adequate measures will be taken like worker awareness and education to minimize damage and accident.
- Solid waste generated during the construction will be collected, temporarily stored, transported and disposed off at pre-determined disposal location(s).

2. Operation Phase

54. The following mitigation measures will be adopted in order to mitigate and control environmental impacts, which may arise due to operation of the housing complex.

- The sewerage effluent from the toilet will lead into septic tank, followed by chlorination. The effluent from septic tank will be discharged into soak pits. The discharge from soak pits if any along with the storm run-off will lead into the surface drainage network and finally discharged into the canal.
- MSW generated from the housing complex will be collected in bin and vats and will be finally removed by the Conservancy Department of KMC for disposal.
- Plantation program initiated during the construction stage should be continued as long as it is required to have a desired green look and maintained.

- Regular sprinkling of water should be undertaken in open spaces to have and maintain a green cover.
 - 1) Road surface of the housing complex should be properly swept and regularly maintained to reduce dust pollution.
 - 2) In the long run piped water supply from KMC system may be arranged to reduce pressure on withdrawal of ground water.

C. Summary of Impacts and Mitigation Measures

55. Although implementation of this component of the KEIP is expected to have an overall positive impact on the environmental condition and livelihood of the local communities, potential environmental impacts from planning, construction and operation of the Project component have been assessed for their significance, in order to identify appropriate mitigation measures. A summary of potential impacts as identified and corresponding mitigation measures is presented in Table 2.

Table 2. Summary of Impacts and Mitigation Measures

Project Stage	Potential Environmental Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimate
Construction	Soil erosion and surface run-off	minimum construction during monsoons and exposed surface resurfaced and stabilized rapidly	PMU/DSC/Contractor	Adequate provisions in the bid documents
	Dust nuisance	spraying of water as and when needed and use of masks and goggles by workmen	PMU/DSC/Contractor	Adequate provisions in the bid documents
	Soil, ground and/or surface water contamination	excavated soil disposed rapidly at approved sites	PMU/DSC/Contractor	Adequate provisions in the bid documents
	Vehicular and construction noise pollution	Mitigation to conform to vehicle maintenance requirements. Activities limited during day time	PMU/DSC/Contractor	Adequate provisions in the bid documents
	Water logging/ flooding at work sites	Rapid construction after trenches are dug to prevent of water logging/ flooding	PMU/DSC/Contractor	Adequate provisions in the bid documents
	Health and safety risks of work force	Occupational health and safety measures for workforce included in bidding documents Proper safety precautions to be adhered during construction.	PMU/DSC/Contractor and KMC	Adequate provisions in the bid documents

Project Stage	Potential Environmental Impacts	Proposed Mitigation Measures	Institutional Responsibility	Cost Estimate
	Environmental health risks at construction camps and work sites	Provision of sanitary and drinking water facilities at work sites and in construction camps if established	PMU/DSC/Contractor	Adequate provisions in the bid documents
Operation and Maintenance	Flooding of the housing complex during monsoon months	Routine and preventive maintenance of storm water surface drains and the outfall structures to the canal	KMC	Part of regular maintenance by KMC
	Overflow from the septic tanks	Routine desilting of the septic tanks and safe disposal of excavated silt	KMC	Part of regular maintenance by KMC
	Littering from poorly managed solid waste	Daily door to door collection of solid waste, daily sweeping of internal roads and regular transportation of collected garbage to disposal site.	KMC	Part of regular maintenance by KMC
	Contamination of stored drinking water for supply	Regular cleaning and disinfection of overhead tanks	KMC	Part of regular maintenance by KMC
	Quality assurance of drinking water source	Regular chemical and bacteriological analysis of the tube well water	KMC	Part of regular maintenance of KMC
	Degradation of plantation areas including avenue plantation	Regular maintenance of the plantation areas	KMC	Part of regular maintenance by KMC

PMU = Project Management Unit of KEIP; DSC = Design and Supervision Consultant of KEIP

V. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PLAN

A. Institutional Arrangements

56. For the proposed housing complex at Shampa Mirza Nagar, capital expenditure to be incurred for implementation of environmental management plan includes the development of infra-structural facilities such as sanitation and drainage system, provision of treatment of toilet block effluent, plantation, etc. Such facilities will be progressively built up during the development of the housing complex. However, the existing facilities of KMC available in respect of water testing, septic tank cleaning, MSW management, etc. will be utilized for maintenance of the created asset and implementation of environmental management plan.

B. Monitoring Plan

57. WBPCB has a system of periodic monitoring of ambient air and water quality as well as noise levels at different locations of Kolkata. The data could be used to check whether the concentration levels of pollutants and noise level are within desired limits. Ground water observation wells set up by CGWB and/or State Water Investigation Directorate for their regular monitoring of water level of Kolkata area may be utilized in verifying whether ground water withdrawal from the hand pump tube wells of proposed housing complex at Shampa Mirza Nagar is within limits of natural recharge.

C. Summary of Monitoring Programme

58. The following Table 3 provide an environmental monitoring program summary for the resettlement of canal bank dwellers component under KEIP, based on responses to potential adverse impacts identified.

Table 3. Summary of Mitigation Measures and Monitoring Programme

Mitigation measures	Parameters to be monitored	Measurement technique	Frequency of monitoring	Responsibility
Construction Phase				
Soil erosion and surface run-off; minimum construction during monsoons and exposed surface resurfaced and stabilized rapidly	Monitor adherence to contract specifications	Visual inspection	Daily	Contractor/ DSC/PMU
Dust nuisance; spraying of water as and when needed and use of masks and goggles by workmen	Monitor adherence to contract specifications	Visual inspection	Daily	Contractor/ DSC/PMU
Soil, ground and/or surface water contamination; excavated soil disposed rapidly at approved sites	Monitor adherence to contract specifications	Visual inspection	Daily	Contractor/ DSC/PMU
Vehicular and construction noise pollution; Mitigation to conform to vehicle maintenance requirements. Activities limited during day time	Monitor compliance to GoI noise standards and adherence to vehicular maintenance	Noise measurements at Project-sites as per Ambient Noise Standard of MoEF/ WBPCB	Monthly updates; Spot checks	Contractor/ DSC/PMU
Water logging/ flooding at work sites; rapid construction after trenches are dug to prevent water logging/ flooding	Monitor adherence to contract specifications	Visual inspection	Daily	Contractor/ DSC/PMU
Health and safety risks of work force; occupational health and safety measures for workforce included in bidding documents. Proper safety precautions to be adhered during construction	Monitor contractors' formulation and adherence to Occupational Health and Safety Plan (OHSP)	Visual inspection on sites and OHSPs	Daily	Contractor/ DSC/PMU

Mitigation measures	Parameters to be monitored	Measurement technique	Frequency of monitoring	Responsibility
Environmental health risks at construction camps and sites; Provision of sanitary and drinking water facilities at work sites and at construction camps, if established	Monitor adherence to contract specifications	Visual inspection on sites	Daily	Contractor/ DSC/PMU
Operation & Maintenance Phase				
Flooding of the housing complex during monsoon months; Routine and preventive maintenance of storm water surface drains and the outfall structures to the canal	Monitor during monsoon months water levels in the surface drains	Visual inspection	Daily during the monsoon months	KMC
Overflow from the septic tanks; Routine desilting of the septic tanks and safe disposal of excavated silt	Monitor for any sign of overflow septic tanks	Visual inspection	Daily	KMC
Littering from poorly managed solid waste; Daily door to door collection of solid waste, daily sweeping of internal roads and regular transportation of collected garbage to disposal site.	Monitor for littering and accumulation of garbage	Visual inspection	Daily	KMC
Contamination of drinking water supply; Regular cleaning and disinfection of overhead tanks	Monitor records of cleaning of overhead tanks	Visual inspection	All tanks to be cleaned and disinfected at least once in a year	KMC
Quality assurance of drinking water at supply end and at source	Monitoring of water quality at selected households and supply tube wells	Chemical and bacteriological analysis at KMC water laboratory	Once a month at supply ends in cluster of households so as to cover all blocks of building in a year ; once a month for the two tube wells	KMC
Degradation of plantation areas including avenue plantation; Regular maintenance of the plantation areas with fresh planting of trees of appropriate species whenever required	Monitoring the health of planted trees and vegetation	Visual Inspection	Once a week	KMC

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

59. Several meetings in the form public consultations were organized by Social Development Unit (SDU) of KEIP to form a consensus and to motivate the Project Affected

Persons (PAP) to leave the canal bank settlements and move into the organized housing at Shampa Mirza Nagar housing being constructed by KEIP. Such meetings were attended not only by the PAPs and SDU representatives (including DTL), but also by the Chairman and CIC, Maheshtala Municipality and the concerned Councillor, DG(P), KMC, TL, DSC, NGO representative and some land owners of the area. Decisions on such important issues like formation of canal resettlement group (CRG), fixation of entitlement matrix, opening of individual bank account (along with accidental insurance scheme) and contribution @ Rs 5000/- per family were agreed. Dates of important meetings are 2 January, 21 February, 27 February, 4 March, 13 March, 17 March, 2 May and 17 August, 2007.

60. As part of information disclosure to the public, the Summary Initial Environmental Examination report on the resettlement of canal bank dwellers at Shampa Mirza Nagar is being displayed in the web site of the KEIP.

VII FINDINGS AND RECOMMENDATIONS

61. The relocation of canal bank dwellers as part of the canal rehabilitation component of KEIP is expected to significantly improve the physical and environmental condition of the canals. It will support and improve the physical, biological & ecological resources of the project areas. The human & economic development and the quality of life of the resettled canal bank dwellers will be enhanced manifold over their present level. In particular the canal bank dwellers who are proposed to be relocated in the Shampa Mirza Nagar housing under the canal rehabilitation works will have significantly improved quality of life through the provisions of flats and other socio-economic benefits as outlined in the revised the Resettlement Plan for the Project.

62. Based on detailed screening and assessment of potential adverse impacts from the various stages of the Project, it is seen that the housing project will not cause significant environmental impacts resulting from its implementation if the recommended mitigation measures and monitoring are carried out.

63. Construction stage mitigation measures for each subcomponent as identified in the IEE should be included in the bid and contract documents for the respective contractor. Identified operation stage mitigation measures should also be included in the operating procedures and plans for the maintenance of the Housing and institutionalized through appropriate regulations.

VIII CONCLUSIONS

64. The resettlement of project affected families of canal bank dwellers of Monikhali canal system in the proposed Shampa Mirza Nagar housing complex will bring in considerable environmental improvements of the canal and the quality of life of the affected persons. There will be some temporary impact on environment during the construction phase of the housing that can be mitigated to a large extent. Operation stage impacts are related mostly to maintenance aspect of the assets proposed to be created. The present IEE is therefore sufficient for evaluation of impacts of the construction and operation of the Shampa Mirza Nagar housing colony for the selected canal bank dwellers. It can be concluded that an Environmental Impact Assessment study is not required for the implementation of this sub-component of KEIP.

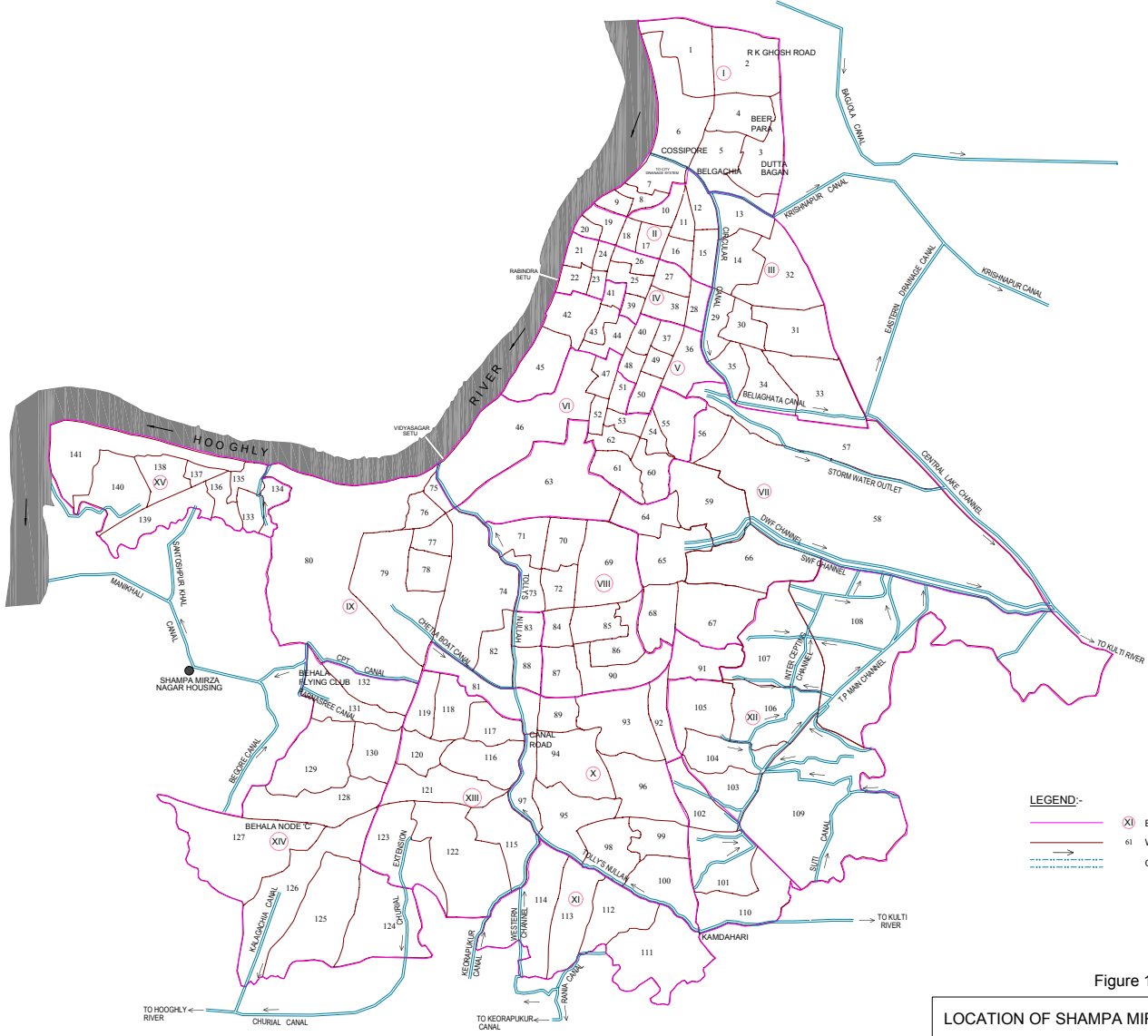
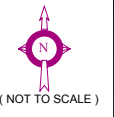
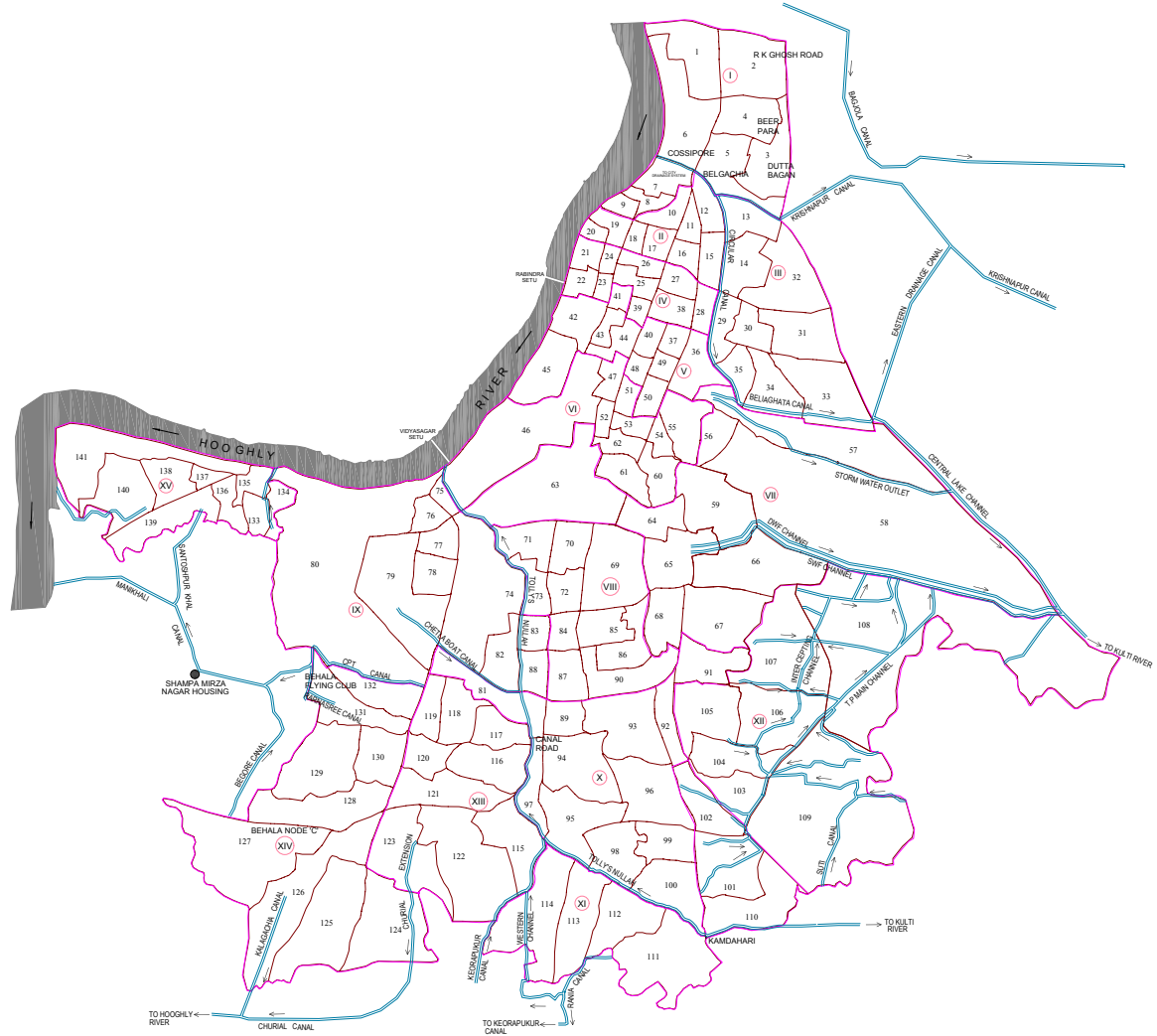
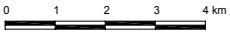
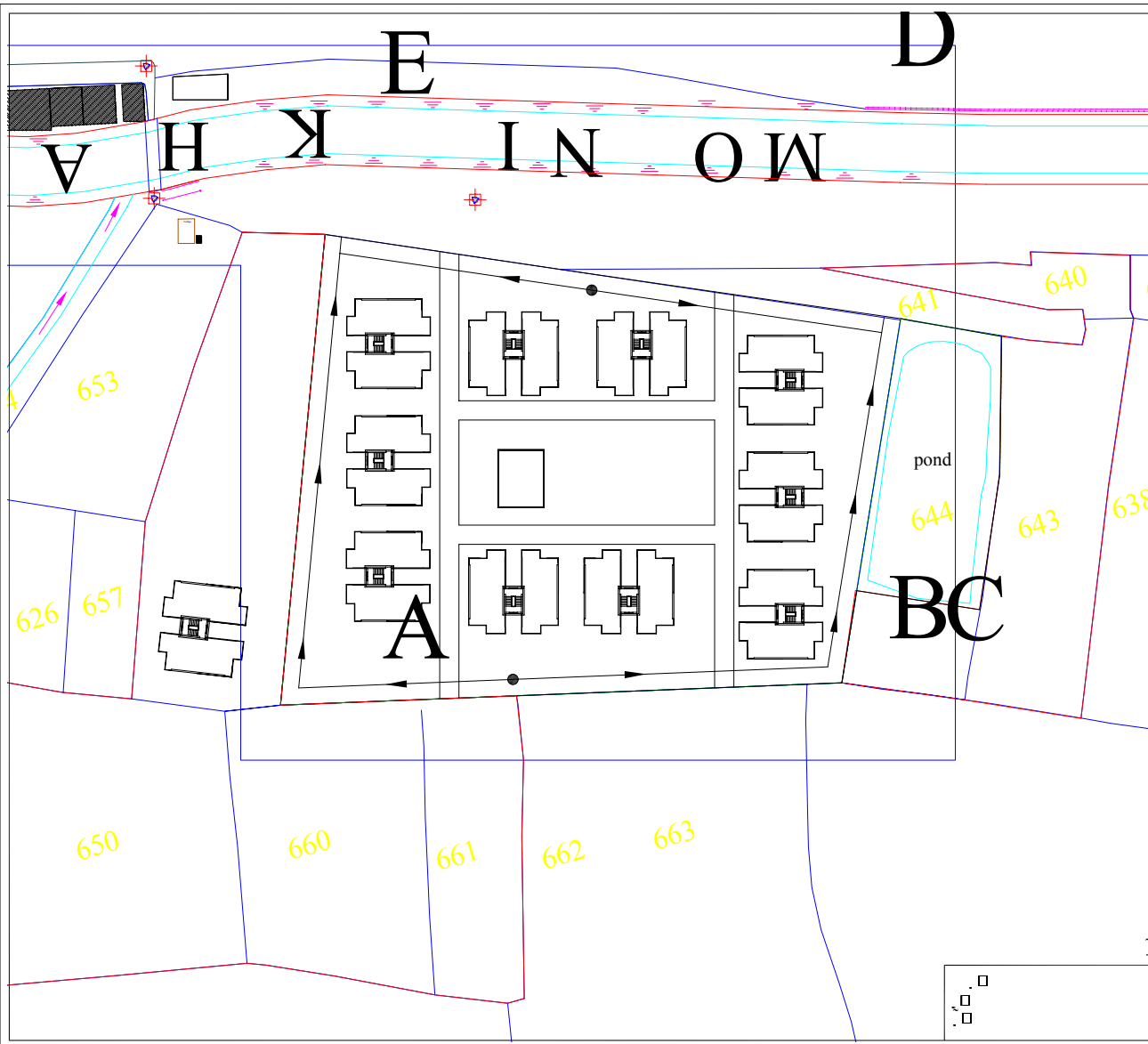


Figure 1.
LOCATION OF SHAMPA MIRZA NAGAR HOUSING





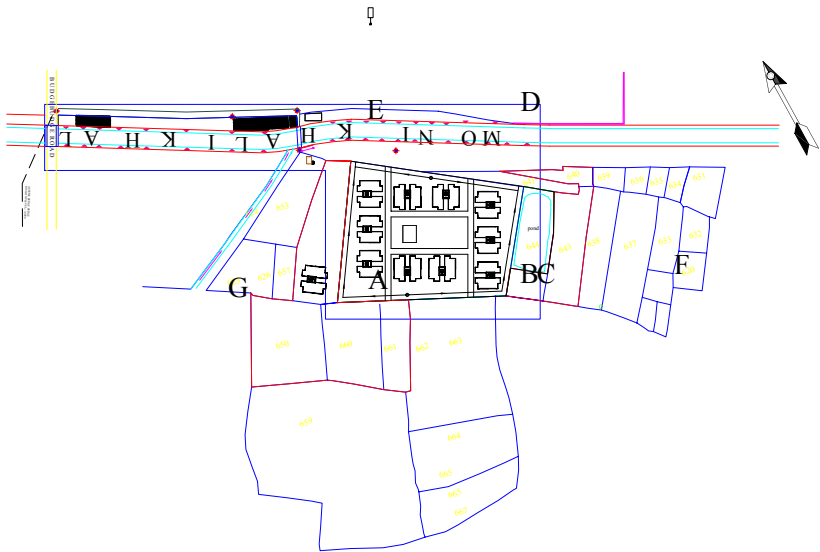
LEGEND.

ID	DESCRIPTION	SYMBOL	ID	DESCRIPTION	SYMBOL
1	TRAVELER STATION		12	RETAINMENT	
2	TREE		13	BOUNDARY WALL	
3	ELECTRIC POST		14	FENCING	
4	TELEPHONE POST		15	GAARD WALL	
5	STUB WELL		16	GRAVEL/CHIP ROAD	
6	TELEPHONE BOX		17	CONCRETE ROAD	
7	WATER TAP		18	DIRT ROAD	
8	LOW LAND		19	W.S.M. ROAD	
9	POND		20	BITUMEN ROAD	
10	PUMP & BUILDING		21	LANDSCAPING	
11	DRAIN		22	CHANGE	
	FIG			USE	
	MANHOLE				

NOTES:
ALL DIMENSIONS ARE IN MM OR OTHERWISE MENTIONED

SPECIAL NOTES:
TOTAL AREA- 11030.36 Sq.M.
BUILT UP AREA- 2650 Sq.M. (24.02%)
ROAD/PAVEMENT- 1050 Sq.M. (9.52%)
OPEN SPACE- 7340.36 Sq.M. (66.54%)

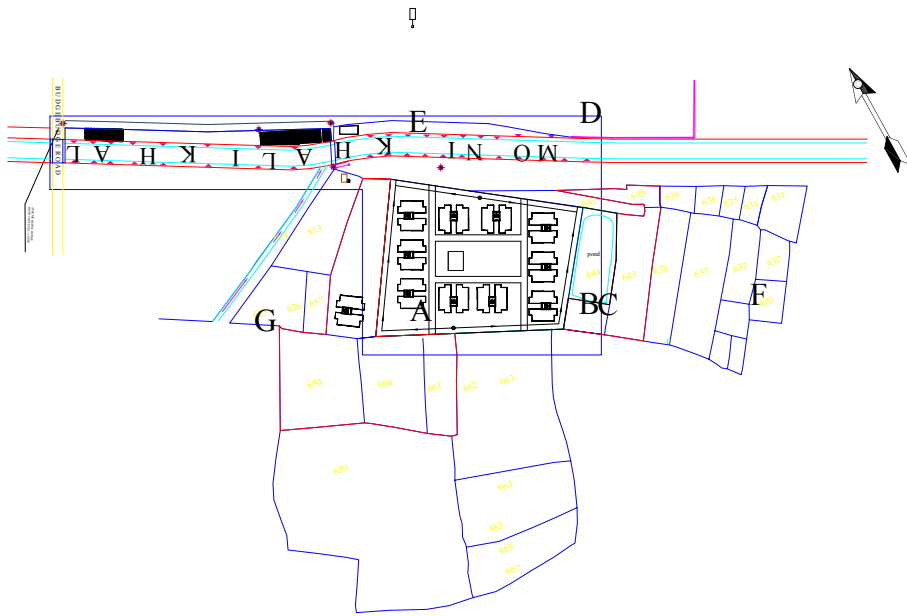




NO.	DESCRIPTION	SYMBOL	SCALE	CONSTRUCTION	THICKNESS
1	EXISTING WALL		1:10	REINFORCED CONCRETE	200
2	NEW WALL		1:10	REINFORCED CONCRETE	200
3	EXISTING ROOF		1:10	REINFORCED CONCRETE	150
4	NEW ROOF		1:10	REINFORCED CONCRETE	150
5	EXISTING FLOOR		1:10	REINFORCED CONCRETE	100
6	NEW FLOOR		1:10	REINFORCED CONCRETE	100
7	EXISTING DOOR		1:10	REINFORCED CONCRETE	100
8	NEW DOOR		1:10	REINFORCED CONCRETE	100
9	EXISTING WINDOW		1:10	REINFORCED CONCRETE	100
10	NEW WINDOW		1:10	REINFORCED CONCRETE	100
11	EXISTING STAIR		1:10	REINFORCED CONCRETE	100
12	NEW STAIR		1:10	REINFORCED CONCRETE	100
13	EXISTING ELEVATOR		1:10	REINFORCED CONCRETE	100
14	NEW ELEVATOR		1:10	REINFORCED CONCRETE	100
15	EXISTING CORE		1:10	REINFORCED CONCRETE	100
16	NEW CORE		1:10	REINFORCED CONCRETE	100
17	EXISTING COLUMN		1:10	REINFORCED CONCRETE	100
18	NEW COLUMN		1:10	REINFORCED CONCRETE	100
19	EXISTING BEAM		1:10	REINFORCED CONCRETE	100
20	NEW BEAM		1:10	REINFORCED CONCRETE	100
21	EXISTING SLAB		1:10	REINFORCED CONCRETE	100
22	NEW SLAB		1:10	REINFORCED CONCRETE	100
23	EXISTING FOOTING		1:10	REINFORCED CONCRETE	100
24	NEW FOOTING		1:10	REINFORCED CONCRETE	100
25	EXISTING FOUNDATION		1:10	REINFORCED CONCRETE	100
26	NEW FOUNDATION		1:10	REINFORCED CONCRETE	100
27	EXISTING RETAINING WALL		1:10	REINFORCED CONCRETE	100
28	NEW RETAINING WALL		1:10	REINFORCED CONCRETE	100
29	EXISTING CURB		1:10	REINFORCED CONCRETE	100
30	NEW CURB		1:10	REINFORCED CONCRETE	100
31	EXISTING DRIVEWAY		1:10	REINFORCED CONCRETE	100
32	NEW DRIVEWAY		1:10	REINFORCED CONCRETE	100
33	EXISTING PAVEMENT		1:10	REINFORCED CONCRETE	100
34	NEW PAVEMENT		1:10	REINFORCED CONCRETE	100
35	EXISTING SIDEWALK		1:10	REINFORCED CONCRETE	100
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38	NEW PLANTER		1:10	REINFORCED CONCRETE	100
39	EXISTING LIGHT FIXTURE		1:10	REINFORCED CONCRETE	100
40	NEW LIGHT FIXTURE		1:10	REINFORCED CONCRETE	100
41	EXISTING SIGN		1:10	REINFORCED CONCRETE	100
42	NEW SIGN		1:10	REINFORCED CONCRETE	100
43	EXISTING FENCE		1:10	REINFORCED CONCRETE	100
44	NEW FENCE		1:10	REINFORCED CONCRETE	100
45	EXISTING GATE		1:10	REINFORCED CONCRETE	100
46	NEW GATE		1:10	REINFORCED CONCRETE	100
47	EXISTING UTILITY		1:10	REINFORCED CONCRETE	100
48	NEW UTILITY		1:10	REINFORCED CONCRETE	100
49	EXISTING LANDSCAPE		1:10	REINFORCED CONCRETE	100
50	NEW LANDSCAPE		1:10	REINFORCED CONCRETE	100

NOTE:-
 1. ALL DIMENSIONS ARE IN METRE.
 2. BOUND MARK IS CARRIED FROM THE TOP OF
 3. EDGE OF ROAD CENTRE LINE (E-10-100).

NO.	DESCRIPTION	SYMBOL	SCALE	CONSTRUCTION	THICKNESS
1	EXISTING WALL		1:10	REINFORCED CONCRETE	200
2	NEW WALL		1:10	REINFORCED CONCRETE	200
3	EXISTING ROOF		1:10	REINFORCED CONCRETE	150
4	NEW ROOF		1:10	REINFORCED CONCRETE	150
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11	EXISTING STAIR		1:10	REINFORCED CONCRETE	100
12	NEW STAIR		1:10	REINFORCED CONCRETE	100
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14	NEW ELEVATOR		1:10	REINFORCED CONCRETE	100
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16	NEW CORE		1:10	REINFORCED CONCRETE	100
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33	EXISTING PAVEMENT		1:10	REINFORCED CONCRETE	100
34	NEW PAVEMENT		1:10	REINFORCED CONCRETE	100
35	EXISTING SIDEWALK		1:10	REINFORCED CONCRETE	100
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48	NEW UTILITY		1:10	REINFORCED CONCRETE	100
49	EXISTING LANDSCAPE		1:10	REINFORCED CONCRETE	100
50	NEW LANDSCAPE		1:10	REINFORCED CONCRETE	100



NO.	DESCRIPTION	SYMBOL	NO.	DESCRIPTION	SYMBOL
1	TRAVELER SIGN	▲	11	BUILDING	■
2	TRAIL	○	12	RETAINING WALL	—
3	STREET MARK	+	13	STREET	—
4	CEMENTED ROAD	T	14	GRAVEL ROAD	—
5	STONE WALL	—	15	IRON & STEEL PIPE	—
6	CEMENTED ROAD	—	16	CONCRETE ROAD	—
7	WATER TAP	●	17	BRICK ROAD	—
8	LAND ROAD	—	18	STONE ROAD	—
9	STONE	—	19	STONE ROAD	—
10	POSSIBLE BUILDING	—	20	DISBURSEMENT	—
11	ROAD	—	21	DISBURSEMENT	—
12	WATER	—	22	DISBURSEMENT	—
13	WATER	—	23	DISBURSEMENT	—

NOTE:-
 1. ALL DIMENSIONS ARE IN METRE.
 2. BENCH MARK IS CARRIED FROM THE TOP OF BRIDGE BRIDGE ROAD CENTRE (VALUE=10880)

DESIGN & SUPERVISION CONSULTANTS	
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ADDRESS	APARTMENT NO. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
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DATE	2023/01/01
SCALE	1:1000
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PROJECT TYPE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT STATUS	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT VALUE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT RISK	SRINIVAS RAO ENGINEERING PROJECTS
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PROJECT OPPORTUNITIES	SRINIVAS RAO ENGINEERING PROJECTS
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PROJECT BENEFITS	SRINIVAS RAO ENGINEERING PROJECTS
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PROJECT COMMUNICATION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT COLLABORATION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT PARTNERSHIP	SRINIVAS RAO ENGINEERING PROJECTS
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PROJECT COST STRUCTURE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT PROFITABILITY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT FINANCIAL HEALTH	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT OPERATIONAL EFFICIENCY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT QUALITY CONTROL	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT RISK MANAGEMENT	SRINIVAS RAO ENGINEERING PROJECTS
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PROJECT ACCOUNTABILITY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT RESPONSIBILITY	SRINIVAS RAO ENGINEERING PROJECTS
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PROJECT PASSION	SRINIVAS RAO ENGINEERING PROJECTS
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PROJECT GROWTH	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT EXPANSION	SRINIVAS RAO ENGINEERING PROJECTS
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PROJECT OPTIMIZATION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT EFFICIENCY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT PRODUCTIVITY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT PERFORMANCE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT SUCCESS	SRINIVAS RAO ENGINEERING PROJECTS
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PROJECT REALIZATION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT ATTAINMENT	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT ACQUISITION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT GAIN	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT BENEFIT	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT VALUE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT WEALTH	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT RICHES	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT ABUNDANCE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT PROSPERITY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT FLOURISHING	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT THRIVING	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT EXCELLENCE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT PERFECTION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT MASTERY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT EXPERTISE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT SKILL	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT KNOWLEDGE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT WISDOM	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT UNDERSTANDING	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT CLARITY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT INSIGHT	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT PERSPECTIVE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT VISION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT IMAGINATION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT DREAM	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT HOPE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT FAITH	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT TRUST	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT BELIEF	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT CONFIDENCE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT COURAGE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT BRAVERY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT DETERMINATION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT RESOLVE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT PERSEVERANCE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT PERSISTENCE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT ENDURANCE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT STAMINA	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT STRENGTH	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT POWER	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT FORCE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT ENERGY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT VITALITY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT LIVENESS	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT ALIVENESS	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT VIGOR	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT VITALITY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT HEALTH	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT WELL-BEING	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT HAPPINESS	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT JOY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT BLISS	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT ECSTASY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT EUPHORIA	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT ELATION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT EXULTATION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT TRIUMPH	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT VICTORY	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT SUCCESS	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT ACHIEVEMENT	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT REALIZATION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT ATTAINMENT	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT ACQUISITION	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT GAIN	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT BENEFIT	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT VALUE	SRINIVAS RAO ENGINEERING PROJECTS
PROJECT WEALTH	SRINIVAS RAO ENGINEERING PROJECTS
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