



## Impact of Extended Kolkata Metro Railway on its Surroundings and Commuters — a case study from Tollygunge - New Garia, West Bengal, India

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### Abstract

*The extension of Kolkata Metro railway has helped the increasing population in the newly developed urban center situated in the southern part of Kolkata. It facilitates the communication to (commute) different parts of Mega city (and going back to their respective places). As a result, the skyline of Tollygunge to New Garia is changing drastically with the change in land use and land cover. Open space and green cover of this area also decreased alarmingly from 22.60 percent in 1963 to 3.00 percent in 2004. In this paper an attempt has been made to evaluate the growth and development of new constructions. The present paper also consists daily commuter's perception and opinion regarding services provided by metro railway along with the incidence of eviction of settlements required to serve the extension purpose. The increasing stress on the existing environment and related problems of water logging and pollution also has been taken into consideration.*

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### Introduction

Kolkata, formerly known as Calcutta, is the administrative capital of West Bengal, a state in the eastern part of India. , situated on the eastern banks of the river Hoogly. According to the 2001 Census, the population of Kolkata proper is 4.5 million with a working population of 1.7 million. Greater Kolkata has a population of 13.2 million and a working population of 4.5 million (office of the Registrar General of India, 2001). The city stretches out in an elongated manner in the north-south direction. The traditional Central Business District (CBD) is located at the center of this elongated urban structure. Hence most of the major roads run in a north-south direction (Chatterjee, 1995) bringing passengers from the northern and southern parts of the city to the CBD. In Kolkata, 80% of the trips are done through public transport system (Pucher et al., 2005) because the city offers a wide variety of options, ranging from cycle rickshaws to auto-rickshaws to buses to suburban railways to Metro Railway. Yet, the city also suffers from common transportation problems such as traffic congestion, inadequate parking facilities, traffic accidents, and air pollution (Roy, 2002). The fact being this that a meager 6% of the land area of the city is allotted to roads only compounded the problems. In

comparison, the same figure is 21% in Delhi and 11% in Mumbai (Pucher et al., 2005). The inadequacy of roads has made the operation, maintenance and expansion of the Kolkata Metro Railway even more important.

### Study Area

The burgeoning transport problem of Kolkata drew the attention of the city planners, the State Government and also the Government of India. It was soon realized that something had to be done and done fast to cope up with the situation. It was Dr. B. C. Roy, the then Chief Minister of West Bengal, who for the first time conceived idea in 1949 of building an Underground Railway for Kolkata to solve the problem to some extent. A survey was done by a team of French expert but nothing concrete came out. Efforts made to solve the problem by augmenting the existing fleet of public transport vehicles barely touch the fringe of the problem as the roads account for only 6% of the surface area in Kolkata (Pucher et al., 2005). With a view of finding out an alternative solution to eradicate the sufferings of the Kolkatans, the Metropolitan Transport Project was set up 1969. After detailed study, the MTP came to the conclusion that there was no other alternative than the construction of an underground Mass Transit System. The MTP

(Railways) had prepared a Master Plan in 1971 envisaging construction of five rapid transit line for the city of Kolkata, totaling to a route length of 97.5 km. Of these, the highest priority was given to the busy North-South axis between Dum Dum and Tollygunge over a length of 16.4 km. (and) .The work on this project was sanctioned on June 1, 1972. Kolkata Metro, India's first and Asia's fifth, became a reality on October 24, 1984 with the commissioning of a partial commercial service covering a distance of 3.40km. Services on the entire stretch of Metro (Dum Dum to Tollygunge) were introduced from September 27, 1995 covering a distance of 16.45km (Metro Railway, 2009).

### Objectives

The major objective is to evaluate the satisfaction level of the citizens regarding the Metro Railway after Extension. This becomes the basis for few subsidiary objectives such as—

1. To evaluate the daily commuters opinion and suggestion associated with extension,
2. To determine the proportion of eviction of settlements for the purpose of extension.
3. To assess the growth and development of new construction,
4. To assess the environmental impact assessment.

### Evolution of the Kolkata Metro Railways

The Kolkata Metro Railway began operation on October 24, 1984. During the 1980s and 1990s, a 16.45km long Metro Railway line from Dum Dum to Tollygunge with 15 underground and two over the ground stations (Metro Railway, 2004) became operational for public use in multiple phases (Table - 1). The section between Esplanade and Netaji Bhawan and Belgachia and Dum Dum were the first to start operation in 1984. The remaining sections opened in 1986, 1994 and 1995. The initial cost of this project according to the 1970-71 price level was 29.17 million dollar (1dollar=Rs.48). But due to delay of 14-15 years, the cost increased almost tenfold to 325.55 million, as per the 1993-94 price level (Singh, 2002).

The Phase II of Metro extension from Tollygunge to New Garia (a proposed station between Garia and Baghajatin station of Eastern Railway) for a length of 8.7 km was sanctioned in 1999-2000 at a cost of Rs. 907 crores (Metro Railway, 2009). It currently runs for 25km (15.53miles) from Dum Dum to New Garia. This extended portion from Tollygunge to New Garia has been constructed on elevated structure and opened for public in two phases (Metro Railway, 2009). The route between Tollygunge and Kavi Nazrul began operation on August 23, 2009, while that between Kavi Nazrul and New Garia opened on October 7, 2010 (Table 1). The Ministry of Railway is further extending the Metro Railway line to the north, eastern and western parts of the city. Presently, construction of the East West Metro

Railway line is in Full swing. It will extend from Hawrah Maidan in the west, to Saltlake Sector V in the east. Part of this corridor will be constructed underground and part will be on elevated structure. The East-West Metro Railway line will connect the two most important suburban railway terminals, Howrah and Sealdah, to the CBD, and the major bus terminals of Howrah, Sealdah and Salt Lake to one another.

### Database and Methodology

Primary data was collected through questionnaire survey from local people and daily commuters of Metro Railway. The total study uses descriptive and analytical methods. The methodology used is as follows: The history of the Metro Railway followed by the overall analysis of the Draft Development Plan was analysed. A random stratified sampling method was used to analyze the impact of six new extended stations. The analysis considers the viewpoints of the local people, stakeholders, auto drivers & daily commuters of Metro Railway. *Data Analysis and Representation* includes the analysis of the different types of the data about the Metro Railway services. This analyzed data have been represented using different cartographic and quantitative techniques.

### Results and Discussion

#### *Perception of Daily Commuters on Extension*

The computed primary data having the number of commuters who avail metro shows an interesting picture. The percentage of male commuters in metro is more than female i.e. 65 % male and 35% female commuters. About 60% of daily commuters are representing working class population, 30% of the passengers are students of different age groups and remaining are women, housewives, children, retired persons and senior citizens. About 45% of the working population belongs to age group of 45-60 year and 55% belong to age group of 25-45 year. About 65% of the working populations are service holders, 30% are associated with different kinds of business and 5% are associated with various professions such as school, college and university teacher, advocate, chartered accountant etc. Out of total students about 20% are infant and primary students, 40% are secondary and higher secondary students, 30% are college students and rest of them are studying in university.

#### *Commuters Perception*

Different aspects have been considered to know the outcome of Metro Railway extension on daily passengers such as satisfaction level, different advantages (time saving, cost saving and comfortable) of the passengers etc. The survey showed that –

- 1) Majority of the daily passengers are satisfied with the services provided by the Metro Railway. According to Mousumi Chatterjee, resident of Behala and a school teacher

metro is the fastest and relatively comfortable way of travelling despite of overcrowding at office hours.

- 2) Commuters are benefited in respect to time and money.
- 3) This transportation system is comfortable and safe in comparison to other Para transits modes and it is most eco-friendly transport system among the existing modes that run through the city. According to Sumit Aich, employee of Environmental department of state government of West Bengal, metro is the most pollution free mass transit system as it runs by electricity.
- 4) Metro Railway follows its individual route, running at a speed of about 40 km/hr, and has an advantage of exclusive right to its tracks. Thus its pace is not slowed down due to encroachments from other surface modes and on the other hand it also does not hamper the existing traffic.
- 5) However certain times, such as overcrowding at office hours and time intervals among trains particularly at the office time are few of the disadvantages. In opinion of Mithun Das, student of St Xavier college, at office hour number of passengers is so high that it has become quite difficult even to get in the train.

From the survey certain suggestions regarding the betterment of metro railway services were deciphered like – increase the frequency of trains particularly at office hours, introduction of speedy way of ticketing to avoid the congestion, and increase safety measures and security to avoid frequent suicide phenomena.

#### Eviction of Settlements for Extension

To cover the distance from Tollygunge to New Garia Metro Railway authority had to construct 8.657km long elevated track over Tolly's Nullah. Tolly's Nullah is an open sanitation path which passes through the middle of a densely populated area. This Nullah is used to evacuate dirty water of South Kolkata and reduce water-logging phenomena particular during rainy season. The extended area alongside this nullah is mostly a residential area and its population density is quite high. Huge numbers of squatter settlements were located on both side of Tolly's Nullah along with some big old trees. During construction for metro railway extension few squatter settlements and big trees, which were pretty close to the elevated track were demolished. According to Samir Das, local resident of Garia, more than 300 houses (consisting up to three rooms) were evicted most of which had tall roofs. Maximum number of eviction took place at Netaji station and in between Gitanjali and Kavinazrul stations. As mentioned by Avik Dam, resident of those evicted settlement, (that) they were offered Rs.1500-2500/hundred sq.ft area by the

metro railway authority but most of them disagreed to accept that amount.

#### Growth and Development of New Constructions

The extended part of metro railway (Tollygunge – New Garia) followed the Tolly's Nullah uninterruptedly. A bus route which runs parallel with Tolly's Nullah has been observed on the south of the extended metro track. A mini bus, two private buses and a W.B.S.T bus are available in this route, but as there frequency is quite low in that route, auto becomes the first preferable transportation modes along this route, mentioned by Mr. A. Basu, a 45 year old service man and resident of Kudghat area. A primary survey has been conducted to evaluate the change in land price and land use patterns due to extension. It indicates the economic growth of real estate developers.

In between Tollygunge and New Garia, there are more than 500 apartments on both side of Tolly's Nullah within 1km range which were constructed in last 2 - 3 years. At present (August, 2011) here are approximately 125 constructions on their way to completion. The land price was ranging from 1.5-3 lakh/cutta on 2004-2005 and now it has risen to 7-15lakh/cutta on August,2011. The highest price has been observed with in 1km radius from station and price decreased with the increase in distance from stations. There has also been a significant increase in apartment price. It was Rs.700 - 1300/sq.ft in 2006 - 2007 and it has become Rs. 2500 - 3500/sq.ft in 2011. Majority of the apartment consists 16 - 30 flats. The biggest apartment is South City which is located between Tollygunge and Netaji metro station. Room rent has also increased from 400 - 600/per month to 1700 - 2200/per month within 3-4 years. This rapid increase in price could be accounted due to the good accessibility provided by the Metro Railway. Good accessibility provided by metro on the extended part make it one of the preferable place for living. So number of constructions for residential purpose has also increased.

Metro railway extension has been providing good connectivity to the dwellers of south kolkata area. Good connectivity provided by metro railway being is one of the main reason for the increasing urban sprawl in extreme south kolkata area. During survey it has been observed that Bansdrani, Natkala and Garia Bazar areas are mainly for residential purpose though few factories and health-care center also located there. Metro railway service on the extended metro route started from august 2009 but construction work for extension commenced from 2002. The extension proposal and its practical implementation leads to the development of new construction, out of which majority of construction works focus the growing need of living areas. Kolkata obtain more than its optimum population and population is still growing. Hence, the local Govt. Is compelled to permit multi-stored apartments and buildings for residential as well as commercial purpose.

## Environmental Impact Assessment

### *Effect on the Drainage System*

The extension of Metro Railway beyond Tollygunge, a project of 8.657 km route length was sanctioned in 1999-2000 at a cost of Rs. 1032 crores including cost of new rolling stock and land. The major part of the railway track in this section has been constructed on an elevated structure that runs along the Tolly's Nullah. Concrete pillars of 2 meter in diameter have been constructed to support the elevated Metro stretch from Tollygunge to Garia. The Adi Ganga popularly known as Tolly's Nullah was the major drainage basin of the city, especially for the southern part. The construction of pillars is expected to enhance the siltation and may prove to be its death knell. But R.N. Mahapatra, Chief Public Relation Officer of Metro (2009), admitted that as the area is highly populated so following Tolly's Nullah is the best possible way to connect New Garia with the existing metro route. Though in remote past Tolly's Nullah has been used as the water way for the inland area and also source of water but from few decades it has become only a sewage system for those people living in the Naktala, Bansdrone and in Garia area. A section of respondent admitted that (20%) pillars that support the elevated track of metro may have no effect in draining sewage water through Tolly's Nullah. But majority of respondents (56%) have admitted that pillars have little effect in choking water flow through Tolly's Nullah. Muni Chakraborty, nurse by occupation and more than four decade old resident of Bansdrone government colony area, admitted that the pillars that support elevated track of metro resist the inward flow of high tide water from Hooghly river which often bring dead animal bodies and other river waste which gets stuck during surge in the interior part of the area. In opinion of few respondents (24%) though intensity of high tides may have reduced due to the pillars but at the stations where number of pillars are relatively more there stagnation of garbage is a concerning matter which needs to be solved. In the opinion of Mr. D.K. Dhar, resident of Naktala and a employee of a private bank, the benefits provided by extension of metro out run all the problems associated with the construction of pillars on the bed of Tolly's Nullah. Same opinion was also conveyed by Ajoy Das, a 52 year old resident and owner of a grocery shop in Kudghat area.

### *Loss of Trees due to Extension*

another very major impact on environment has been the loss of huge number of trees due to extension. As mentioned by the local residents( that) there were few old trees on the both bank of Tolly's Nullah before the construction of elevated track. Big trees that were close to Tolly's Nullah had to be uprooted during construction work. In opinion of Nandini Das, house wife and more than decade old resident of Bansdrone, major number of trees were cut to construct the stations over Tolly's Nullah. In opinion of Subir Das, resident of Bansdrone

Government colony area and auto driver by profession, approximately hundred big trees were lost due to extension, majority of which were coconut, guava, banana and mango trees. Highest numbers of trees were cut down to construct the Surya Sen station at Bansdrone and Kavi Nazrul station at Garia Bazar mentioned by Lata Roy, house wife and more than two decade old resident of Kudghat area. Considerable numbers of trees were also demolished in between Gitanjali and Kavinazrul station. After completion of construction of metro tracks there were no effort has been taken neither by the Metro authority nor by the State Government to subsidize the loss of trees.

## Recommendations

- 1) Metro Railway authority as well as the State Government should take some action against the siltation problem and invest in desiltation programmes.
- 2) Further stretch of Metro Railway should avoid any kind of construction on the bed of the Tolly's Nullah.
- 3) Increase the frequency of trains particularly at office hours.
- 4) Introduction of speedy way of ticketing to avoid the congestion particularly at office hours.
- 5) Increase safety measures & security to avoid frequent suicide phenomena.

## Suggestions to the Passengers

- 1) Passengers should have a minimum sense of adjustment and cooperation instead of criticism and complaining against the services provided by metro for most of times.
- 2) Passengers should queue up near the gate if they are about to get off & should not block the gate
- 3) Passengers should keep their money ready at the queue of ticket counter before his/her turn comes to save time.

## Conclusion

Metro railway undoubtedly serves as one of the most popular and convenient mode of transport in comparison to all other modes that runs through the streets of Kolkata. The present paper attempts to draw certain conclusions—

- 1) Overall it has been observed that daily commuters are quite happy because availing metro services is time saving, cost saving and comfortable. However Metro Railway authority should look in to commuter's safety, security and overcrowding problems.
- 2) In a congested area like Bansdrone, Naktala, Garia any kind of big construction and development plans for people's interest requires eviction of settlement and loss of trees. As the Metro railway follows the Tolly's Nullah



on an elevated track, the number of eviction and loss of trees were much less.

- 3) Plot and apartment price has been increasing rapidly and land pressure (particularly for residential purpose) has also increased drastically due to connectivity provided by Metro.
- 4) Construction of pillars on the bed of Tolly's Nullah to support the elevated track has developed both good and bad consequences on sewerage system. Water movement has been partially choked due to pillars. Any kind of further construction in the bed of Tolly's Nullah should be prohibited and Metro Railway authority as well as State Government should look into this matter to eradicate this problem.
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In conclusion it could be said that extension of Metro railway services have definitely benefited the common man but its impact on environment at various places has been severe. It is up to the authorities to take up the matter seriously and work together to make Kolkata proud of its metro services.

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Table – 1: Evolution of Kolkata Metro Railway

Metro Railway service Began	Stations	Length of Route
24 October 1984	Esplanade – Netaji Bhavan	3.40km (2.11miles)
11 December 1984	Dum Dum – Belgachia	2.15km(1.34miles)
29 April 1986	Netaji Bhavan – Tollygunge	4.28km(2.66 miles)
13 August 1994	Belgachia – Shyambazar	1.62km(1 miles)
2 October 1994	Esplanade – Chandni Chowk	0.71km(0.44 miles)
19 February 1995	Chandni Chowk – Central	0.60km(0.37 miles)
	Shyambazar – Girish Park	1.93km(1.20 miles)
27 September 1995	Girish Park – Central	1.80km(1.12 miles)
	Dum Dum – Tollygunge	16.45km(10.22 miles)
11 February 1996	M.G.Road	The Station opens to Public
23 August 2009	Tollygunge – Kavi Nazrul	5.89km(3.66 miles)
7 October 2010	Kavi Nazrul – New Garia	3.00km(1.86 miles)

Source: Metro Bhavan, Kolkata

Table - 2: No. of Evicted Settlements

Stations	No of Houses	Condition	Amount Offered (/00 sq. ft)
Tollygunge-Netaji	5	Slum, Pucca	1500
Netaji	100	Pucca	2000
Netaji-Suryasen	-	-	-
Suryasen	40	Kachha, Illigal, Slum /Squatter	2000
Suryasen-Gitanjali	20	Slum, Pucca, Grocery Shop	1500
Gitanjali	22	Slum Area	1500
Gitanjali-Kavinazrul	110	Slums, Shops (Pan, Grocery, Coal Carpentry)	2000
Kavinazrul	30	Slum, Pucca	2000
Kavinazrul-Khudiram	10	Kachha, Illigal, Slum /Squatter	2000
Khudiram	40	Slum, Pucca, Grocery Shop	2000
Khudiram- Kavi Subhas	15	Slum, Pucca	1500
Kavi Subhas	50	Slum, Pucca	2000

Source: Primary Survey

Table - 3. Change in Land Price, Apartments Price and Room Rent

Name of Stations	Land Price (Rs. Lakh / cuttas)		Apartment Price (Rs. /sq. ft)		Rent per Room (Rs. / Month)	
	2006-07	2010-11	2006-07	2010-11	2006-07	2010-11
Tollygunge - Netaji	2-3.5	8-15	900-1200	2200-3000	400-600	2500-3500
Netaji - Surya Sen	2-3	7-13	700-1000	2000-2700	400-500	1700-3000
Surya Sen - Gitanjali	1.5-2.75	7-10	700-900	2000-2500	400-500	1700-3000
Gitanjali - Kavi Nazrul	2-2.5	6-10	700-800	2000-2700	400-450	1500-2800
Kavi Nazrul - Khudiram	2-2.5	8-11	700-1000	1800-2600	300-500	1500-2500
Khudiram - Kavi Subhas	1.5-2.5	7-10	700-1000	1700-2500	350-500	1500-2500

Source: Primary Survey &amp; 99acer.com

Table - 4: Development and Location of Apartments

Location of Stations	Metro Routes	Locality	Some recently constructed Large Apartments (< 1 km from Metro Station)	Location of Apartments
Tollygunge (22.29'39"N 88.20'41"E)	Tollygunge to Netaji (1.76km)	Netaji Subhas Chandra Bose Road, Chandi Ghosh Road Kolkata - 40 (NE side)	ITC Sangeet Resarch Center Tapan Sinha Memorial Hospital Metro Railway	22.28'58"N to 22.29'59"N & 88.20'15"E to 88.20'50"E
Netaji (22.29'52"N 88.20'44"E)		Banarjee Para Road (NW side)	Diamond City South Disha Apartment Abhilasa Apartment Swapna Neer Apartment	
Masterda Surya Sen (22.28'25"N 88.21'37"E)	Netaji to Masterda Surya Sen (1.77m)	Moore Avenue, Kolkata - 40 (North side)	Surya Residency Mrinalini Apartment Apostolic Carmel Provincial House Regent Apartment	22.29'50"N to 22.28'25" & 88.20'50"E to 88.21'37"E
		New Tollygunge, Kolkata - 93& Bansdronei New Govt Colony, Kol-70 (West side)	Trinayana Apartment Mata Di Tower	
Gitanjali (22.28'10"N 88.22'10"E)	Masterda Surya Sen to Gitanjali (1.05km)	N.S.C Bose Road (USHA Area), (East side)	Shreeram Kutir Sky Line Nanor Sri Krishna Apartment	22.28'25"N to 22.28'10"N & 88.21'37"E to 88.22'30"E
		Subhod Park(Bansdronei/USHA area), (West side)	Suchana Apartment Meghmala Apartment Sisirkona Apartment	
Kavi Nazrul (22.27'50"N 88.22'48"E)	Gitanjali to Kavi Nazrul (1.32km)	Goragacha (Garia), Kolkata- 47 (East side)	Café Coffee Day Branch Adya Palli Apartment ICICI Garia Branch	22.28'10"N to 22.27'50"N & 88.21'30"E to 88.22'48"E
		Barlias (Garia), Kolkata-84 (West side)	Anikamal Apartment Akash Apartment SBI Bank (New Branch)	
Khudiram (22.27'57"N 88.23'27"E)	Kavi Nazrul to Khudiram (1.19km)	Barbatala Area, Kolkata-84 (East side)	Individual Houses Barbatala Slums Relatively less number of apartments	22.27'30"N to 22.28'15"N & 88.22'45"E to 88.23'30"E
		Barlias (Garia), Kolkata-84 (West side)	Sristi Apartment Idol Plaza Remedy Medical Hospital	
New Garia/Kavi Subhas (22.28'19"N 88.23'52"E)	Khudiram to Kavi Subhas (1.59km)	Balia Area (New Garia) (North side)	Belmont Apartment National Institution of Hotel Management Nihar Kunj Apartment	22.27'45"N to 22.28'30"N & 88.23'30"E to 88.24'E
		Goragachi Area (New Garia) (South side)	Sarada Apartment Less Apartments and high concentration of slums	

Source: Primary Survey

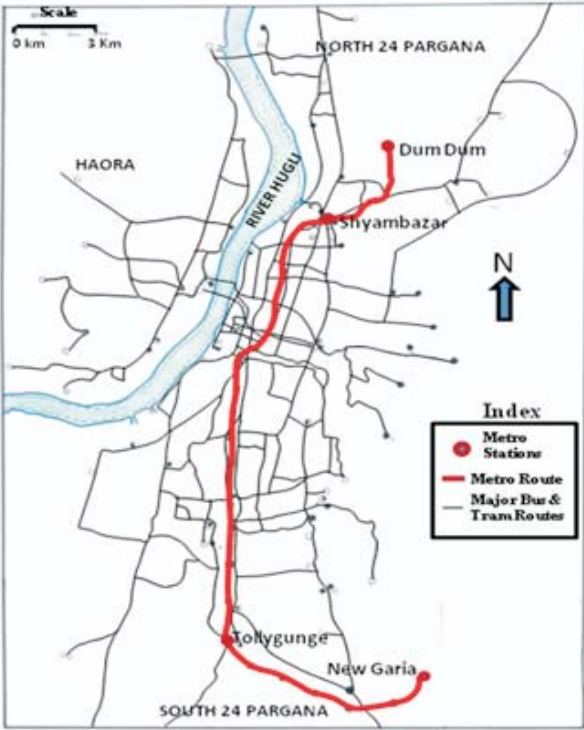


Fig. 1: Location of Study Area

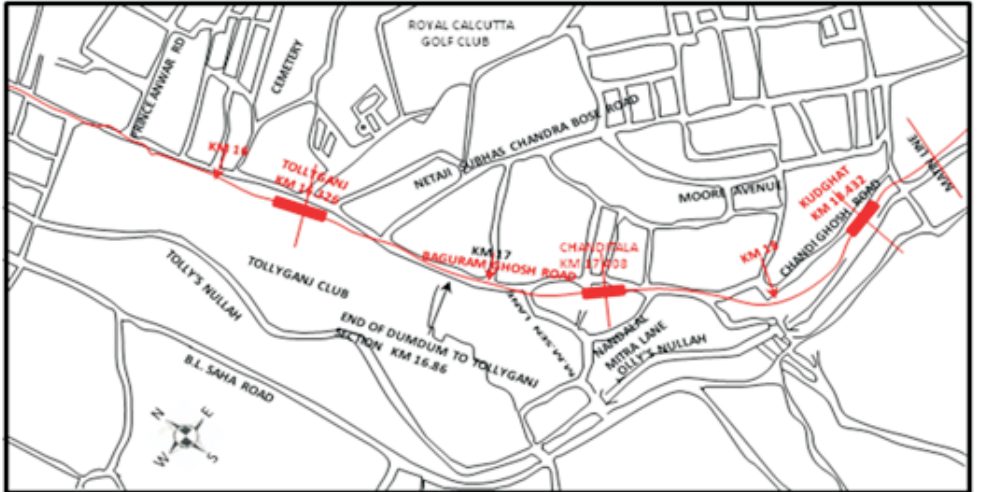


Fig. 2A: Index Plan of the Extended Part (Tollygunge - New Garia)

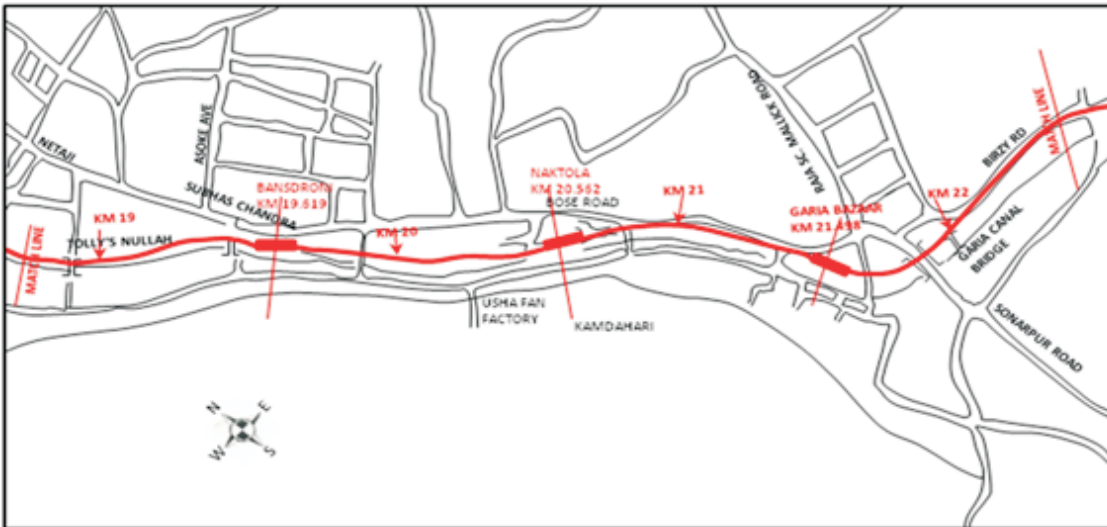


Fig. 2B: Index Plan of the Extended Part (Tollygunge - New Garia)

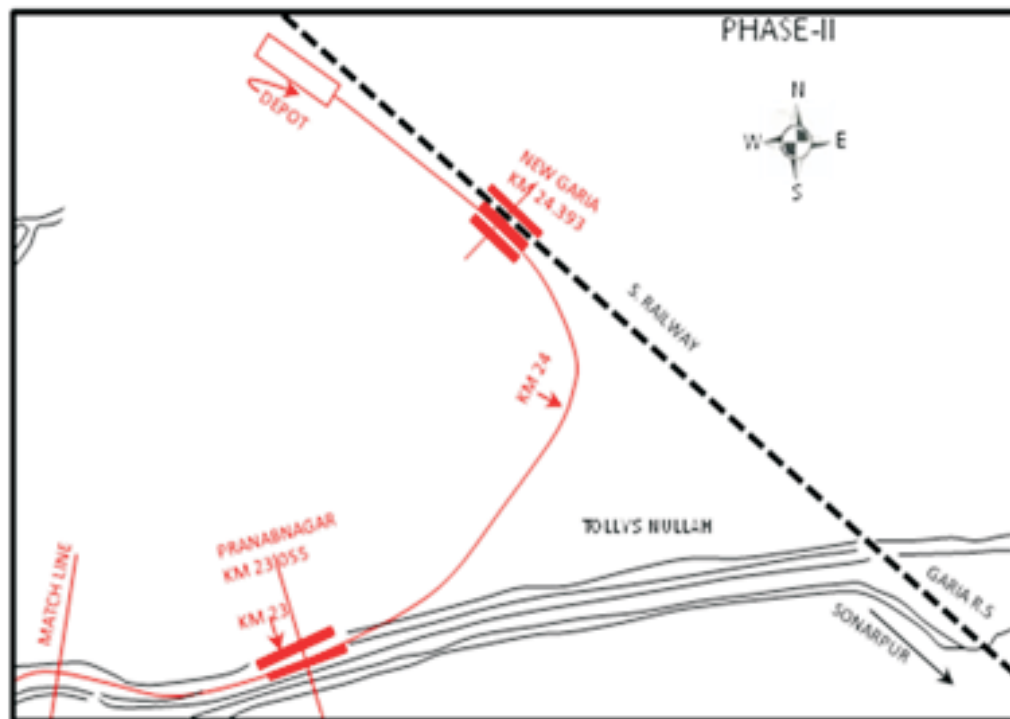


Fig. 2C: Index Plan of the Extended Part (Tollygunge - New Garia)



Fig. 3: Field Photographs of the Elevated Track over the Tolly's Nulla



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