

# Non-Motorised Transport:

## Potential and Challenges

### *A Case of Kolkata*

Dissertation 2013-14  
CEPT University

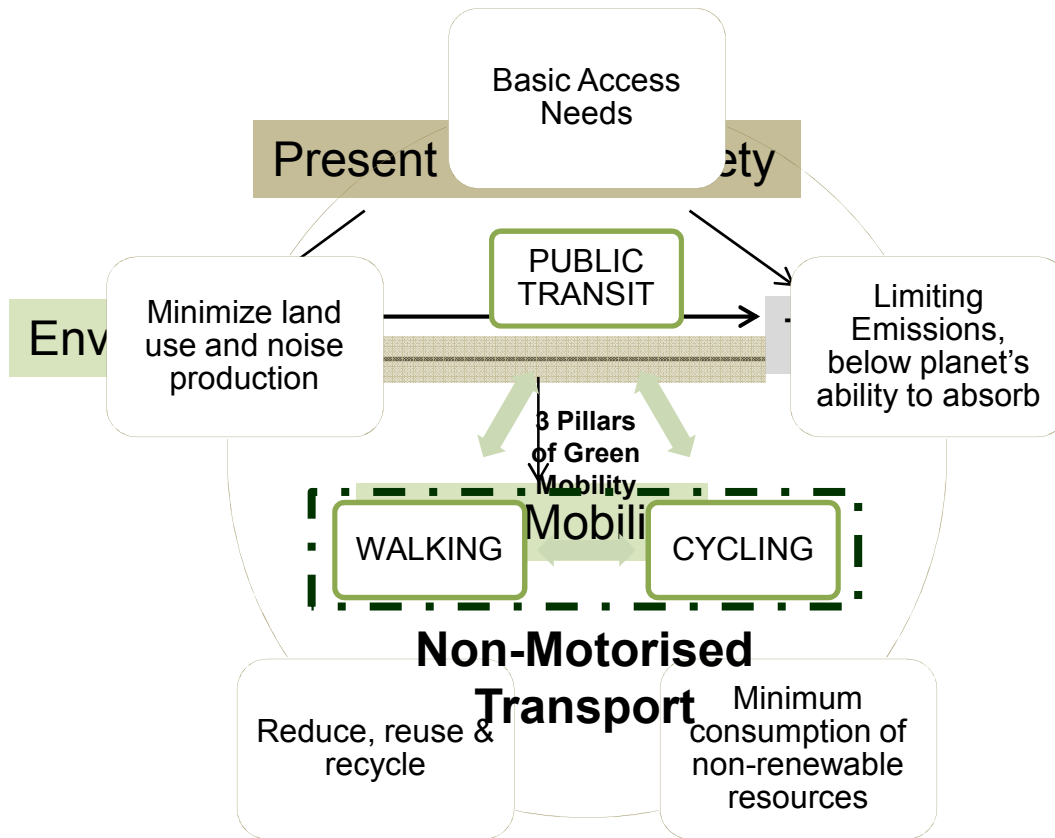
Presented By:

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Faculty of Planning  
CEPT University- Ahmedabad



Source: being a calcuttan/facebookpage

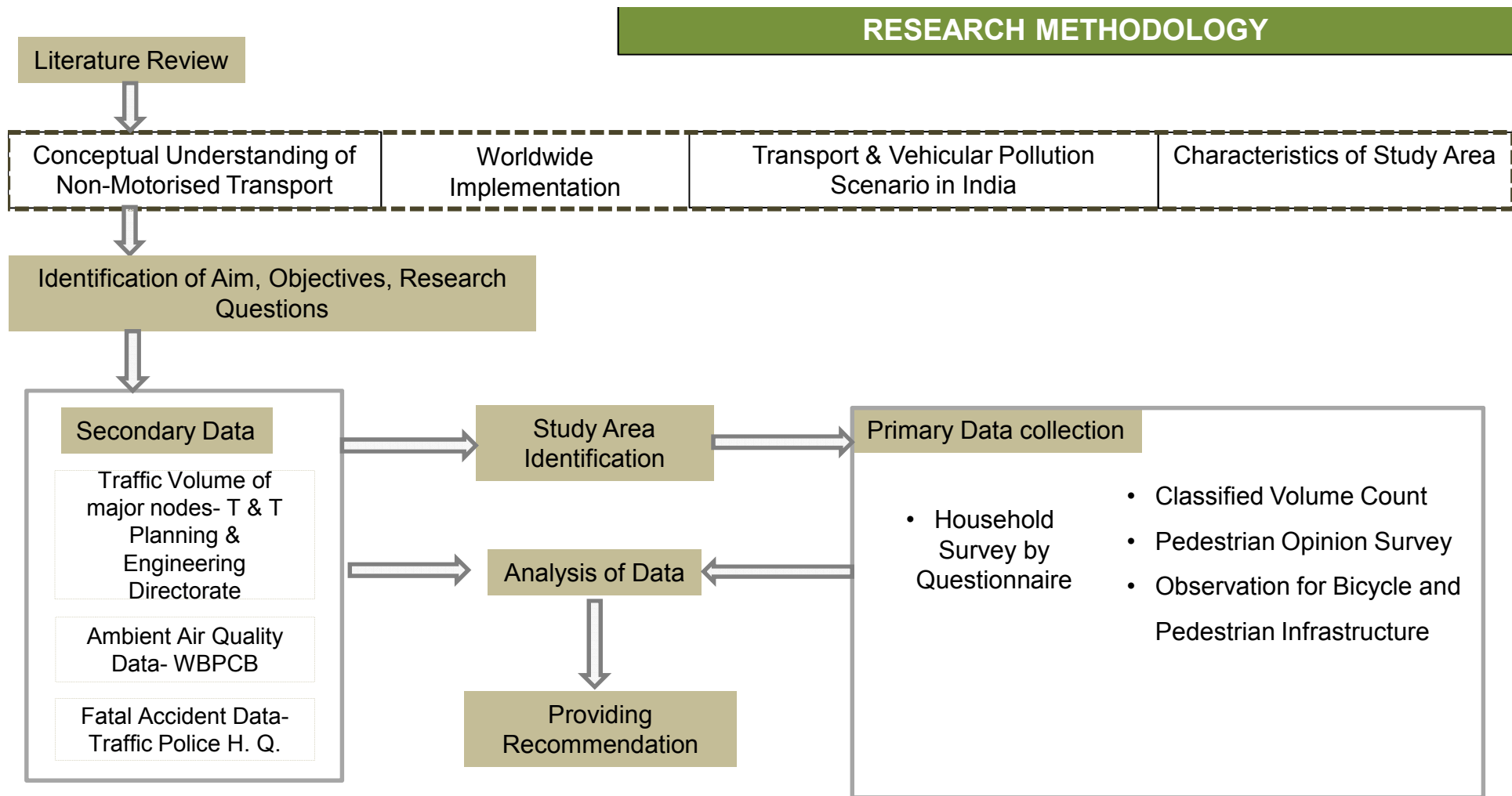
## INTRODUCTION



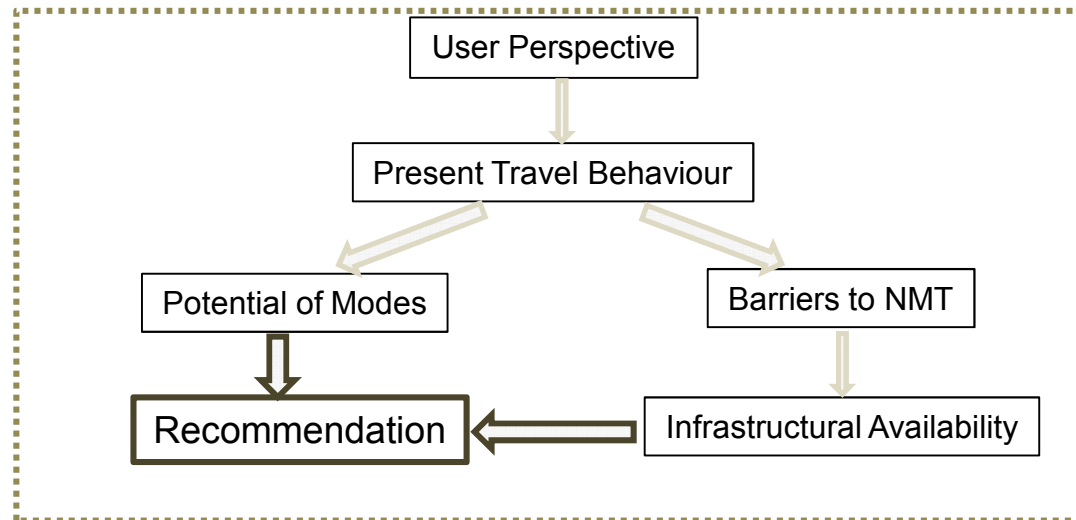
## AIM, OBJECTIVES

Aim: ***To explore NMT as an option along a certain stretch of Kolkata***

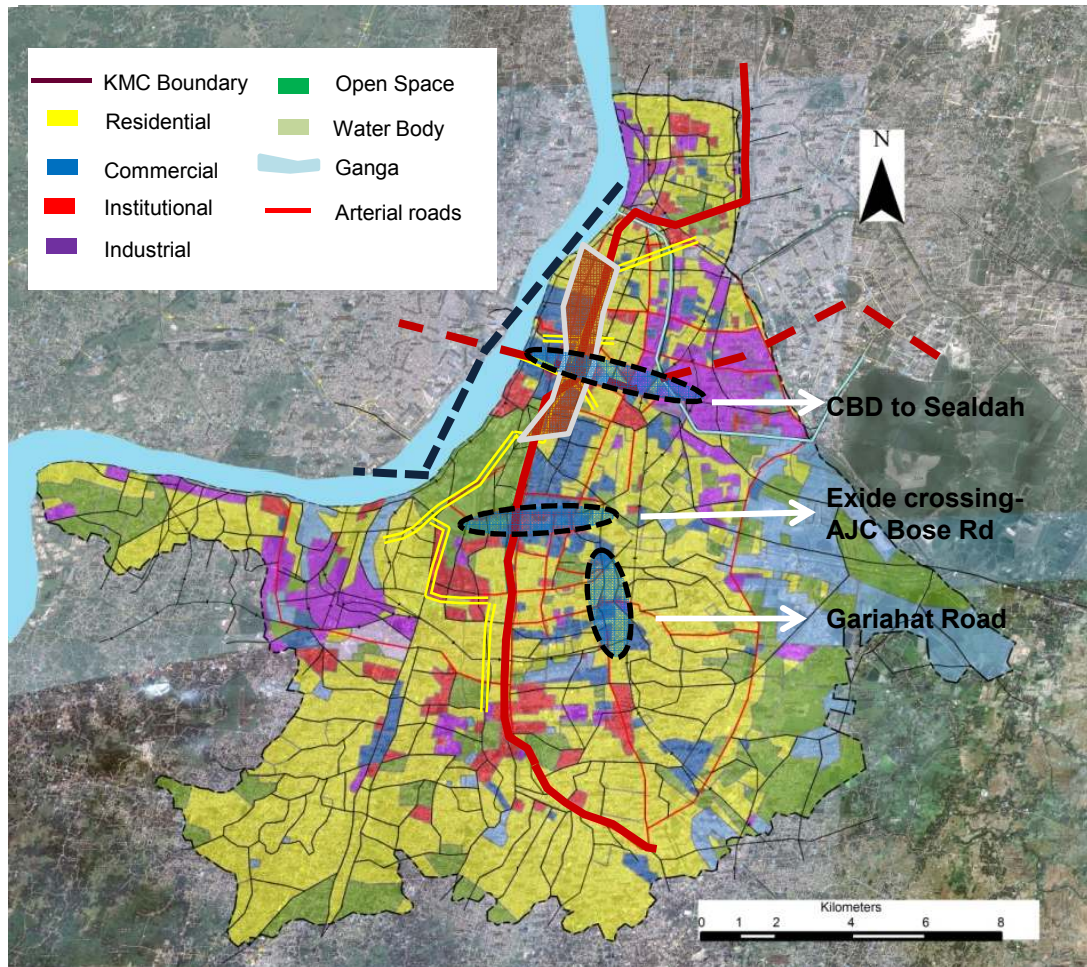
- Objectives:
1. To study the present transport scenario of the study area
  2. To analyze travel behaviour and future potential of NMT modes
  3. To understand the barriers of green mobility and assessing its gap



## ANALYSIS FRAMEWORK



## CITY AT A GLANCE



Source: Author 2014

### Major Modes of Transportation:

Public transit - Bus

Tram

Metro railway

Intermediate Public Transit

Taxi

Auto

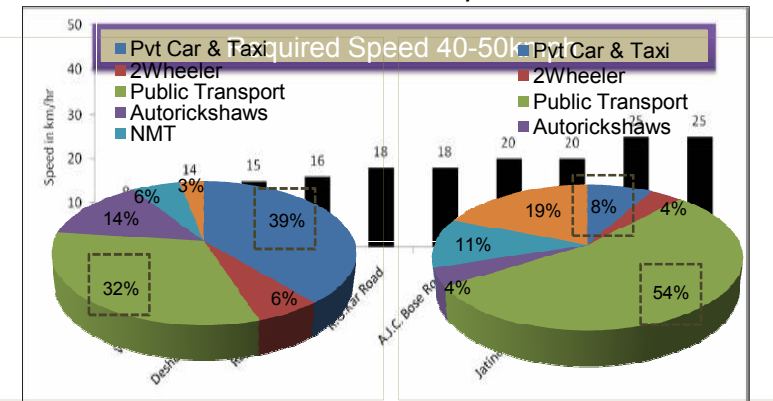
River Navigation

Shibpur- Babughat- Chandpal Ghat- Bagbazar

Pedestrian



*Contradiction between Traffic Composition  
Less Speed than Desirable Limit  
and Modal Split*



Seeking Solutions to Health, Air Pollution and Congestion in Our Cities, A. Roy Chowdhury, V Chattopadhyay, 2011

## SURVEY AREA SELECTION

Identifying the Nodes from Traffic Volume Data



### PARAMETRES

Air Pollution



Volume of Vehicle



Private Vehicle



Public Transit



Tram



Road Accidents



Footpath Availability

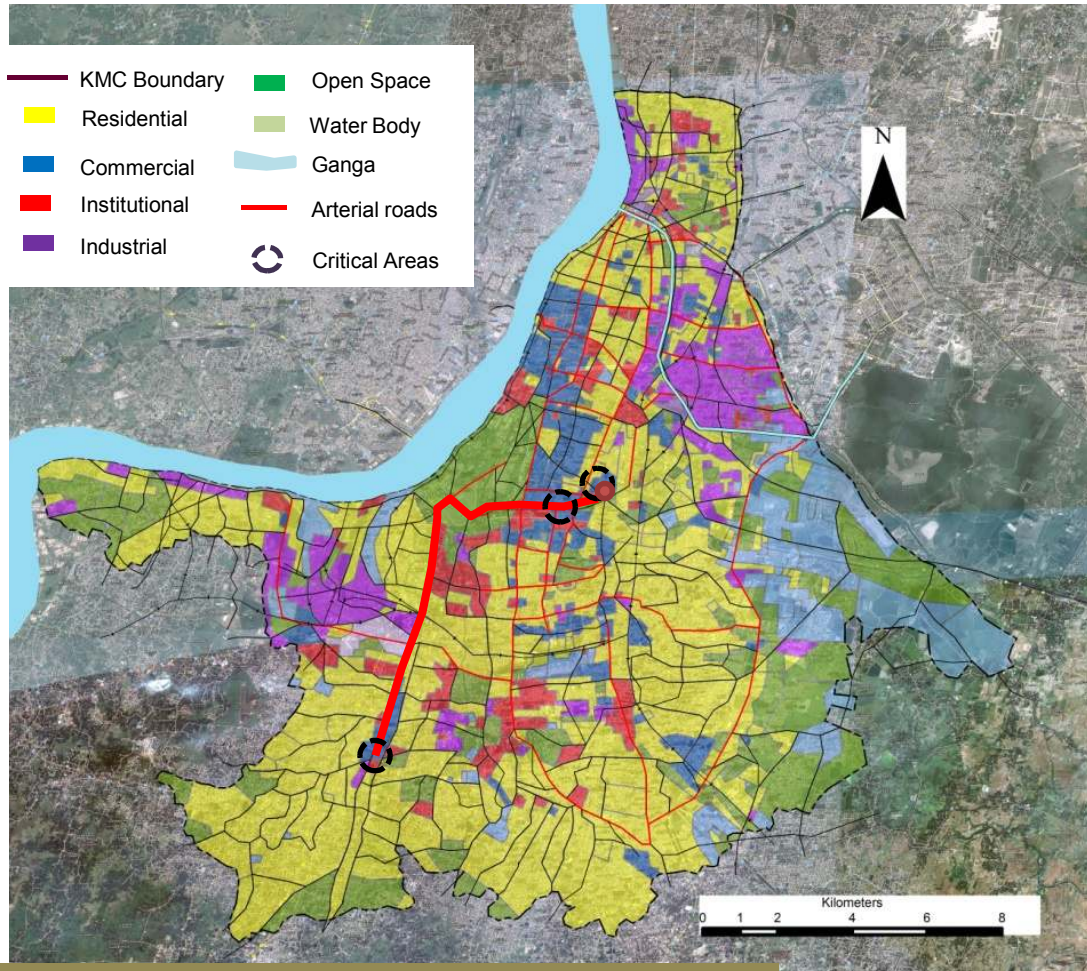


## SURVEY AREA SELECTION

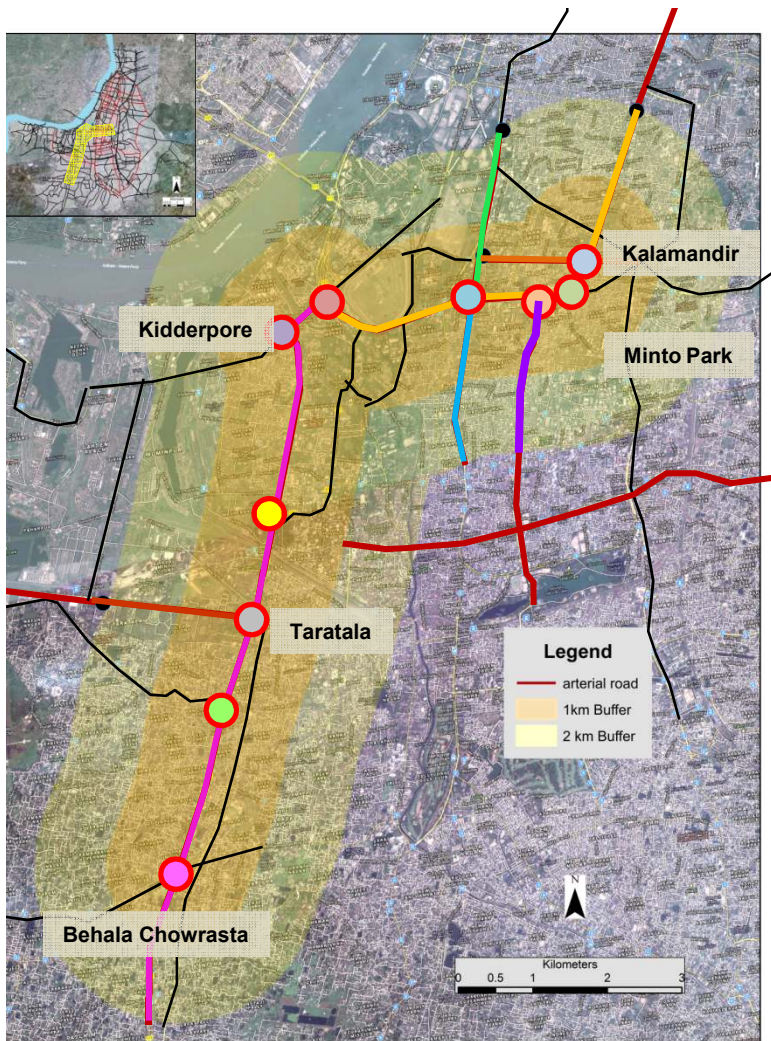
Intersection Name	Total Vehicle Count	Rank	% of Pvt Vehicle	Rank	% of Public Transit (Bus)	Rank	Tram	Footpath	Accident
DS Rd- Meghnad Saha crossing	49402	7	63.32	13	17.31	12	2	1	0
Raja SC Mallick Rd- Prince Anwar Sh	71207	19	57.26	11	14.29	15	3	2	0
S.P. A.T. Mukherjee-Hazra Road	64875	15	55.67	9	25.71	5	2	2	7
Rash Behari- S.P. Mukherjee crossing	78183	21	48.68	7	23.1	7	2	2	5
DS Rd- Tallygunje Circular crossing	61257	13	42.81	5	21.38	9	2	1	0
Raja S.C. Mallick- N.S.C.Bose Rd	18671	1	39.15	3	19.16	11	3	2	0
DS Rd- Prince Anwar Shah crossing	62268	14	37.32	1	27.49	4	2	1	0
Tolly Tram depot	46038	6	37.69	2	14.74	14	2	2	0
AJC Bose Rd -Beliaghata crossing	68040	18	46.85	6	34.31	3	3	2	9
Esplanade Crossing	60759	12	62.1	12	21.12	10	1	2	0
Moulali	66053	16	42.73	4	37.53	1	1	2	14
AJC Bose Rd- SNB Road crossing	34557	3	50.37	8	36.45	2	1	2	0
AJC Bose Rd- Park Street Crossing	55589	10	56.13	10	13.68	19	3	1	0
JLN Rd-Shakespeare Sarani crossing	55216	9	75.45	18	14.28	16	3	1	0
AJC Bose Rd-Shakespeare Sarani	41630	5	76.42	20	16.98	13	2	2	14
Exide Crossing	65637	16	66.92	15	21.5	8	3	2	14
Minto Park	59546	11	63.61	14	11.66	20	3	2	14
CR Avenue- Ganesh Chandra Avenue	54766	8	76.12	19	10.53	21	3	2	12
CR Avenue- MG Rd crossing	26821	2	69.35	17	24.42	6	1	2	8
CR Avenue- Vivekananda Rd crossing	38850	4	57.37	12	13.96	17	3	2	12
Diamon Harbour Rd-Hochi min Sarani	75429	20	68.2	16	13.69	18	3	2	12



## SURVEY AREA SELECTION



Major Nodes	Total Rank
Diamon Harbour Rd-Hochi min Sarani	86
Minto Park	76.5
AJC Bose Rd-Shakespeare Sarani	75.5
Exide	70.5
CR Avenue- Ganesh Chandra Avenue	68
CR Avenue- Vivekananda Rd	67
Raja SC Mallick Rd- Prince Anwar Sh	66
AJC Bose Rd- Park Street	62.5
JLN Rd-Shakespeare Sarani	59.5
Moulali	57.5
S.P. A.T. Mukherjee-Hazra Road	52.5
AJC Bose Rd -Beliaghata	51
Rash Behari- S.P. Mukherjee	51
DS Rd- Meghnad Saha	42
Esplanade	40
CR Avenue- MG Rd	39
DS Rd- Tallygunje Circular	37
AJC Bose Rd- SNB Road	35.5
Tolly Tram depot	33
DS Rd- Prince Anwar Shah	29
Raja S.C. Mallick- N.S.C.Bose Rd	21



Source: Author 2014, Primary Survey

## SURVEYED ROAD & MODAL CHARACTERISTICS

Out of Total 104.2 km of arterial roads of K.M.C. area,

A. J.C. Bose Road- 5.27 km

Diamond Harbor Road – 8.22 km

J. L. N. Road- 1.88 km

S.P. –A. T. Mukherjee Road- 1.82 km

Shakespeare Sarani- 1.82 km

Sarat Bose Road- 0.72 km

Taratala road- 1.64 km

=21.37 km

Major Nodes Along the Stretch

Kalamandir

Beckbagan

Minto Park

Exide

Hastings

Wategang

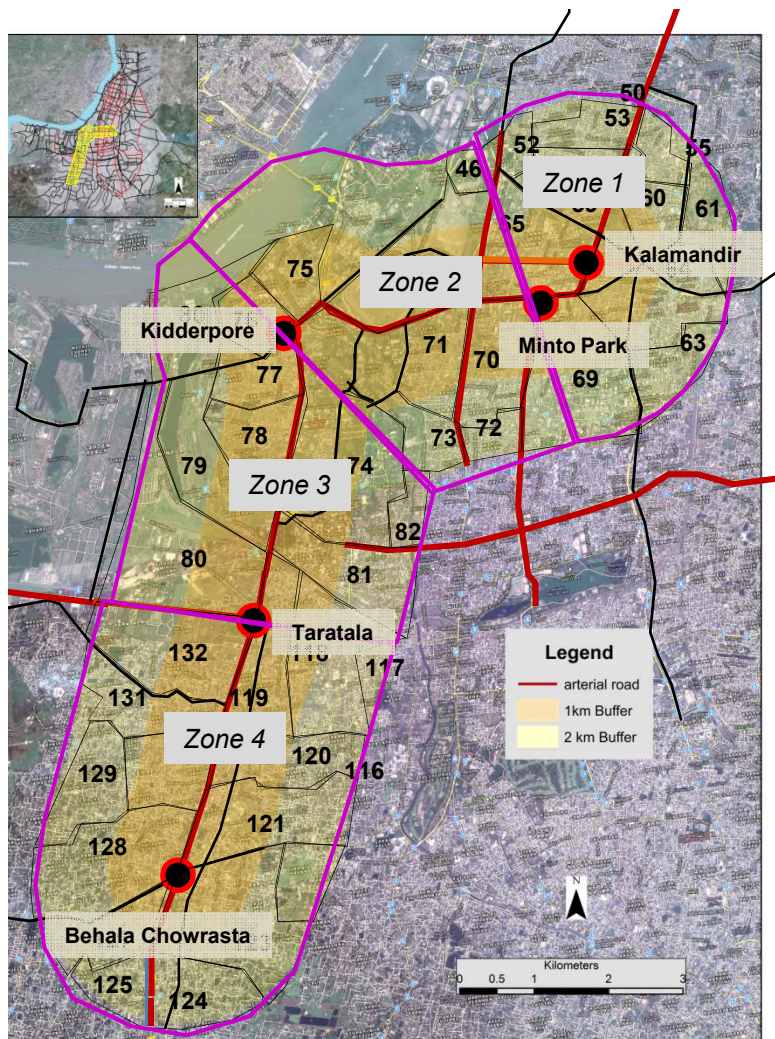
Mominpur

Taratala

Behala Bus Stop

Behala Chowrasta





Source: Author 2014, Primary Survey

## SAMPLING

Out of Total 104.2 km of arterial

- roads of K.M.C. area,

- For further analysis:

A. J.C. Bose Road- 5.27 km

Division into 4 zone across nodes

Diamond Harbor Road - 8.22 km

Zone 1: till Minto Park

J. L. N. Road- 1.88 km

Zone 2: Minto Park to Kidderpore

S.P. A. T. Mukherjee Road- 1.82 km

Zone 3: Kidderpore to Taratala

Shakespeare Sarani- 1.82 km

Zone 4: Taratala to southern boundary

Sarat Bose Road- 0.72 km

- For pedestrian Opinion Survey:

Taratala road- 1.64 km

Major Nodes Along the Stretch

Kalamandir

Beckbagan

Minto Park

Exide

Hastings

Wategang

Mominpur

Stretch	No. of Groups
=21.37 km	
Zone 1	1
Zone 2	2
Zone 3	3
Zone 4	3
Total Population within 2km buffer-1035226	

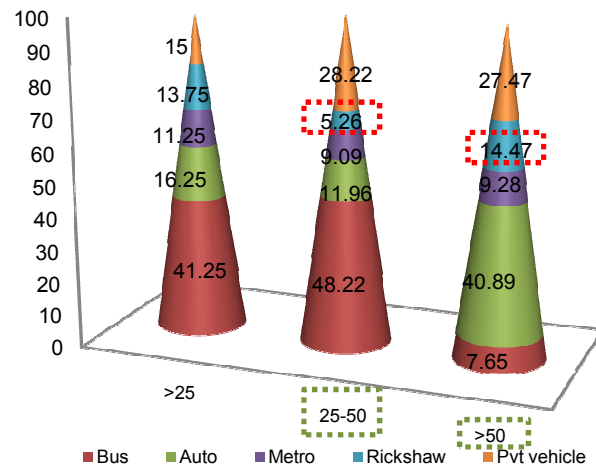
For Household Survey

384 samples needed to get 95% confidence in the sample

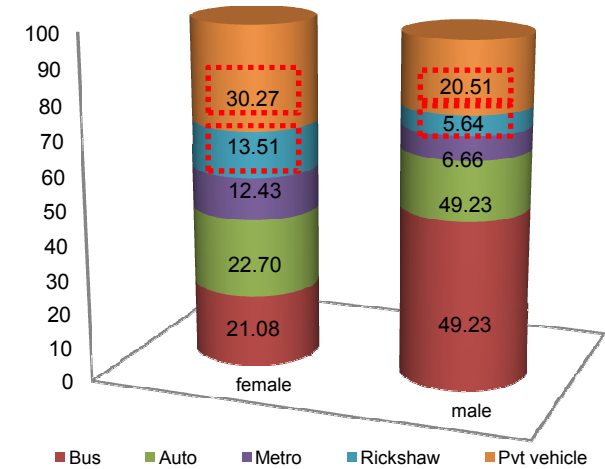
## ANALYSIS OF TRAVEL BEHAVIOUR

Parametres
Age
Sex
Income
Distance from Main Road
Trip Purpose
Trip Length

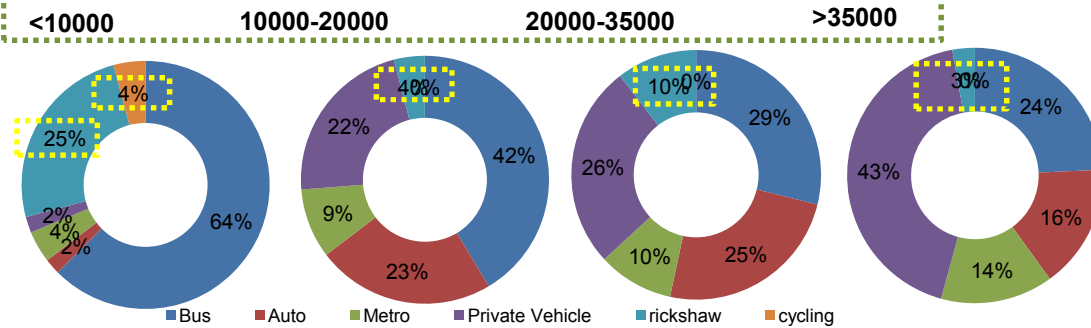
Age wise Modal Share



Sex wise Modal Share

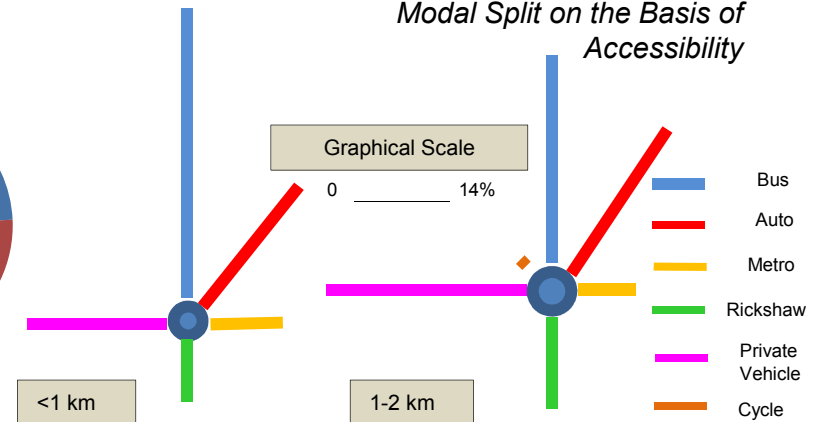


Income wise Modal Share



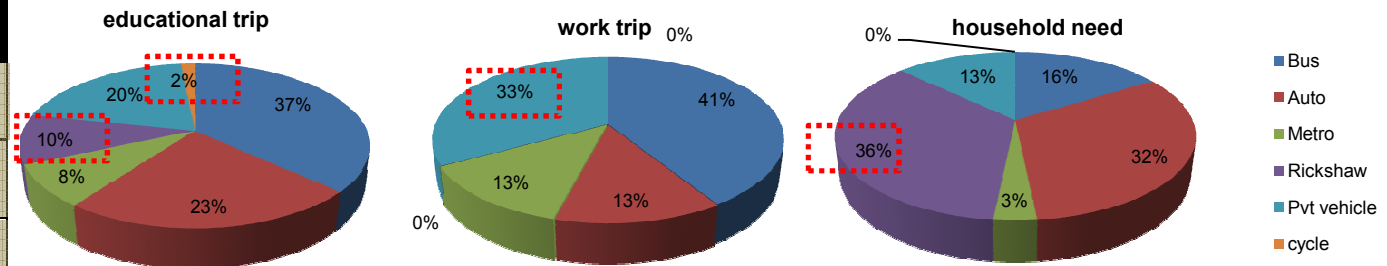
Source: Author 2014, Primary Survey

Modal Split on the Basis of Accessibility

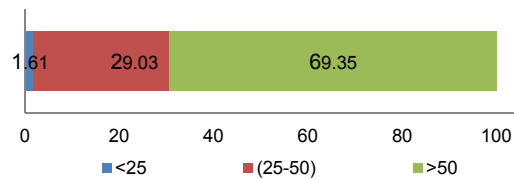


## ANALYSIS OF TRAVEL BEHAVIOUR

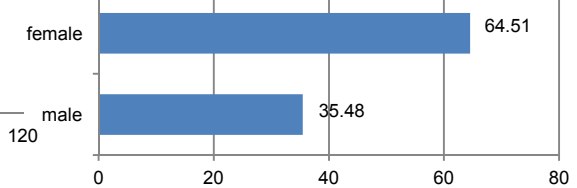
### Purpose wise Modal Choice



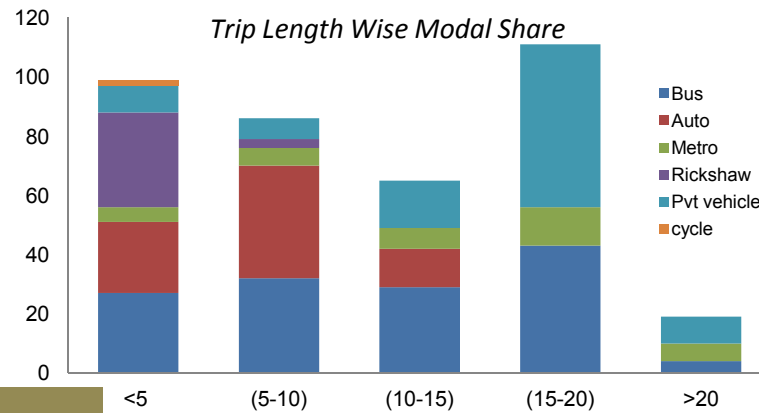
### Age wise Distribution of Household Trip



### Sex wise Distribution of Household Trip

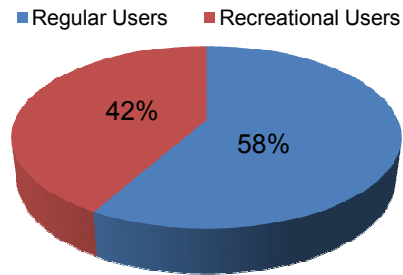


### Trip Length Wise Modal Share

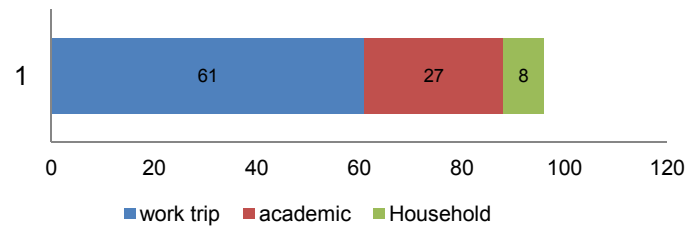


Source: Author 2014, Primary Survey

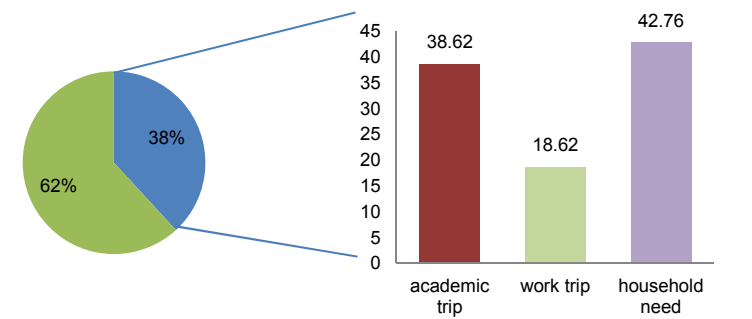
## ANALYSIS OF TRAVEL BEHAVIOUR



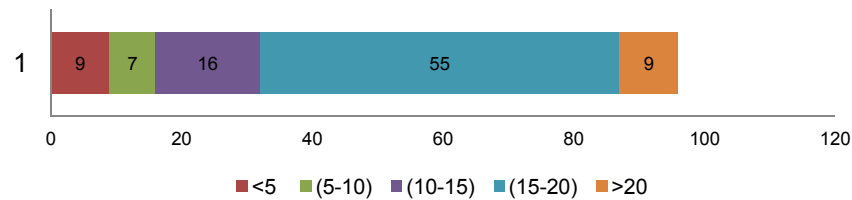
*Purpose wise Trip Distribution for Regular Private Vehicle Users*



*Cycle Owners*

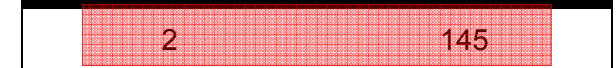


*Trip Length wise Trip Distribution for Regular Private Vehicle Users*

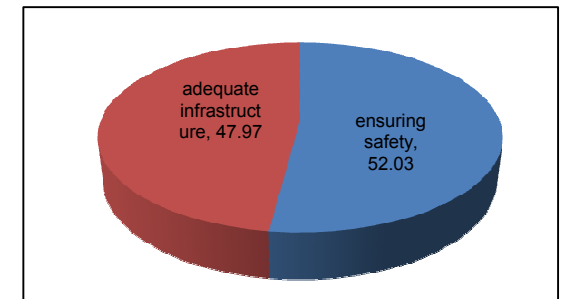


**Regular Use as Major Mode**

**Minor Trips**



*Reasons behind Rare Usage of Cycle*



## ANALYSIS OF TRAVEL BEHAVIOUR

*Correlation Matrix between Different Parametres and Modal Choice*

Modes	Parametres						
	distance from main road	age	sex	Income	trip length	work trip	household need trip
NMT	0.85	0.24	0.26	-0.03	-0.17	-0.99	0.32
private vehicle	0.22	0.84	0.78	0.63	0.52	0.01	0.03

positive		negative	
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*Potential For NMTs*

	Zone 1	Zone 2	Zone 3	Zone 4
<b>NMT</b>	65405.37	279883.4	287880	331934
<b>Walking</b>	785.124	408.1633	367.3469	1100

Source: As Computed from Primary Survey

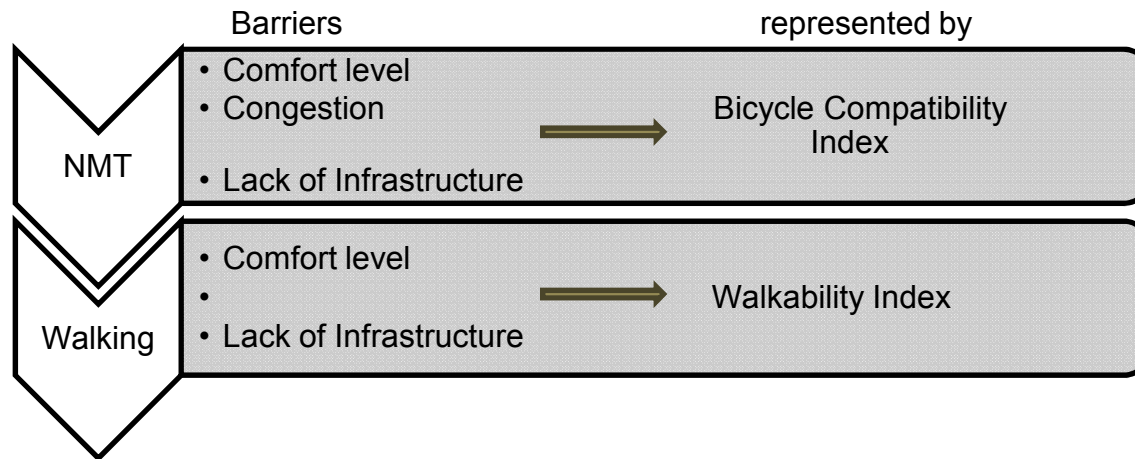


## BARRIERS TO NMT

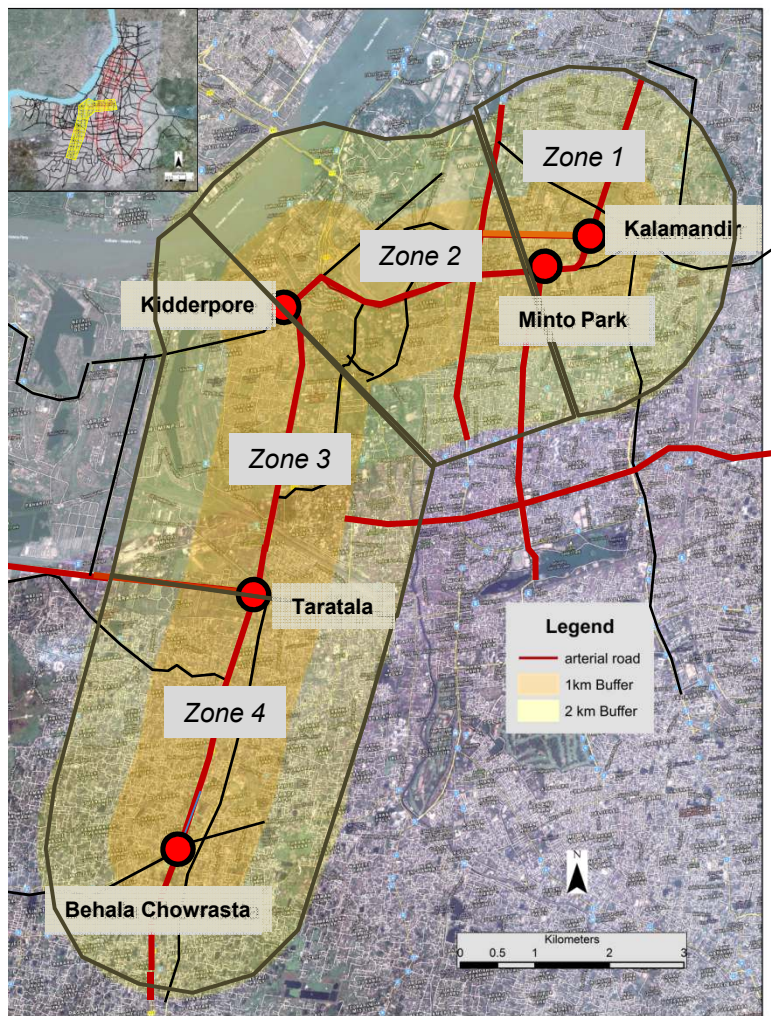
*Identifying Barriers to Green Mobility through Respondents' Rating*

	NMT				Walking			
Zones	1	2	3	4	1	2	3	4
Frequency*	2.37	3.55	2.3	3.68				
Safety (in terms of Accident)*	2.44	1.87	1.97	2.56	1.87	1.9	1.95	2.59
Lack of Comfort level*	2.22	1.5	1.8	2.21	1.78	1.52	1.92	2.33
Availability at Night*	2.29	1.92	3.12	2.72				
Congestion Creator*	2.24	1.45	2.1	2.25	1.88	1.9	2.27	2.39
Lack of Infrastructure*	2.08	3.35	1.2	2.14	1.83	1.67	1.8	2.01

Most critical 2<sup>nd</sup> Most critical  
1- worst, 5-best



Source: \* as evolved from Literature review, as computed from Primary Survey



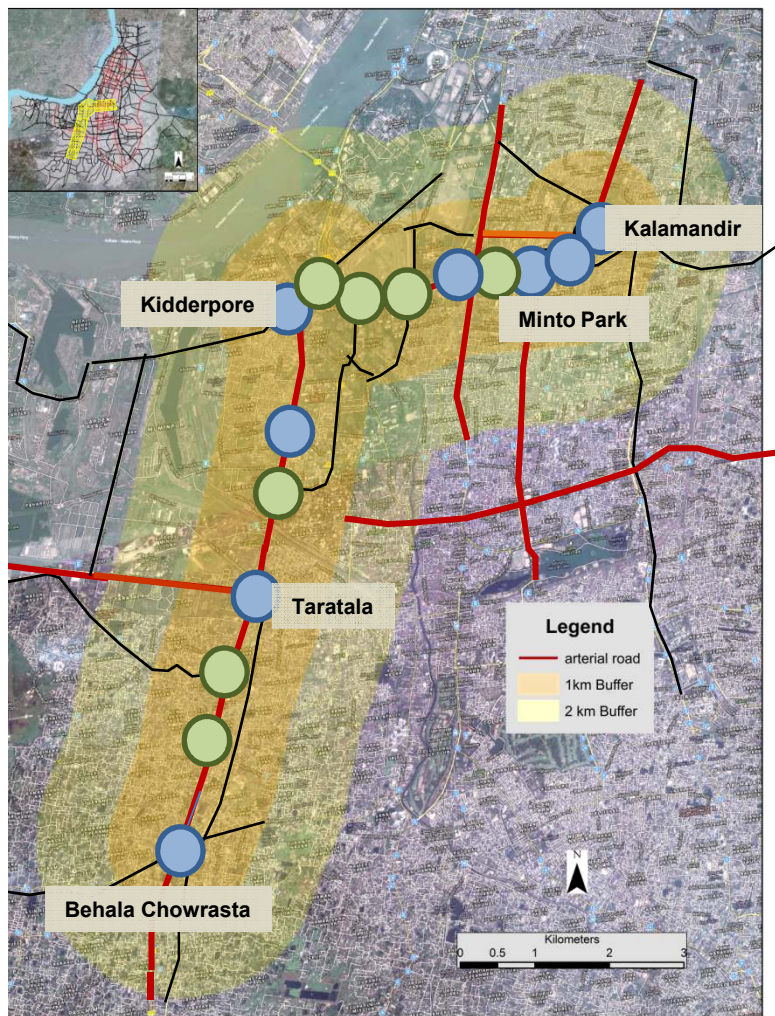
Source: Author 2014, Primary Survey, Computed from FHWA standard

## BARRIER TO CYCLING

*No bicycle track along the route- results in discomfort and congestion*

	Zone 1	Zone 2	Zone 3	Zone 4
presence of a bicycle lane	0	0	0	1
bicycle lane width	0	0	0	2
Curb lane width	5.5	5	6.5	5.5
Curb lane volume	1250	2416	1646	1912
Other Lane Volume	1250	1208	1646	1912
Speed	30	40	35	20
Presence of parking space	1	0	1	1
Occupancy of parking space	0	0	1	1
Type of Landuse	0	0	0	1
right turn vehicle	0	0	0	0
no of large trucks	0.1	0.1	0.2	0.2
parking time limit	0	0	0	0

Stretch	Zone 1	Zone 2	Zone 3	Zone 4
BCI value	4.69	5.54	5.85	4.61
BCI range	4.41-5.40	>5.40	>5.40	4.41-5.40
LoS	E	F	F	E



Source: Author 2014, Primary Survey, calculated as per MoUD SLB

## BARRIER TO WALKING

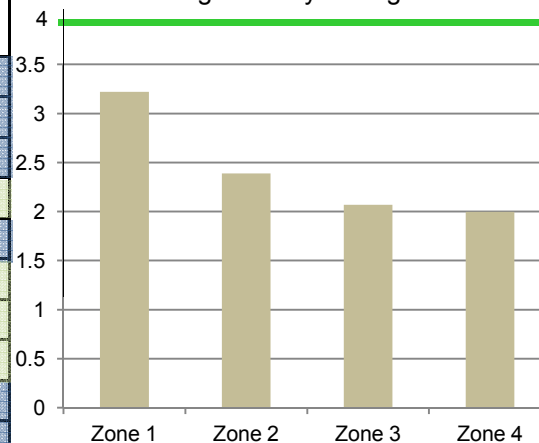
### LoS for Pedestrian Waiting Time

	Name of crossing	Arms	Avg Waiting Time (sec)
1	Kalamandir	4	70
2	Beckbagan	3	90
3	Minto Park	4	60
4	Camac Street	3	40
5	Exide crossing	4	70
6	PG crossing	4	30
7	PTS Crossing	3	30
8	Hestings	3	40
9	Kidderpore	3	50
10	Ekbalpur	3	60
11	Mominpur	4	40
12	Taratala	4	60
13	14 Bus Stand	4	30
14	Manton	3	30
15	Behala Chowrasta	4	50

% of intersections with >45 sec	SLB Rance	LoS
53.33333333	50-75	3

### Pedestrian facility Rating

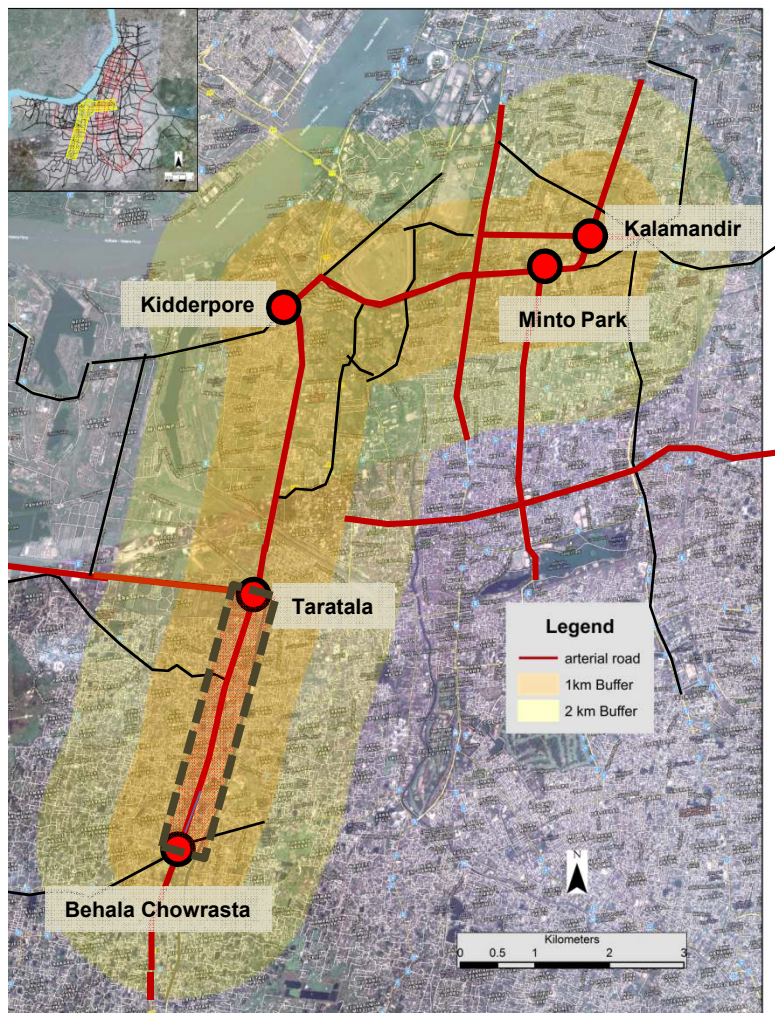
3.85 Average Facility Rating for Kolkata



### Walkability Index for Different Stretches

Zone 1	0.822
Zone 2	0.738
Zone 3	0.656
Zone 4	0.649







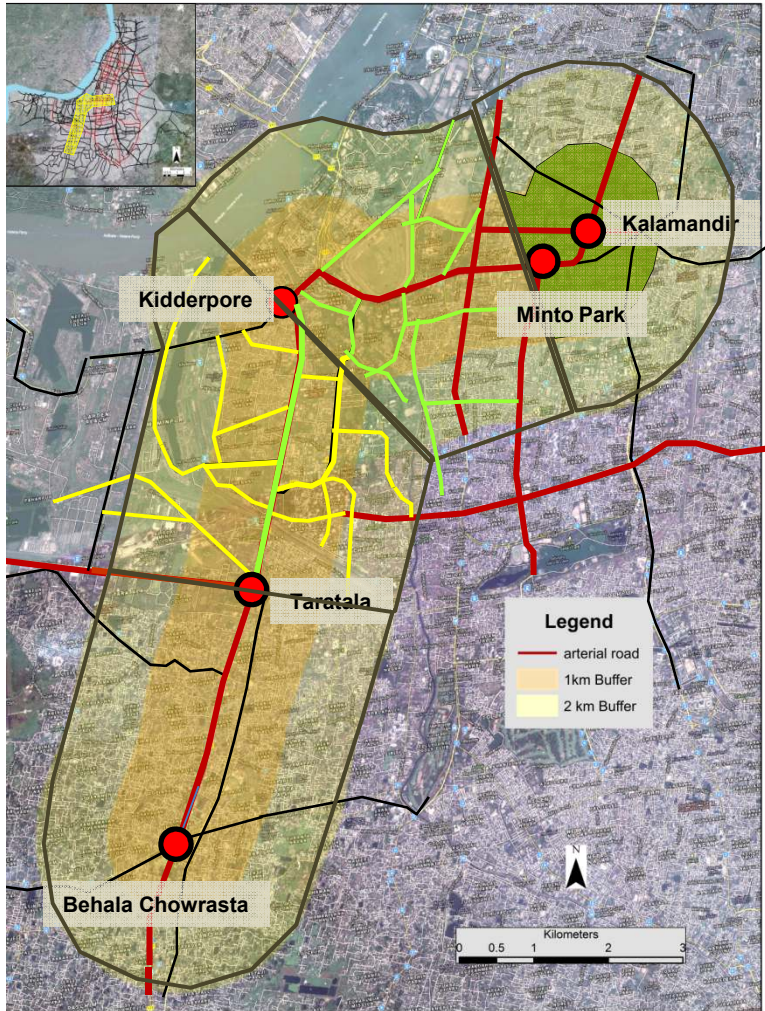
Source: Author 2014

## INFRASTRUCTURAL REQUIREMENT

Infrastructural Requirement:

Stretches		
	Walkability Index	Bicycle Compatibility Index
Kalamandir to Minto Park	8.22	7.53
Minto Park to Kidderpore	7.38	7.08
Kidderpore to Taratala	6.56	6.91
Taratala to Behala Chowrasta	6.49	7.57





Source: Author 2014, Primary Survey

## RECOMMENDATION

	Infrastructure	
B u s	<ul style="list-style-type: none"> <li>Separate bus lane</li> <li>Bus prioritized signal at peak hour</li> </ul>	
N M T	<ul style="list-style-type: none"> <li>Separate bicycle track</li> <li>Priority to cycles before taking right turn</li> <li>Bicycle parking at the bus stops to encourage its use</li> </ul>	
W a l k i n g	<ul style="list-style-type: none"> <li>Make footpaths physical and visual obstruction free</li> <li>Reduce median height</li> </ul>	

Thank you...