EXECUTIVE SUMMARY

(PASSENGER WATER TRANSPORT SYSTEM – NARIMAN POINT)

1 INTRODUCTION

Inland water transport is generally considered to be a cost-effective, relatively fuel-efficient, environmentally friendly and employment-generating mode of transport. A number of countries are now taking initiatives to make better use of existing capacity and invest in inland water transport. Several development projects aimed at enhancement of inland water transport infrastructure and operations are under way not only in European and other Western countries but also in Asian countries such as China, Myanmar, Bangladesh, and India.

Keeping in view the city's configuration which offers the possibility of water transport to augment the existing transport capacity; Government of Maharashtra (GoM) has been endeavoring to develop a passenger water transport system on the western coast of Mumbai. In continuation of its efforts, GoM appointed Maharashtra State Road Development Corporation (MSRDC) as the nodal agency to implement the Passenger Water Transport (PWT) project.

2 ABOUT PROJECT

Maharashtra State Road Development Corporation (MSRDC), Govt of Maharashtra proposes to establish "Passenger Water Transport System along West Coast of Mumbai" which will cover approximately 55 km from Borivali to Nariman point. The six passenger water transport (PWT) terminals are 1) Nariman Point 2) Bandra 3) Juhu 4) Versova 5) Marve and 6) Borivali (near existing jetty) situated along the west coast of Mumbai.

3 BACKGROUND

The GoM is keen to develop the Passenger Water Transport System on the west coast of Mumbai. For this purpose, GoM has appointed Maharashtra State Road Development Corporation (MSRDC) as a nodal agency to implement the Passenger Water Transport Project through a Government Resolution (GR) No. IWT 2098/ CR-31/ Part -3/PRT 1 Home Department in 2002.

The main objective of the project is to provide relief the existing congested transport system in Mumbai by providing an alternate mode of energy efficient and environment-friendly transport system. This will encourage water transport as a viable alternate mode of transport in Mumbai

Various studies have been conducted to ascertain the feasibility and the most economic route. The various studies undertaken till date are:

a. Techno-financial feasibility study of Passenger Water Transport System along west coast of Mumbai, by Mott MacDonald, Mumbai.
b. Mathematical Model Studies for examining Wave Tranquillity and Optimising Layouts for Passenger Water Transport Terminals in Mumbai, by Central Water and Power Research Station.

c. Demarcation of High Tide Line and Low Tide Line for Passenger Water Transport Terminal locations along West Coast of Mumbai, by Centre for Earth Science Studies.
d. Passenger Ferry Operator Study for Passenger Water Transport Terminal locations along West Coast of Mumbai, by Mott MacDonald.

4 NEED OF THE PROJECT

The island city of Mumbai is the financial capital of India. It is the largest commercial and industrial center of India. Mumbai is marked and highly developed with large office and business complexes, commercial centres.

The Northern part of Mumbai is fast developing in terms of housing schemes to accommodate the large population. The majority of commuters (80%) travelling to the south Mumbai use the Western Suburban rail which is most faster, cheaper and reliable. However the trains are overcrowded making at times difficult to travel Another popular mode of transport is the City Bus transport, namely BEST, which is also efficient. But time consuming. Car owners at present use the available S.V. road route and the Western Express Highway to travel between Borivali and Nariman Point to reach to the place of work. Both these roads have already reached the saturation level. There is no open space available for the expansion of these roads. The heavy congestion on these roads leads to indefinite delay in travel time. Therefore there is a need to find an alternative to the congested roads. Also there is no land available for[expansion.

It is observed that today's transportation methods have led to problems like congestion, air and noise pollutions. Thus there is a need to develop and adopt a new environmentally sustainable and responsive transportation system. In selecting this system consideration should be given to the mode that does not contribute to unnecessary increase in fuel consumption, exhaust emissions and congestions.

With the natural environment facilitating, the development of waterways would be an alternative in Mumbai to ease commuting and save on time and fuel consumption.

5 PROJECT LOCATION

The proposed project of "Passenger Water Transport along West Coast of Mumbai will cover approximately 55 km from Borivali to Nariman point.

Nariman Point

The proposed location at Nariman Point lies in Ward – A, as per the ward distribution of Mumbai, project site is located near N.C.P A. Building. Covering around 40,000 sq. mt. of area.

FIGURE 1: PROJECT LOCATION WITH NAVIGATIONA ROUTE

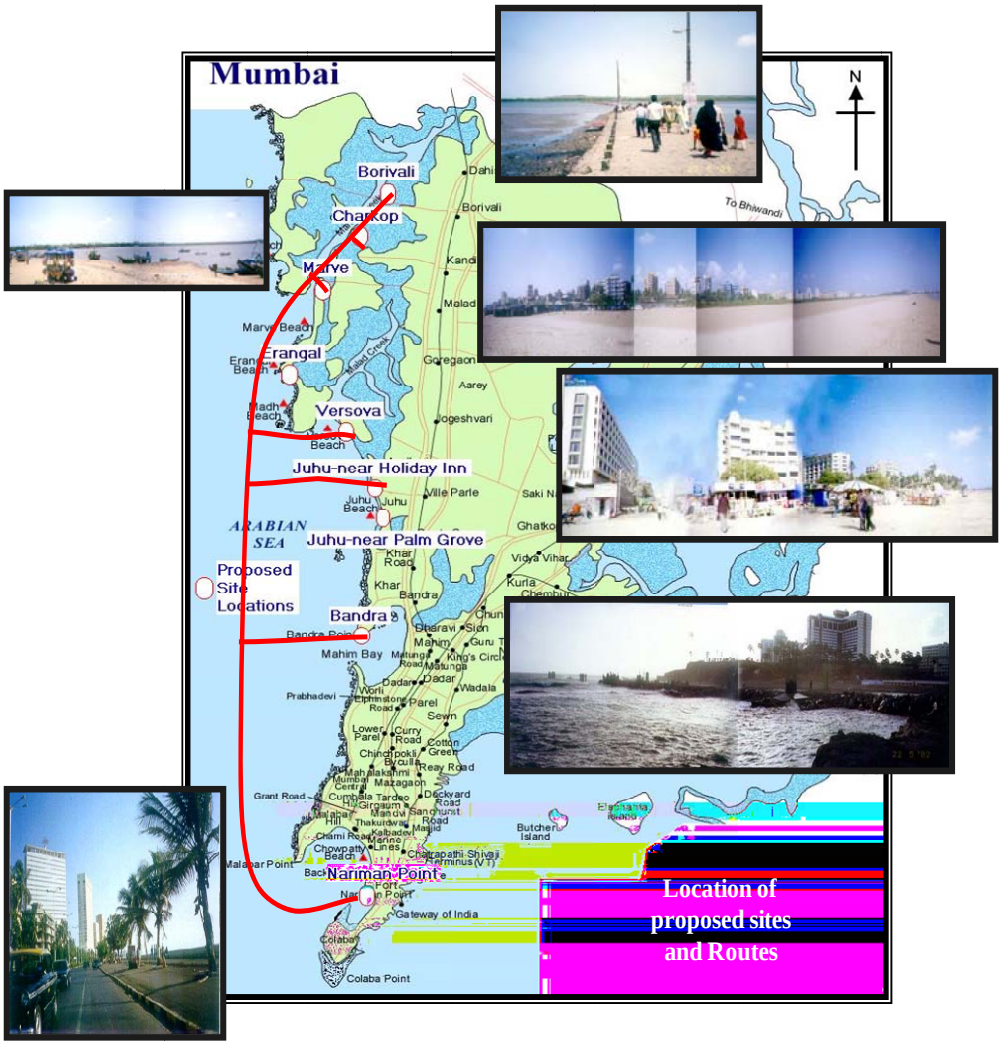

FIGURE 2 : GOOGLE IMAGE- NARIMAN POINT

6 DESCRIPTION OF THE PROJECT AT NARIMAN POINT SITE

The project envisages the development of both offshore and onshore facilities. The infrastructure development on shore facilities proposed is terminal building and access roads. The amenities proposed in the terminal building are ticket counters, arrival and departure lounge, office for ferry operators, security booths, traffic control room, restaurants, rest rooms, book stalls, telephone booths, ATMs and first aid facilities.

The plot area for Nariman point is 40,000 sq. m. with min. BUA of 4000 sq.m. The berthing facilities provided for this project 6 catamaran & 4 Hoverport. The terminal area is 100% on water. The area is upto 1, 60,000 cum need to dredged. The Breakwater 250m long on south and 300m long on north of back bay entrance.

At the Nariman point location during phase I 4 berths are provided & in phase II 2 berths are provided. For Master plan period (2055) total 10 no. of berths are provided.

7 BASELINE ENVIRONMENTAL STATUS

In order to assess the existing environmental sta[tus in the project area, primary and secondary data on various environmental attributes viz. air quality; noise levels, water quality, soil, ecology, land use etc. have been collected.

7.1 Study Locations

The study location is Nariman Point (Near State Bank of India). It is one of the busiest area in Mumbai with many government and corporate offices, business housed, some of the prestigious hotels and sky scrapers.

7.2 Air Quality

The baseline Ambient Air Quality data of the region has also been obtained. Air quality monitoring was carried out at Nariman point for the proposed project area in winter season. The SPM and RSPM values did not vary through the project as all the locations are prone to vehicular congestion. The PM2.5, PM 10, SOx, NOx and CO values are much below the permissible limits. The other parameters such as Lead, ozone, Ni, As, benzene & Benzo (a) pyrene are below permissible limit. The construction of the passenger water transport will reduce the vehicular congestion on the roads. Thereby the air quality will not be affected but will improve due to reduced vehicular movements.

TABLE NO. 1: AIR QUALITY MONITORING DATA

Parameters	Units	Nariman Point Location	Permissible limits
PM 2.5	$\mu g/m^3$	33.33	**60**
PM 10	$\mu g/m^3$	70.83	**100**
SO_2	$\mu g/m^3$	20.09	**80**

NO_2	$\mu g/m^3$	22.5	**80**
CO	mg/m^3	<0.4	**2**

7.3 Water Quality

The main drinking water source in the study area is provided through Brihanmumbai Mahanagar Palika (BMC) water supply system. The marine water quality along this coast is studied as these regions are characterized by the presence of residential population along the coast. The shores are common and famous places of tourist attraction in the city. The physico- chemical and biological characteristics of the sea water along the route have been studies. The development of the water transport system will not have any adverse effect on the quality of the coastal sea water as the proper pollution control measures will be adopted to maintain water quality.

TABLE 2: WATER QUALITY ANALYSIS DATA

Parameters	**Units**	**Location Nariman Point**
Physical Parameters		
Turbidity	NTU	24.2
Chemical Parameters		
pH	--	7.91
Total Dissolved Solids	mg/lit	30844
Dissolved Oxygen	mg/lit as O2	4.8
Salinity	% o	24.96
Sulphates	mg/lit as SO4	1755
Phosphates	mg/lit as PO4	1.84
Nitrates	mg/lit as NO3	0.22
C.O.D.	mg/lit as O2	169
B.O.D. (27 ^oC, 3 days)	mg/lit as O2	50
Nitrite	mg/lit as NO2	0.012

7.4 Noise Quality

Noise quality analyzed in the study area; it was observed that the noise levels were near the CPCB limits. This is due to the increase in the vehicular traffic along the route. Proposed project of west coast passenger water transport system during operation phase will provide better option to the travelers. It will reduce the time for travelling & also provide safe &

affordable mode of transport. This will definitely help to reduce the current noise level through diversion of traffic along the west coast PWT.

It is envisage that there will be a slight increase in existing baseline noise level during construction period. But by adopting proper measures and care it can be mitigated to acceptable levels.

PERMISSIBLE NOISE LEVEL (CPCB STANDARDS)

Area code	Category of Area	Permissible Limit	
		L_{eq} Day time	L_{eq} Night time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

TABLE 3: OBSERVED NOISE QUALITY IN THE STUDY AREA

Time	Nariman Point
Leq Day time (Day time = 6.00 a.m. to 10.00 p.m.)	68.40
Leq Night time (Night time = 10.00 p.m. to 6.00 a.m.)	57.60

7.5 Ecology and Bio-Diversity

The project area does not have great terrestrial ecological factor present in the vicinity. The biodiversity in the project area is almost common type.

Marine Ecology

The construction of the water transport system traverses through the sea. The organisms in the marine ecosystem are unique and play an important role in the energy production and transfer. The standing crop biomass and productivity of the water body can be determined by studying the bacterial count, phytoplankton and zooplankton.

1) Phytoplankton

The productivity in the sea is carried out by the microscopic phytoplankton present in the water column. They are the autotrophs responsible for all the production of organic food available in the sea. The phytoplankton density recorded at Nariman point is 3.6×10^3/lit. The terrestrial run off bring in nutrients that are favorable for the growth. Waters at Nariman point show the presence of off shore species like *Thalassiothrix spp* indicating a well mixed and balanced diversity in the region.

2) **Zooplankton**

The phytoplankton production in turn is responsible for growth of zooplankton. Zooplankton are microscopic free floating animal component of the plankton community. The zooplankton species observed were *Calanus spp*. *Eucalanus spp* and medusa.

3) Benthos

The intertidal zone is dynamic zone at the interface between sea and terrestrial environment. The life in the zone is influenced by the physical factors like waves, temperature and light and by anthropogenic disturbances.

The study area has a mixed intertidal zone. The substratum is rocky at Nariman point. The organisms in the intertidal area were dominated by molluscans belonging to gastropoda and pelecypoda (Bivalvia) family. The population density was 22/m^2

8 COMPONENTS OF THE PROJECT

8.1 Water Supply

Water Requirement: The water requirement during construction phase will be 100 m^3/day for construction purpose and 10 m^3/day for domestic purpose. The domestic waste water generated during construction phase shall be treated in septic tank system.

During Operation Phase 10 m^3/day water will be required for the proposed development for domestic purpose. The sewage generated will be treated in an onsite Compact sewage treatment plant (STP) of 10 m^3/day.

The water supply for domestic purpose will be from the local municipal supply. Tanker water will also be made available as and where required.

8.2 Electric Supply

The source of power supply at Nariman Point shall be through BEST.

8.3 Fire Fighting Equipment

The following have been considered to provide fire fighting system at all the five proposed terminals.

- Hydrant system
- Sprinkler system
- Pump room (Main pump and Booster pump)
- Portable Extinguisher

8.4 Drainage & Sewerage

An adequate drainage system and drainage plan as per the slope has been sketched out for the terminals. The drainage pipeline shall be fitted with oil & grease traps so as to remove any oily material from the run-off water.

8.5 Solid Waste

The construction waste generated during construction phase will be reused for leveling of the site at terminals. Approximately 20 kg/day of Municipal solid waste will be generated during operation phase which will be segregated onsite and handed to local municipal authority.

8.6 Manpower Requirement

During the construction phase about 50 construction laborers shall be required on each location. During the operational phase about 75 persons would be employed. These would include crew on the craft as well as people working in the ticket counter, cafeteria, and others.

9 MITIGATION MEASURE PLAN

In the proposed project area the studies has been carried out for analysis of air, noise, water & waste generation during construction phase& operation phase. Based on that some mitigation measures are suggested to avoid any impact on surrounding environment of the project.

9.1 Air Quality

- New and properly maintained construction equipments shall be utilized
- Regular maintenance of machineries and equipments shall be carried out
- Asphalt and hot-mix plants will not be at site
- Fugitive dust entrainment will be controlled by sprinkling water
- Proper green belt area will be developed for trapping fugitive emissions
- Transportation vehicles will be covered to avoid dust emission
- Trucks carrying soil, sand or stone will be covered with traps to avoid spilling and blowing by wind from site of construction

9.2 Noise

- All construction equipment will be duly lubricated and maintained in good working condition.
- Stationery construction equipments will be placed away from habitation
- Personal Protective Equipments (PPE) for workers. Workers exposed to high noise level should user ear plugs.
- Regulation of timings of construction work generating noise pollution near the nursing home and residential areas
- Scheduling of project activities will be adopted
- Noise barriers in terms of thick vegetation cover wherever required will be used for attenuation of noise.
- Signboards will be put so as to avoid unusual use of horns and also for avoiding idling noise.
- Continuous Noise monitoring will be carried out during operational phase to collect comparative data.

9.3 Solid Waste

- The construction debris generated will be disposed off immediately on same day without storing at site.
- This will avoid chellate formation or spreading it in the nearby area.
- It will be disposed off in MCGM approved sites in and around city.
- Prior approval of these sites will be obtained.

Any developmental project would have its own impacts on various parameters. These impacts, besides moderate on environment during construction phase, may also have sustainable positive impacts. The said project certainly has maximum positive impacts on

socio-economy as well as environmental factors. The social impact will include additional employment, ancillary industry where as reduction or conservation in fuel will boost up the economy.
This project will also enhance environmental measures in the area and there will be increase in aesthetic look of the project area.

10. ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) is also prepared to take care of and to counter environmental impacts. Implementation of EMP will long way to maintain good and healthy environment.
Accordingly, all the anticipated activity was thoroughly studied and the environmental impacts were identified. All the relevant base line data was collected, the existing environmental status was assessed and evaluated. In the light of this information and the prediction, the environmental: -management plan is prepared.

11. DISASTER MANAGEMENT PLAN

Disaster Management Plan (DMP), safety measures and action plan have also been prepared. it is also included to make ground preparation for natural calamity, which is most unlikely event in the present surrounding of the site. . DMP for fire fighting safety measures for incidences of accident in sea are in place.

12 ENVIRONMENT MANAGEMENT COST

TABLE 5: BUDGET FOR ENVIRONMENT MANAGEMENT COST

SR. No	Items	Cost (INR) During Construction	Cost (INR) During Operation
1	Air Environment	7.5 Lacs	5 Lacs
2	Water Environment	5 Lacs	4 Lacs
3	Noise Environment	3.5 Lacs	2 Lacs
4	Green Belt	14 Lacs	5 Lacs
TOTAL EMP COST		**30 Crores**	**16 Lacs**

In addition to this EMP cost there will be addition of capital cost of Rs. 40 Crores which includes safety equipments, Fire fighting systems, Patrolling van etc.

13 COST OF THE PROJECT

The estimated cost of the total project is **Rs 252.07 Crores.**