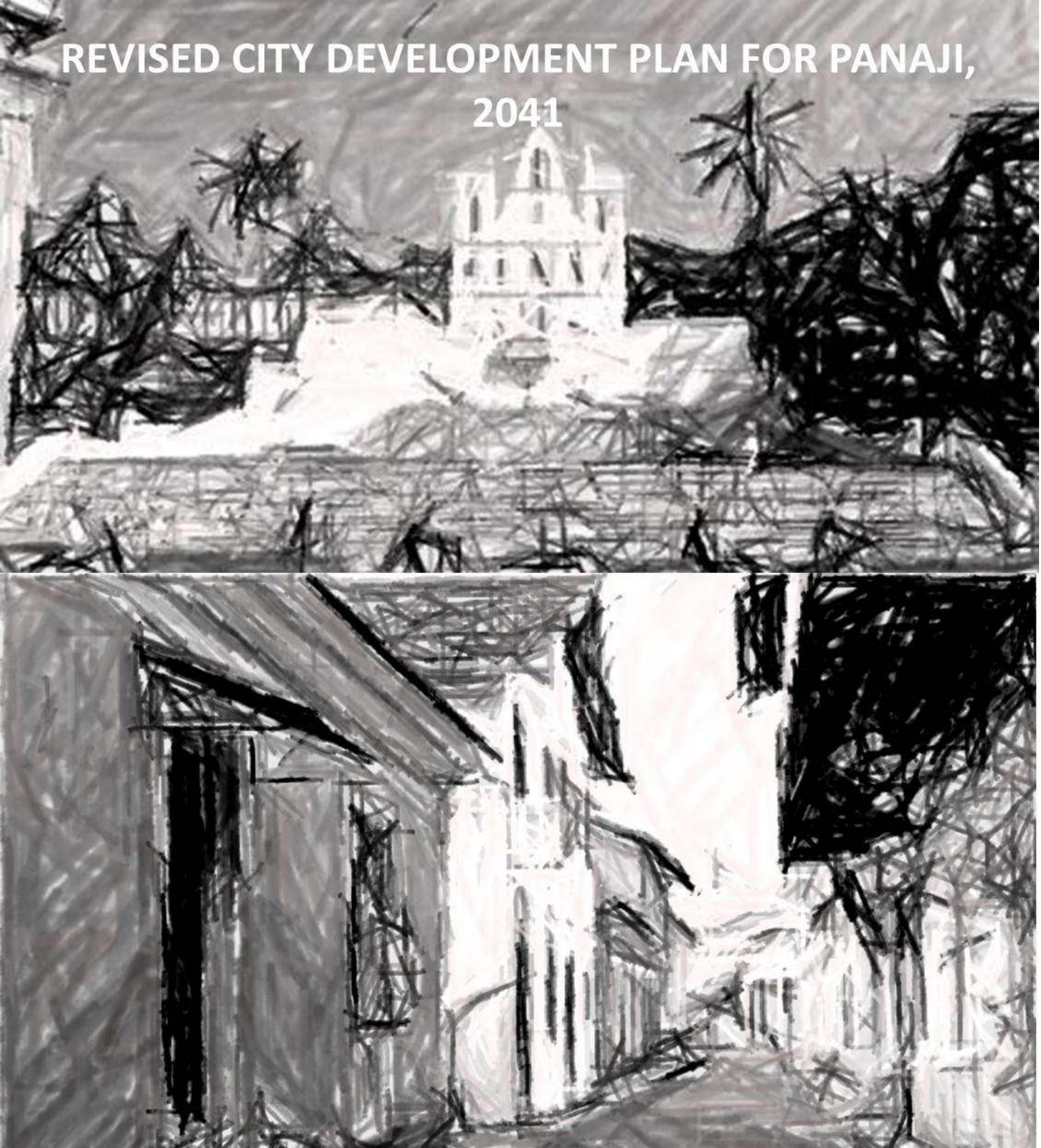
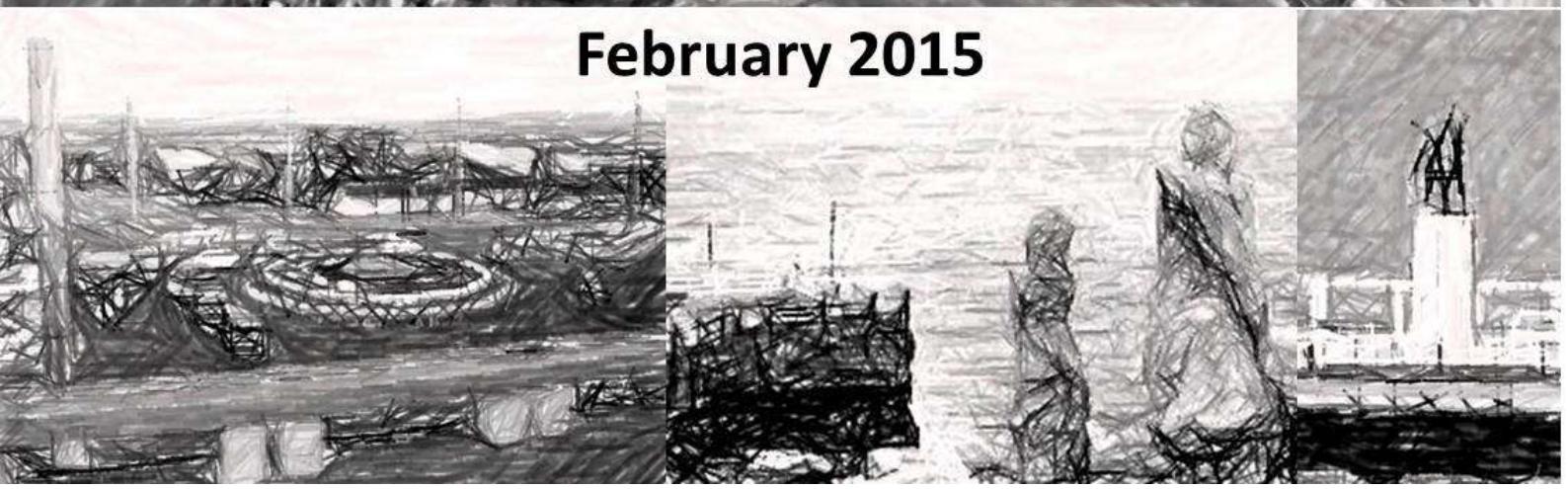


REVISED CITY DEVELOPMENT PLAN FOR PANAJI, 2041



February 2015





Revised City Development Plan for Panaji, 2041

February 2015

Supported under

**Capacity Building for Urban Development project
(CBUD)**

*A Joint Partnership Program between
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and

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CORPORATION
OF THE CITY OF
PANAJI

[CRISIL Risk and Infrastructure Solutions Limited](#)

Ministry of Urban
Development,
Government of India

Capacity Building for Urban
Development
City Development Plan for
Panaji - 2041

Final Report

February 2015

Abbreviations

ARV	Annual Rental Value
BSUP	Basic Services for Urban Poor
BT	Bituminous
BPL	Below Poverty Line
BOD	Biochemical Oxygen Demand
BOT	Build Operate and Transfer
CPWD	Central Public Works Department
CBUD	Capacity Building Urban Development
CPHEEO	Central Public Health and Environmental Engineering Organisation
CDP	City Development Plan
CIP	City Investment Plan
CCP	Corporation of the City of Panaji
CC	Cement Concrete
CI	Cast Iron
CAA	Constitutional Amendment Act
CAGR	Compound Annual Growth Rate
CMP	Comprehensive Mobility Plan
CPHEEO	Central Public Health Engineering and Environment Organization
CRIS	CRISIL Risk and Infrastructure Solutions
CSP	City Sanitation Plan
CIP	Capital Investment Plan
CCP	Corporation for the City of Panaji
CCF	Charles Correa Foundation
DI	Ductile Iron
DPC	District Planning Committee
DEAS	Double Entry Accounting System
DCB	Demand Collection and Balance Statement
DMP	Disaster Management Plan
DPR	Detailed Project Report
DCR	Debt Coverage Ratio
ESR	Elevated Service Reservoir
EWS	Economically Weaker Section
FOP	Financial Operating Plan
GLR	Ground Level Reservoir
GOI	Government of India
GDP	Gross Domestic Product

GR A/C	General Revenue Account
GIS	Geographical Information System
GSPCB	Goa State Pollution Control Board
HOD	Head of Department
IHSDP	Integrated Housing and Slum Development Programme
IEC	Information & Education campaign
IDA	International Development Association
JNNURM	Jawaharlal Nehru National Urban Reforms Renewal Mission
KTC	Kadamba Transport Corporation
LPCD	Litres Per Capita per Day
LED	Light Emitting Diode
MOUD	Ministry of Urban Development
MOHUPA	Ministry of Housing and Urban Poverty Alleviation
MPC	Metropolitan Planning Committee
MLD	Million litres per day
MSL	Mean Sea Level
NGO	Non Profit Government Organisation
NRW	Non Revenue Water
NUPAM	National Urban Poverty Alleviation Mission
ODP	Outline Development Plan
OHT	Over Head Tank
PMU	Project Monitoring Unit
PPP	Public Private Partnership
PHC	Public Health Centre
PHED	Public Health Engineering Department
PIU	Project Implementation Unit
PWD	Public Works Department
RAY	Rajiv Awaas Yojana
RSPM	Respiratory Suspended Particulate Matter
RTO	Regional Transport Office
RFP	Request for Proposal
RFQ	Request for Qualification
SLB	Service Level Benchmarking
SFC	State Finance Commission
SPM	Suspended Particulate Matter
SBR	Sequencing Batch Reactor
SCADA	Supervisory Control and Data Acquisition
SLB	Service Level Benchmark

STP	Sewage Treatment Plant
SWM	Solid Waste Management
SWOT	Strength Weakness Opportunity and Threat Analysis
SWD	Storm water drains
SLC	State Level Committee
TPD	Tons per Day
TCPO	Town and Country Planning Organisation
TDS	Total Dissolved Solids
TERI	The Energy and Research Institute
ULB	Urban Local Body
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
UFW	Unaccounted for Water
URDPFI	Urban and Regional Development Plans Formulation & Implementation
UGD	Under Ground Drainage
WBM	Water Bound Macadam
WTP	Water Treatment Plant
WPR	Workforce Participation Rate

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1. EXECUTIVE SUMMARY

The Corporation of Panaji City (CCP) had prepared a City Development Plan (CDP) in 2007 for an area of 8.12 km² with a population of about 59,066. The revision of CDP for the Panaji city has been prepared in keeping with the objectives of the CBUD project to address the major constraints of urban development and specifically focus on the capacity building requirements for successful urban management and poverty reduction across the selected ULBs in India.

Panaji is Municipal Corporation which is located in Tiswadi taluk of North Goa district. It is the state capital of Goa and district head quarter of North Goa district. It was annexed by India with the rest of Goa and the former Portuguese territories in the invasion of 1961 and became a state-capital on Goa's elevation to statehood in 1987 and has been the administrative center from the time of Portuguese rule. It is presently the state capital of Goa and the only urban centre in the state with the status of Municipal Corporation. Panaji is the third largest city of the state after Margao and Vasco. In the recent years the city has emerged as a major tourist destination in the state due to its tourism resources, good connectivity and availability of good tourist infrastructure facilities. The growing importance of the city as tourist destination has increased the tourism based economic activities by many folds over the years. This has been supported by various trade and commerce establishments, hotels and restaurants, tours and travels and tourism based art and artefacts. The city is also a major trading center for agricultural products and other commodities coming from the neighboring smaller towns and rural areas. The city also serves as the medical and education hub for urban and rural areas within the district as well as state.

Panaji population accounts to 2% of the total state's urban population and 16% of the North Goa district urban population. The city population growth has been fluctuating over the past five decades mostly due to the changes in the area under jurisdiction of CCP. The total population of Panaji is 40,017 as per Census 2011 which shows decline of population from Census 2001 population of 59,066. This is due to exclusion of Taleigao and Durgawado, which were part of Panaji Municipal Council in Census 2001 are made outgrowths in Census 2011. In 2002 when Panaji gained the status of Municipal Corporation by incorporation of the Corporation of City of Panaji Act 2002, these areas were excluded from the jurisdiction of Panaji resulting in to reduction of population. The city receives considerable amount of tourist population throughout the year. As per the tourist statistics for 2011, Tiswadi taluka received 1,13,6861 tourists which comprised of 6,90,926 domestic tourists and 4,45,935 foreign tourists. Given the fact that Panaji is one of the prime tourist destinations in the taluk, it can be assumed that the city receives maximum amount of Taluka level tourist's arrivals throughout the year.

The city area has been changing over the years in last five decades as a major commercial and tourist hub apart from being the administrative capital. Panaji is one of the prime tourist attractions in the state having good geographical setting, administrative centre, availability of good tourist infrastructure and its good accessibility to other tourist destinations. The city's economy thrives on various economic activities supporting tourism sector. As per the data from Department of Tourism for 2011 the city of Panaji received 6.90 lakh domestic tourists and 4.45 foreign tourists. The tourist arrival in the city has increased by 10% from 2008-2011 which is quite phenomenal. Hence, tourism will remain the backbone of the state as well as the city's economy in the coming future.

Panaji is also a major commercial and administrative centre having large portion of city under administrative and commercial activities. As per 2011 Census, about 98% of the city population are engaged in tertiary sector with work participation rate (WPR) of 42.56%. The commercial areas and markets are concentrated mostly in the Northern part of the city. The core city area of Panaji has

evolved into the commercial area due to the tourism potential and related commercial activities. Apart from this new commercial area have been developed in the out growth areas of the city at EDC Patto which is emerging as administrative hub with majority of government offices and departments located in this area.

The city of Panaji does not possess any industrial establishments; yet there are number of industries at a range of 15 km from the city. The Corlim Industrial estate is one of the important industrial estates located near Panaji which has about 58 industrial units that enhances the economic prospects of the city. The city is ecologically sensitive zone and not favourable for heavy and medium industries. Handicraft and cottage industries supporting tourism is prevalent in the city.

Given this scenario, there is need to develop physical and social infrastructure of the city, taking into account the conservation of heritage, improvement of tourist infrastructure and preservation of the environmental features. In light of this through participatory development of CDP for Panaji the vision has been formulated as "**To develop the city as a clean, environment friendly and ecologically sustainable with focus on improvement of the city urban infrastructure facilities, tourist infrastructure, conservation of the natural elements and heritage structures by adoption of eco-friendly alternatives and techniques**"

The sectors such as water supply, sewerage and sanitation, solid waste management, storm water drainage, traffic and transportation, urban poverty and slum improvement, local economic development, urban environment, social infrastructure, and heritage management are covered under the development goals to realize the vision. The development goals have been framed on the basis of priority areas, to achieve the Vision for the city and to meet the desired sector specific service level benchmarks and indicators. Thus the sector specific development goals have been substantiated with detailed action plan.

The project identification has been carried out on the basis of demand-gap analysis. Further, the sector strategies and action plans have been finalized based on discussions with relevant stakeholders. The goals and service outcomes are envisaged to be implemented by 2021 as an immediate priority. The projects identified involve rehabilitation of existing infrastructure systems and augmentation of the capacity to meet the demands of future population.

i) Water Supply

The city has 100% coverage w.r.t the existing roads with present supply of 198 lpcd. In case of water supply the key problem areas for Panaji are system losses due to old and damaged distribution pipeline network and uneven water supply distribution across the city. The present Non revenue water losses accounts to 35%. Lack of proper water supply zoning is resulting in poor monitoring of the water supplied and the high losses incurred. As per our assessment the city requires additional 12.25 MLD of water by the end of 2041 to meet the demand of 2041 and further city requires the additional distribution network of 31.43 Kms. Further, to provide continuous water supply, the city would require a storage capacity of 7.98 MLD. Majority of these components are being taken up under the DPR prepared for improvement works of water supply system for Panaji and its surrounding areas by PHED under JnNURM funding. Hence the investment has been identified taking into account the projects proposed in DPR to include additional components for 2041.

ii) Sewerage and Sanitation

The key issues in case of sewerage and sanitation are lack of 100% coverage of underground drainage (UGD) system and poor condition of the existing sewerage network. It is observed that the present sewerage coverage in the city is adequate and has 100% coverage w.r.t the existing road length. Only 31.3% of the households out of the total households having access to water supply have sewerage connections. At present only 8.0 MLD (67%) of sewerage is being collected and treated in

the existing STP of 12.5 MLD. Hence, the present treatment facilities are adequate. The major natural drains in the city are infused with the waste water and the waste by the residents affecting the flow as well as the discharge of polluted water into the River. There are presently 29 numbers of public conveniences with a total capacity of 171 seats located in various parts of the city. However, with the increasing tourist influx in the city every year there is a need to provide adequate number of public toilets at major tourist destinations within the city as well as in the core city area. As per the gap analysis, the city requires an additional sewerage network of 31.43 km and 8.73 MLD additional capacity of sewerage treatment plan by the end of 2041. Majority of these components are being taken up under the DPR prepared for improvement works of sewerage system for Panaji and its surrounding areas by PHED under JnNURM funding. Hence the investment has been identified taking into account the projects proposed in DPR to include additional components for 2041.

iii) Solid Waste Management

The present solid waste coverage in the city is adequate and has 100% coverage w.r.t the household coverage, collection efficiency and extent of segregation. However, the O & M of SWM has been a major issue for the CCP with only 17.20% of collection efficiency from SWM taxes and (- 49%) of cost recovery for private operators. The CCP has 22% of waste recovered from biodegradable and non biodegradable waste at present. The CCP lacks adequate SWM infrastructure like composting units, proper land fill site, SWM vehicles etc. for efficient execution of SWM system in the city. As per the gap analysis, the city will generate additional SWM of 111.0 MT by 2041 and would require a SWM recycling and composting land of 24 acres by 2041. The fleet capacity for transportation of the waste to the treatment plant by 2041 will need additional 55.0 MT by 2041. Majority of these components are being taken up under the DPR for Solid Waste Management for Panaji by CCP under JnNURM funding. Hence the investment has been identified taking into account the projects proposed in DPR to include additional components for 2041.

iv) Storm Water drainage

At present there is 100% coverage of SWD w.r.t the existing road network within the CCP area. The city SWD network was laid during Portuguese period and still functional. However, there is a persistent problem of flooding during monsoon due to high water levels in River Mandovi and shortcomings of the present SWD system to mitigate such incidences. The present state of outfall drains is bad with dumping of SWM and lacks proper maintenance. The city needs a proper storm water drainage management plan which should be based on in depth study of the existing SWD system, its carrying capacity, its surface condition and need for replacement and improvement. The roadside drains should be aligned as per the topography and integrated to the network of major outfall drains forming a proper drainage system within the city. As per the gap analysis, the city requires additional 78.22 km of SWD by the end of 2021 and 90.76 km by 2041. The action plan includes development of storm water drainage rehabilitation plan; rehabilitation of nallahs and up gradation of roadside storm water drains. The DPR for Rehabilitation of the St. Inez drain is under preparation by CCP which has been considered and additional components are proposed for 2041.

v) Traffic and transportation

The city has 100% coverage of Bitumen Tar (BT) surface roads. However, the total road coverage in the city is only 3.6% of the total city area. The increasing number of private two wheelers and four wheelers in the city over the years has elevated the traffic congestion and parking issues. The public transport system has not been effective to serve the mobility pattern of city hence still less preferred. There is highly inadequate parking area in the city which is not regularized and presently not charged. All the major roads have on-street parking, which reduces the effective right of way. There is lack of efforts to promote pedestrian and other environment friendly mode of transportation in the city. The city bus stand lacks good passenger and tourist facilities.

As per the gap analysis, the city requires 26.28 km of additional road network by the end of 2021. Only 5.16 km of road network needs surface improvement from BT to CC by 2041. Majority of the components are being taken up under the Comprehensive Mobility Plan (CMP) for Panaji by CCP under JnNURM funding. Hence the investment has been identified taking into account the projects proposed in CMP to include additional components for 2041.

vi) Housing and Basic Services for urban poor

The present housing stock in the city has 99% of the houses under good and livable category. The city of Panaji does not have identified slums within the city limits. However, there are few urban poor pockets located mostly in the low lying areas along the major drains. The problems with urban poor are manifold in a context of Panaji due to absence of proper authentic database and authorisation. There are issues regarding tenure of land, provision of infrastructure, education and awareness, health and sanitation, social problems of caste and religion. The key challenge is provision of affordable housing to the urban poor. Further, the service levels should be improved such that the proposed housing schemes should have water supply, sewerage, door-to-door waste collection, CC roads, and street lighting facilities. The strategy outlined focuses on achieving by 2021, 100% housing for the urban poor; access to water supply, open drains, sanitation, 100% coverage of CC roads to UGD Access to health and education facilities.

The action plan include study and assessment of the urban poor pockets in the city and rehabilitation of urban poor through development of pucca housing, construction of housing, providing access to physical infrastructure and social amenities as well as livelihood restoration through activity centers and skill development programme. Majority of the components are being taken up under the Basic Services for Urban Poor (BSUP) for Panaji by CCP under JnNURM funding. Hence the investment has been identified taking into account the projects proposed in BSUP to include additional components for 2041.

i) Social infrastructure

The city is well equipped with social amenities like educational facilities, health facilities, fire fighting services, markets, commercial buildings, sports facilities and city level parks. Being a major tourist hub it has access to all major amenities. About 10% of the total city area is under parks and playground while 10% is under commercial use. The key challenge in social and cultural infrastructure sector is the lack of development of the existing recreational and open spaces and inadequate area allotted for wholesale markets due to which the core city area faces congestion. The requirement for development of schools, hospitals, socio cultural facilities and parks and playgrounds has been assessed as per the URDPFI guidelines.

vii) Urban environment, Disaster management and Climate change

The city is located in the CRZ zone and has been ecologically sensitive zone. At present due to high urbanisation and land reclamation for development has been causing threats to the existence of the ecosystem within the city. This may lead to deterioration of the natural features and lower the city's resilience to various natural disasters which will erupt as a result of climate change. This will not only affect the city infrastructure facilities but also to the residents of the city. The city prone to natural disasters like earthquake and monsoon induced floods. The floods are a major concern due to the city's topography and increasing rise in mean sea level.

Apart from this, practice of on-site sanitation system with septic tank / soak pit is contaminating the ground water and water bodies as ground water table is high in the city area. The city is prone to high levels of noise as well as air pollution especially in the core area due high influx of vehicular movement, commercial activities and pedestrian movement. The city also faces high risk of fire accidents in the core city areas like core city and adjoining heritage areas.

The action plan includes mapping and preparation of GIS based database of ecological features and eco sensitive zones, eviction of encroachments along the water bodies, implementing pollution mitigation policies and strategies, take up energy conservation and diligent impact assessment and monitoring for infrastructure projects.

The cope up with the natural and manmade disasters in the city, establishment of Disaster management cell at CCP with emergency response system has been proposed. Various climate change mitigation measures which mainly includes primary enabling and supporting considerations like institutional and regulatory frameworks, financing mechanisms, and capacity-building, which would be required for planning of new infrastructure or retrofitting/climate proofing of the existing one.

viii) Heritage Management

The city is spotted as one of the most attractive tourist destinations in India. Panaji is known for its Indo-Portuguese cultural heritage having a number of heritage structures, buildings, monuments and sites of significant importance. The city houses several beautiful residential, institutional buildings having rich architectural heritage. The DPR for Heritage Conservation has been prepared by CCP which includes detail assessment of the city heritage and proposals for development and conservation of the identified areas. Hence the investment has been identified taking into account the projects proposed in DPR to include additional components for 2041.

i) Tourism sector development

As discussed earlier the city is the heartthrob for various tourism activities being the state's major tourist hub. The city's good connectivity in the state, availability of good tourist infrastructure and varied tourist attractions has been major factors for its popularity. To enhance the local tourism potential of the city, development of the river side road from ferry point, improvement of the CCP level parks, improvement of hill steps at Cortini, improvement of the Dona Paula area and provision of signage for tourist circuit.

CCPs Financial Assessment

Revenue Income of CCP has a CAGR of approximately 15.9% over the analysis period (2007-08 to 2011- 12). Property tax is the major contributor to tax revenue which accounts to 57% of tax revenue followed by sign board/hoarding tax and trade and occupation tax is 38% and 33% respectively. Own revenues accounted for 76.94% of the total revenue while only 13.18% was accounted by the revenue grants which are mainly from the state finance commission.

The revenue expenditure of CCP can be divided into four categories viz. General administration and tax collection, operations and maintenance, public health and convenience and sanitation and debt servicing. The public health and convenience is major contributor for expenditure with 76.6% share followed by expenditure on general administration and charges with 20.9% share. The operating ratio of CCP has improved from 1.34 in 2007-08 to 1.08 in 2011-12 owing to higher growth rate of the revenue income (15.9%) than the revenue expenditure (9.9%).

Capital account comprises of the capital grants receipts from various Central and state government funding. Over the period starting 2007-08 to 2011-12, CCP received capital grants worth Rs. 1774.67 lakhs from various sources. CCP has not taken any loans or municipal bonds during the review period. Therefore, the capital income consists of only capital grants received from various sources. The capital account of Panaji CCP for the 2011-12 is showing surplus funds. The total capital expenditure over the period of last five years is 1215.89 lakhs against the total capital grants receipts of Rs 1774.67 lakhs with only 69% utilisation of the funds. The capital grants are utilised mostly for solid waste management, traffic and transportation, water body, basic service to urban poor, heritage/tourism conservation, urban renewal and urban governance projects.

The investment requirement have been identified to implement the sectoral action plans and included in the city investment plan (CIP). CIP is prepared in line with the identified vision for the city through a comprehensive process of gap assessment and through stakeholder consultation. This assessment has also based on identified sector specific strategies, implementation actions, and associated reforms with specific inputs from stakeholders too. The strategies adopted primarily have three dimensions: improving the service delivery by efficiency measures, improving service delivery by creating infrastructure assets: and improving the governance aspects. The total estimated capital investment required for providing efficient services to the present population and future population of the city by the year 2041 is Rs. 2670.77 crores. A total investment of Rs. 2025.96 Crores is proposed for to be undertaken by 2020-21 to cater to infrastructure requirement. The table below presents the summary of sector-wise total investment need and investments.

Sr no	Sector	Short Term (Rs.Crores)	Long Term (Rs.Crores)	Total (Rs.Crores)
1	Water Supply	93.56	4.60	98.16
2	Sewerage & Sanitation	153.47	38.31	192.53
3	Urban Roads, Traffic & Transport	988.24	364.66	1,352.90
4	Storm Water Drains	243.81	-	243.81
5	Street Lights	133.36	116.50	249.86
6	Solid Waste Management	138.81	-	138.81
7	Urban Environment and Disaster Management	63.00	-	63.00
8	Urban Governance	29.29	2.50	31.79
9	Tourism and Heritage	147.90	100.00	247.90
10	Social Infrastructure	23.50	10.50	34.00
11	Housing and Urban Poverty alleviation	11.00	7.00	18.00
	Total	2,025.96	644.07	2,670.77

The sectors of tourism, heritage, traffic and transportation, have been given the highest priority. Hence, 61.71% of the total investment (54.45% for transport and 7.62% for Tourism and Heritage) has been earmarked towards the projects under these sectors. This is followed by the sectors of water supply (3.92%), sewerage and sanitation (7.58%), urban environment and disaster management (2.52%), and solid waste management (5.50%).

Corporation of Panaji (CCP) – CCP would be responsible for design, construction, operation and maintenance of solid waste management system, development works proposed for urban poor section, enhancement of the urban governance system, conservation of the city level ecologically sensitive areas and provision of city level infrastructures viz. public toilets, commercial markets, parking facilities, improvement of city level parks etc. CCP would be the implementing agency for the Projects identified in the above mentioned sectors. In the overall investment, CCP has to contribute 17.03% of total investment.

Public Health and Engineering Department, Goa (PHED) – It would be responsible for design, construction, operation, and maintenance of water supply and sewerage system. PHED would be the implementing agency for the projects identified in the above mentioned sectors. In the overall investment, PHED has to contribute 12.92% of total investment.

Public Works Department (PWD) / Goa State Infrastructure Development Corporation (GSIDC) – It would be responsible for design, construction, operation, and maintenance of the city roads as

well as the design and construction of new storm water drains within the city. PWD / GSIDC will be implementing agency for the proposed projects for provision of new roads, improvement of surface condition of existing roads and improvement of the SWD system in the city. In the overall investment, PWD has to contribute 38.55% of total investment.

Goa State Electricity Board (GSEB) - It would be responsible for design, construction, operation, and maintenance of street lights within the city. GSEB would be the implementing agency for the projects identified for improvement of street lighting system within the city. In the overall investment, GSEB has to contribute 7.18% of total investment.

Water Resource Department (WRD) / Goa State Infrastructure Development Corporation (GSIDC) - It would be responsible for operation, and maintenance of major drains in the city. WRD / GSIDC would be the implementing agency for the projects identified for improvement of major SWD within the city. In the overall investment, WSD has to contribute 7.74% of total investment.

Kadamaba Transport Corporation (KTC) - KTC would be responsible for procurement, operation and maintenance of public transport system within the city. It would be the implementing agency for the projects identified for improvement of the public transport system and infrastructure within the city. In the overall investment, WSD has to contribute 10.48% of total investment.

Department of Tourism (DoT), Goa – DoT would be responsible for construction, operation and maintenance of tourist points within the city. Hence DoT has been identified as responsible agency for the tourism development projects identified in the CDP. In the overall investment, DoT has to contribute 4.23% of the total investment.

Department of Health and Education – The state department for education and health would be responsible for development of the education and health facilities identified as per the URDPFI guidelines. In the overall investment, the education department has to contribute 0.27% of the total investment and health department has to contribute 0.16% of the total investment.

River Navigation Department (RND): The river navigation department of the state government as it does would be required to support the stakeholders of the city development through upgradation and development of new ferry routes to and fro from the city. The RND would be required to undertake 0.27% of the total identified investments for upgradation of the water ways to and fro from the city.

Goa Traffic Cell: The traffic cell in the state of Goa plays a very critical role in the management of traffic in the city during the peak tourist influx seasons. During the consultations with the traffic cell and other officials involved in traffic and transport management in the city, various projects to be implemented by the Traffic cell emerged and the same has been considered in this CDP. In the overall investments at the city level it is envisaged that the Traffic Cell would need to contribute towards improvement of junctions, traffic calming measures, online traffic management etc. and the cell would need to contribute 0.6% of the total identified investment.

Implementing Agency	Short Term (Till 2021)		Total Investment (Till 2041)	
	Investment Estimated	% of Total	Investment Estimated	% of Total
PHED	239.95	11.84%	280.61	11%
PWD	716.00	35.34%	1,059.46	40%
CCP	319.82	15.79%	332.32	12%
WRD	251.81	12.43%	251.81	9%
DoE	5.00	0.25%	5.00	0%

Implementing Agency	Short Term (Till 2021)		Total Investment (Till 2041)	
	Investment Estimated	% of Total	Investment Estimated	% of Total
DoH	3.00	0.15%	3.00	0%
DoF	15.50	0.77%	26.00	1%
DoT	139.90	6.91%	239.90	9%
KTC	184.70	9.12%	193.70	7%
GSEB	133.36	6.58%	249.86	9%
RND	5.71	0.28%	7.91	0%
Traffic Cell	11.20	0.55%	21.20	1%
Total	2,025.96	100%	2,670.77	100%

CCP Investment capacity and Financial Operating Plan

An attempt had been made to assess the investment capacity of CCP is assessed through a financial operating plan (FOP), which gives a multi-year forecast of finances for the medium term. In line with the phasing of identified projects in the capital investment (CIP), the FOP has been generated for the same period for CCP. A salient feature of the FOP is that all outstanding dues, including debt and non-debt liabilities if any, are also taken into account. Accordingly, the annual accounts of CCP for the period between the financial years 2008-09 and 2012-13 were used to determine past trends for both revenue and expenditure items and to arrive at appropriate growth assumptions for each of the income and expense items. After forecasting the revenue account, the CIP has been loaded on to cash flow. The FOP is generated to assess the investment sustaining capacity of CCP.

The project funding structure comprises grants under the New Urban Renewal Mission framework (accounting for 70% of the funding as per JNNURM-I structure has been assumed); internal surplus and debt are considered to meet the balance fund requirement. The level of investment that CCP can sustain is determined by studying the overall surpluses/year-to-year opening balance and debt-service coverage ratio (DSCR). A spread sheet FOP model has been customized to depict the financial position of CCP. The investment sustaining capacity of CCP is assessed based on the FOP assumptions. The model was used to calculate the overall surpluses under various scenarios involving combinations of internal revenue improvement, state support, financing terms, etc.

Given the existing financial position of CCP, the revenue and capital accounts of CCP are projected against the growth scenario. The FOP is generated from the sustainable investment point of view in line with the current growth trends against the identified investment. The overall city level investment estimated is Rs. 2670.77 crores (on constant prices). However, since the CCP is not providing all urban services in the city, the share of investment from in the total investment for the city is Rs. 319.80 Crores (on constant prices). The investment sustainability has been assessed for the CCP considering that CCP would be required to undertake the investments to the tune of Rs. 319.80 Crores and the remaining investment would be undertaken by the respective department providing and managing the city level services.

It is observed that without any grant support, CCP can implement capital projects with an investment size of Rs 111.15 Crores. Based on the availability of grants (if only on 90% basis), CCP can take up priority projects in the area of de-congestion of the city, solid waste management and public sanitation up to Rs. 240.43 Crores. However, as per the assessment it is observed that the CCP would be in a position to undertake investments to the tune of Rs. 319.80 Crores (100% of the investments to be

made by the CCP) if the suggested reforms are implemented and it would receive the grants from the newurban development mission of the central government.

Given the importance of Panaji in the region, it is very important to improve the basic infrastructure facilities to attract the investment and industries in the city and further to boost the economic development in the region. Therefore, CCP should aim to implement the improved revenues and reduced expenditures in order to generate revenue surplus to increase the investment capacity. The increased investment capacity of the CCP clubbed with grant support for state and central governments will enable CCP to take up larger projects. Following key steps to be taken by CCP to achieve the improved case scenario investment:

- On immediate basis, reforms are to be implemented in property tax to improve the coverage and collection efficiency; the reforms could be policy levels change to streamline the department.
- CCP should levy the user charges on SWM services – CCP may explore this initiative as part of property tax.
- Identify additional revenue generating ventures on immediate basis.
- CCP should explore the outsourcing of certain function to reduce establishment expenditure.
- CCP should curtail the regular capital expenditure over the next 5-10 years. CCP should take up only priority works in wards.
- CCP should explore the PPP route to implement either the projects or project components.

Thus the CDP embodies the approach methodology and implementation action which can facilitate the development of Panaji. However to facilitate this there is also need to streamline and strengthen the institutional arrangements to implement the development plan. In this context it is important that requisite institutions system and capacities are in place. The CCP has over the years undertaken several initiatives to reform the urban governance and implement reforms at the city level. However, there is need to further and deepen these initiatives, these and associated aspects are also discussed in the report.

2. PROJECT BACKGROUND

2.1 Context

The need for an overall urban improvement and development to sustain the economic growth momentum post the liberalization era first found its expression in the mandate of JnNURM launched by the Government of India in 2005. The project endeavored to bring about an improvement in urban quality of life and make them as investment destinations. The programme derived its initial rationale from the “National Common Minimum Programme” of the Government of India that laid stress on expansion of physical infrastructure and therefore, comprehensive urban renewal and slum development could be taken up. The second rationale for such a large scale programme was derived from India’s International commitment to achieving the Millennium Development Goals and therefore, the Government of India (GoI) proposed to

- **Facilitate investments in the urban sector; and**
- **Strengthen the existing policies in order to achieve these goals.**

In recognition to the above mandate, the JnNURM programme was conceived. The scale of the programme was aimed to be in a mission mode primarily to make the cities to realize their full potential and become engines for growth. It was opined that the urban sector contributes to over 50% of the country's Gross Domestic Product (GDP) and therefore, focused attention is required for urban infrastructure development.

As already mentioned above, the JnNURM is the first flagship national programme for urban development of this nature and size by the Government of India. The programme sought to bring about a change in the very manner of looking at urban development. It recognized the importance of two major aspects for urban development in the country including

- **the need for urban infrastructure improvement in order to improve quality of life and sustain the local economy as well as to attract more investments; and**
- **the need for investment for carrying out the urban infrastructure improvements.**

In doing the above, the programme brought about the necessary awareness among the Urban Local bodies (ULBs) for planning and implementation of projects, need for systematizing the urban services and their management, the need for involving stakeholders in project planning and raising revenues for the urban areas that can sustain the urban infrastructure. Significant emphasis was given to urban governance reforms and the need to link reforms with investments. Assistance therefore, to the state governments and ULBs was proposed to flow through a reforms linked plan. Introduction of such reforms were considered crucial for developing sustainable infrastructure that would include,

- **efficient management of created physical assets so as to increase self-sustainability and**
- **enhance efficient service delivery.**

Both these aspects were to be achieved through the agenda of reforms in the cities.

Progress

Over the past seven years, the programme has committed over Rs 286 billion for 552 projects involving a total investment of over Rs 620 billion. Some of the **key achievements** of the project include:

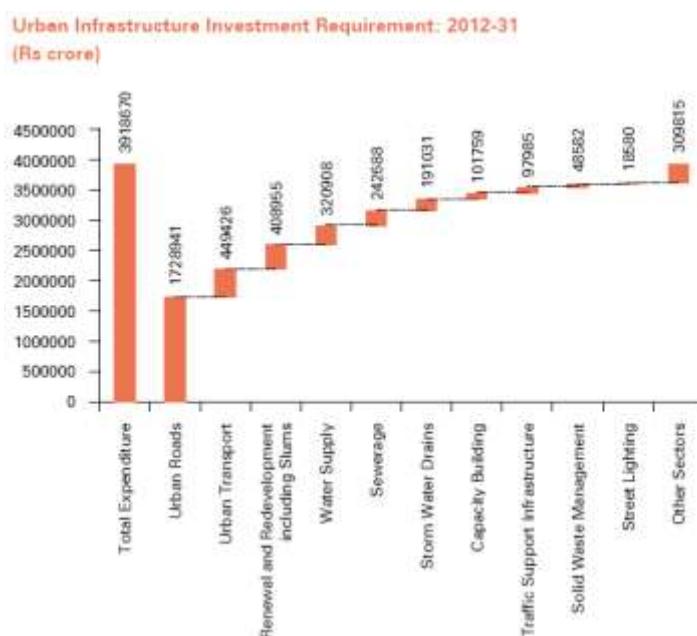
- The mission has been successful in catalyzing multi-year investments and reformed development in urban infrastructure.
- There has been visible improvement in the delivery of municipal services in many cities.
- Some cities have prepared development/master plans for the first time. There is also greater awareness in the ULBs for the need to develop systematic plans for improvement in infrastructure. There is also an increase in aspiration levels among communities and there is a demand for better infrastructure and services.
- Several projects especially in transport sector have been taken up within the JnNURM framework that has significantly improved the quality of life in the cities.
- There has been good progress in implementation of reforms at policy level at state and central level. Most of the states have framed their policies on reforms and started implementing the same. ULBs have started implementing the reforms in the areas of accounting and e-governance.

While there has been significant change in the urban sector due to JnNURM at the same there has been **challenges** which needs to be addressed going forward.

- CDP was seen as an investment plan for projects in the immediate term and not as a vision document for the city with very limited cities revising the same.
- While preparing the CDP, consultations with the stakeholders was limited and mostly restricted to the line departments and parastatal agencies.
- The pace of project execution has been found to be slow. Some states have been able to take greater advantage of the programme than others.
- Cities have also not been very successful in leveraging JnNURM funds to raise finances on their own or to attract private or PPP-based investment.
- The ULBs are not in a position to take over all the functions mentioned under 12th schedule of 74th CAA at present. Most ULBs are also not in a position to take over functions like roads and bridges, water supply sewerage, drainage and urban forestry due to their present incapacity to do so.
- Institutional strengthening and capacity building initiatives are yet to initiate in most of the ULBs. Most of the ULBs are facing capacity related issues such as lack of staff (staff recruitment has not been carried since long)

The Planning Commission of Government of India, through a committee has devised a framework for JnNURM-II. This framework has been prepared after studying and analyzing the success and challenges arising from JnNURM-I and the initiatives taken by other Ministries in Urban Development.

The High Powered Expert Committee (HPEC) report further identified about Rs 39 lakhs crores of investment in infrastructure in the urban areas of India.



2.2 Revised CDP under CBUD Project

2.2.1 CBUD Programme

In order to give an impetus to reforms under JnNURM, the MoUD and Ministry of Housing and Urban Poverty Alleviation (MoHUPA) have launched a new project called “**Capacity Building of Urban Development**” (**CBUD**). The project has been launched with support from The World Bank (WB). The GoI has received the financing from the WB/International Development Association (IDA) towards CBUD project. The broad aim of the CBUD project is to address the major constraints of urban development and specifically focus on the capacity building requirements for successful urban management and poverty reduction across the selected ULBs in India.

The project will contribute to GoI’s overarching objective of creating economically productive, efficient, equitable and responsive cities. Achieving this objective, will help sustain high rates of economic growth, accelerate poverty reduction, and improve services, especially to the urban poor. The project has following three components:

Figure 1: CBUD Project components



Capacity Building for Strengthened Urban Management - This component is aligned with the infrastructure and governance sub-mission of JNNURM and will thus support technical assistance across the several urban management topics.

Capacity Building for Effective Urban Poverty Monitoring and Alleviation - These capacity building initiatives are aligned with the basic services to the urban poor sub-mission. They reflect the need for building information systems, sharing experiences, and designing strategies on urban poverty alleviation.

Implementation Support - This component will support a National Project Management Unit (PMU) for providing overall technical and managerial support during the implementation of the Programme. The PMU will have critical role in promoting and supporting the project.

2.2.2 Preparation of Revised CDP under CBUD Programme

In order to identify broader issues for intervention and areas of assistance pertaining to development of city, City Development Plans (CDPs) which were already available for most of the cities under the

JnNURM are required to be revised as per the revised CDP Guidelines (April 2013) issued by Ministry of Urban Development.

The MoUD has identified 30 numbers of cities across India under the CBUD project to facilitate this support. Further, MoUD invited proposals from various consultants for preparation of CDPs for these cities. This responsibility was entrusted to CRISIL Risk & Infrastructure Solutions, Mumbai.

2.3 Revised CDP Guidelines – Key Areas of Emphasis

The revised guidelines issued by MoUD further incorporate additional aspects which broadly are as follows and these aspects shall be covered while preparing both the Fresh and Revised CDP.

- Formation of CDP Committees – Policy and Technical
- Inclusion of Heritage, Health and Education sector in the CDP
- Stress on infrastructure management aspects
- Outcome parameters of projects
- Revenue enhancement initiative, Expenditure management initiatives and Asset management initiatives
- Special emphasis on PPP projects
- Transit oriented development.

Apart from the above points, some of the other key areas of importance in the revised guidelines are as follows.

2.3.1 Vision Led Planning

The revised guidelines specify that unlike the past CDPs the vision for city need to be more detailed. They need to be based on understanding the SWOT for the city as well as the needs and priorities of the people of the city. The people must be encouraged at workshops and consultation sessions to visualize their future of the city, their aspirations and the consequent growth that they anticipate in the city. This vision finally can be translated into respective sectoral visions.

2.3.2 Resource based planning

Every city in India in the context of its regional location has particular strengths in terms of its resource endowments. Such resources need to be assessed and their strengths realized for city development. The approach for plan preparation could be: a) national resource led planning for cities endowed with natural resources like water bodies) OR b) Economy based (for an industrial or trading city), OR c) Tourism based for heritage cities OR d) combination of the above. This helps in settling the city apart from the rest. This approach can be identified based on:

- a) Existing city strengths and its opportunities,
- b) Regional role of city in the context of state development, and
- c) Needs of the city.

2.3.3 Participatory Approach

As already mentioned above, the revised CDP guidelines have specified that the CDP be treated as a “living document”. For this periodic revision and updation of the CDP is necessary. Such revisions have to and must be conducted with a participatory planning approach. The CDP outlines that Local area plans need to be prepared in consultation with the ward committees to fulfill the expectations of

the citizens. Also, the guidelines specify that such an approach is necessary to ensure equity concerns and poverty issues to be integrated in the CDP. Consultations also need to be carried out at every stage of the plan preparation and implementation. The citizens must be able to prioritize and choose their needs for infrastructure development.

2.3.4 Equity concerns, poverty and local economy development

Poverty and local economy development go hand in hand. Understanding of the local economy would help in devising appropriate infrastructure development strategies that can help in/be conducive to the growth of local economy and thereby nurture local talent and resources. These need to be given adequate focus in the present CDP exercises and therefore help in not just local economy development but also in regional economy development.

The 12th five year plan has also started a mission for National Poverty Alleviation (NUPAM) for targeting housing and poverty alleviation based on recommendations of the NUPAM identifying the issues of poverty and housing in city and implementation status of programmes such as RAY, IHSDP etc. Integration of these aspects would be crucial in making the CDP relevant to state and central government policies.

2.3.5 Capacity Building in ULB

The ULBs presently face serious human resource shortage for planning, development and urban management activities (including operations and maintenance, monitoring and evaluation, financial management and procurement). This issue has been highlighted by the study on appraisal of JnNURM projects as well. The guidelines have proposed that the CDPs must address this issue as to the gaps in such capacity can be addressed.

Also, it has been suggested in the guidelines that urban reforms need to be done with greater participatory approach. The strategies to arrive at the vision for the city should be linked to the reform agenda. ULBs should be asked to furnish the reforms and propose a time line to achieve the same. Administrative and structural reform should be made mandatory and carried out as soon as possible. Financial thresholds need to be decided and adhered to in terms of the central assistance under JnNURM being given as a soft loan or a grant. This approach would help in designing an appropriate capacity building strategy.

2.3.6 Sectoral Action Plans with Goal Oriented Targets

The revised guideline specifically also lay out the need for preparation of sectoral action plans that have targets that are oriented towards specific goals. Action plans are specifically required for sectors including Local Economic Development Plan, Infrastructure Development Action Plan, Housing and poverty alleviation action plan, City Mobility Plan, Heritage Management Plan (Where needed), Financial Management Plan, Institutional and Capacity Building Action Plan and Environment Management Plan (including disaster management). Such sectoral plans would be based on clearly identified goals. Also, inter-sectoral as well as intra-sectoral linkages need to be addressed through the CDP.

2.3.7 Monitoring and Evaluation Arrangements

The guideline clearly spells out the need for monitoring and evaluation at regular intervals as to the extent of implementation of the CDP. Also, development of such monitoring arrangements would go a long way in securing community participation who can be involved in the process of monitoring.

2.4 Objective of the Assignment

The CDP aims to identify an integrated solution to the challenges facing the city. It recognizes the economic growth strategy as well as the actions that would be required by various agencies to ensure the sustainable development of the city. The CDP is the ULB's strategy that presents the vision of a desired future for the city, and the mission statements on how the ULB, together with other stakeholders, intends to work towards achieving this long-term vision. The City Development Plan incorporates the assessment of city on majorly four levels: Socio Cultural and Economic Environment; Physical Environment; Infrastructure Services and Institutions; Urban Poverty and Heritage.

The primary objective of this assignment is – to revise and update the existing CDP.

The scope of work in brief shall entail –

- Profiling the present status of the city, giving an in-depth analysis of its demographic, economic, financial, infrastructure, physical, environmental and institutional aspects
- Based on the above analysis, the consultant shall develop a perspective and a vision for the city, which would be prepared in consultation with its relevant stakeholders. In order to achieve the vision, a formulation strategy for bridging the gap between where the city is at present and where it wishes to reach need to be prepared.
- The CDP should provide for a City Investment Plan (CIP), based on which the concerned ULB will be able to access funds under central/ state government schemes as well as from own and other sources based on priority actions and projects identified in the CDP.
- The document should also provide Financial Operating Plan (FOP) to direct the ULBs for mobilizing various financial resources to implement the identified projects. The inter-sectoral and intra-sectoral issues need to be addressed by the CDP.
- Preparation of the CDP will consist of city development strategies that will emerge out of a structured consultative process. The process will enable elected representatives, key staff of departments of Municipal Corporation/ Municipal Council, Parastatal agencies and other institutions, policy makers and the citizens to participate and plan for spatial, social and economic development of the concern cities.
- The CDP has to adhere to the latest revised toolkit prepared by the MoUD for CDP preparation published on its website www.jnnurm.nic.in in Dec 2009 or later.

2.5 Approach and Methodology

"This section would provide the proposed approach, methodology, and work plan to execute this assignment. Our approach to the assignment is based on the objectives to be achieved from the study and our experience of undertaking similar nature of assignments with ULBs in the country"

The approach to the assignment is based on consultative and analytical assessment of the existing situation. The inputs from stakeholders have been used to prioritize areas of development and to formulate the strategies in order to make the revised CDP an implementable document.

The methodology for undertaking the work of preparation of Revised CDP is provided in the figure below. Broadly there are five stages in a sequential order to undertake this work. Each of the task and the detail components are further discussed in detail in this chapter.

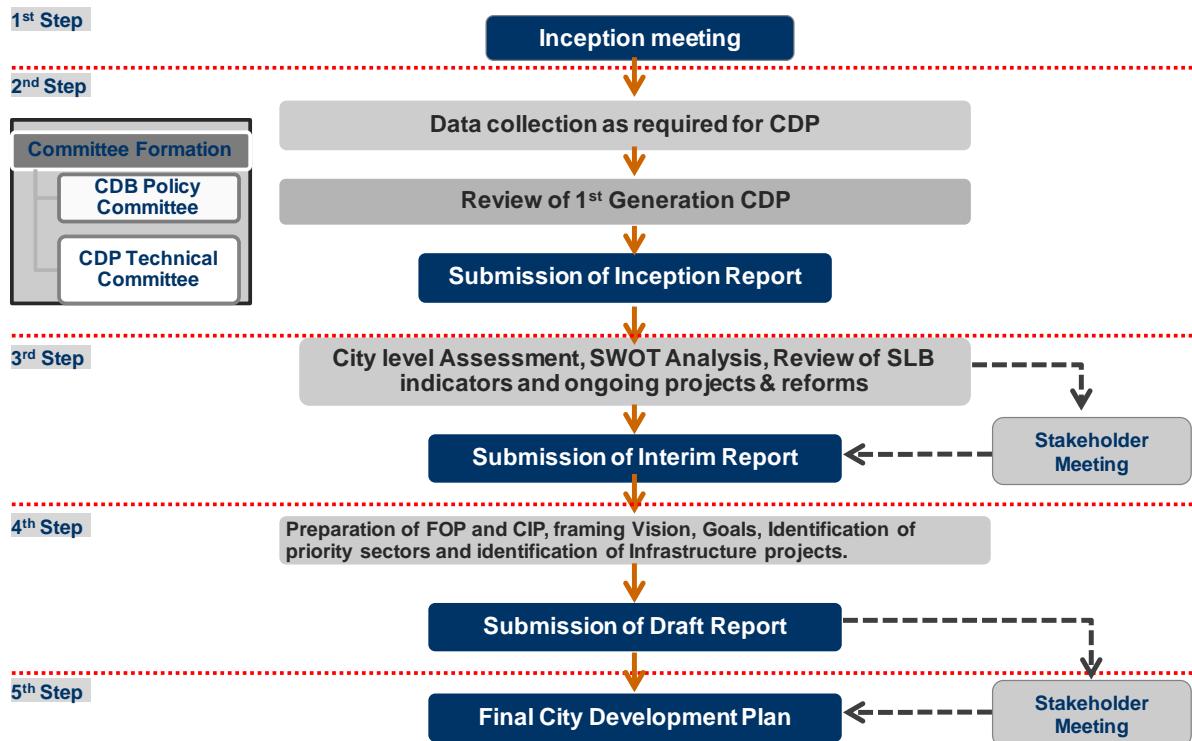
Figure 2: Revised CDP Preparation Methodology



The Revised CDP is prepared for the period of next 30 years, i.e. 2041. It will be a forward-looking consensus program for the city that outlines the path with respect to the following aspects;

- **Infrastructure Development** – Assessment, gap analysis, arriving at investment requirement (short term and long term) and prioritization of various services provided by Municipal Corporation - water supply, sewerage, storm water drainage, roads, traffic & transportation, street-lighting, solid waste management, firefighting, education, health, etc.
- **Slum Development** – Prepare a programme for the development of slum pockets in the city. This includes access to all the basic services as well as housing for urban poor.
- **Economic Development** – The revised CDP will focus critically on tapping the existing potential and identifying key economic development opportunities for the city.
- **Social Development** – The revised CDP will take into account the social development needs of the city such as the need for hospitals, education institutes, and recreational centers.
- **Institutional Development** – Assessment of capacity-building required for ULBS to undertake development of city.
- **Financial sustainability** - The revised CDP will assess the revenue sources, areas of expenditure and current and future investment requirement of the city. Based on this, it would arrive at a sustainable investment capacity and would suggest measures to improve revenues and control expenditures.
- **Reform Assessment plan** – The revised CDP will also discuss status of various reforms undertaken by the ULBS to bring about improvements. These reforms are in the areas of accounting, e-governance, property tax, user charges, building byelaws, etc.

Moreover, the approach is based on the philosophy of developing workable solutions. The methodology for undertaking the work of preparation of Revised CDP is provided in the figure below. Broadly there are five stages in a sequential order to undertake this work.

Figure 3: Revised CDP preparation methodology

2.6 Brief on 1st Generation CDP

The Corporation of the city of Panaji (CCP) had prepared a City Development Plan (CDP) in 2007 for an area of 8.12 km² with a population of about 59,066. The CDP has been prepared by CCP under the guidance of the policy committee which was formulated in 2007. The policy committee had 30 ward members and headed by the Mayor of CCP. The CDP was prepared after thorough consultation with technical experts, local stakeholders and academicians. However, the CDP was not finalized and was not placed for approval from state and central government.

The project proposals for the city were developed on the basis of the vision set for the city. It was

“To develop Panaji as a city that is environmentally and economically sustainable, a city that is a mixture of heritage and modernity, a city that cares for its citizen, a city that cares for its tourist, a city that maintains its culture, a city that provides high quality infrastructure services and facilities, a well-managed clean, green and safe city that provides a better present and bright future to its people.”

2.6.1 Projects proposed in 1st generation CDP

The CDP envisaged projects along with the strategic direction for the city to achieve the vision as well as to improve the urban services in the city. The projects were finalized based on the stakeholder consultations. The projects were identified in the sectors of water supply, sewerage, storm water drainage, SWM, roads and basic services to urban poor.

The estimated investment for the projects was Rs. 286.55 crores. The water supply sector accounted for 26% while urban environment accounted to 25% of the total investment followed by traffic and transportation, solid waste management, tourism, street lighting and GIS mapping. The Table below shows the break up of investment under various sectors proposed under the 1st generation CDP .

Table 1: Investment Envisaged in 1st Generation CDP

S. No	Sector	Investment (Rs in crores)	Investment (%)
1	Water Supply	74.80	26
2	Sewerage and Sanitation	14.08	5
3	Solid Waste Management	19.08	7
4	Storm Water Drains	4.50	2
5	Traffic and Transportation	36.15	13
6	Urban Environment	70.40	25
7	Basic Services for Urban Poor	10.00	3
8	Tourism	18.42	6
9	Street Light	18.40	6
10	Urban Renewal	1.10	0
11	Urban Governance	1.37	0
12	GIS	18.26	6
	Total Cost	286.55	100

Source: CDP 2006, Panaji

The investment allocation shows maximum preference given to water supply and urban environment. It is followed by traffic and transportation, urban governance, street lighting, GIS mapping and tourism and heritage. The critical urban infrastructure such as storm water drainage, solid waste management and basic services for urban poor has been considered crucial in the CDP proposed.

2.6.1.1 Existing Status

The total investment envisaged in Panaji CCP was about Rs 286.55 crores. CCP further prepared the Detail Project Report (DPR) for the projects identified in the CDP and submitted to the Ministry of Urban Development (MoUD) for approval. Five projects had been approved and sanctioned under JNNURM funding.

The first project is for the improvement of water supply system in the city and its surrounding areas which has been approved and recently taken for implementation by the state PWD. (Rs. 71.22 crores). Apart from this, Detail project reports for implementation of E-governance component for CCP (19.79 crores), Heritage Conservation (Rs 3.91 crores), Solid waste management plan (Rs 34.54 crores) and Basic Services for Urban Poor (Rs 10.20 crores) has been approved under the Goa State's urban development program and MoUD. Apart from the proposed works under DPR for water supply, all the other four projects approved as per the 1st generation CDP has not been implemented till date. Apart from these five DPRs, a DPR for Comprehensive Mobility Plan for Panaji and DPR for Urban Renewal were also prepared by CCP and sent to MoUD for approval. The DPR for Urban Renewal was sent back by MoUD stating to be a medium priority considering the need of the city while the Comprehensive Mobility Plan for Panaji has not yet approved. The Table below lists the status of the projects proposals prepared under the 1st generation CDP.

Table 2: Status of projects prosed under the 1st Generation CDP

S. No.	Sector	Proposed Projects	Project Cost in Lakhs	Approved by SLSC	Status
1	Storm water drainage system	DPR on St. Nallah/Creek in Panaji	2774.0	26/7/2013	Forwarded to MoUD on 8/8/2013 for approval
2	Traffic and Transportation	Comprehensive Mobility Plan for Panaji city	74291.0	26/7/2013	Forwarded to MoUD on 8/8/2013 for approval
3	Urban Renewal	DPR for Urban Renewal	38.10	22/2/2010	MoUD has returned stating its of medium priority.
4	Solid Waste Management	DPR for Solid Waste Mgmt.	3453.58	26/7/2013	Submitted to MoUD on 21/10/2013
5	Heritage	DPR for Heritage Conservation	39.18	22/02/2010	DPR approved by MoUD and it was tendered by CCP. However, not yet taken up for implementation
6	Urban Poor	DPR for Basic Services to Urban Poor	1020.0	22/02/2010	DPR approved but asked to prepare detail estimates which is under progress
7	Urban Governance	DPR for Governance	1979.17	22/02/2010	DPR approved by MoUD and it was tendered by CCP. However, not yet taken up for implementation

Source: CCP, Panaji

2.6.1.2 Need for revision of CDP

The rational for revising/ updating the CDP is to revisit and examine the extent to which CCP and the concerned authorities have been able to implement the envisaged plan and also identify the development agenda going forward in discussion with stakeholders. The MoUD has further revised the guidelines for preparation of CDP; hence, the revised CDP shall further look into the changes/ additions suggested in the guidelines.

2.7 Brief on Various Studies Undertaken by CCP

Apart from the CDP prepared by the CCP, it has also undertaken various following studies in the recent past. These studies are in the areas of heritage conservation, improvement of the traffic and transportation systems in the city, climate change and improvement of basic infrastructure services. The Table below lists the various studies undertaken by CCP till date.

Table 3: Various studies undertaken by CCP

Area of Study	Description of the study
Traffic and Transportation	<ul style="list-style-type: none"> ▪ Comprehensive Mobility Plan for Panaji ▪ Decongestion model prepared by Charles Correa Foundation (CCF) ▪ DPR on Public Bicycle Sharing (PBS) system for Panaji prepared by Embark, India
Solid waste management and Sanitation	<ul style="list-style-type: none"> ▪ City Sanitation Plan for Panaji ▪ DPR for Solid Waste Management prepared by CCP
Urban Poor	<ul style="list-style-type: none"> ▪ DPR for Basic Services for Urban Poor
Climate Change	<ul style="list-style-type: none"> ▪ Urban Vulnerability Assessment Report for Panaji, ICLEI ▪ Climate Resilient infrastructure services Case study brief: Panaji ▪ Planning Climate Resilient Coastal Cities: Learnings from Panaji and Visakhapatnam, India, prepared by TERI ▪ Solar City Master Plan for Panaji
Urban Infrastructure	<ul style="list-style-type: none"> ▪ DPR for water supply system in Panaji and its surrounding areas prepared by PHED ▪ DPR for development of St. Inez nallah prepared by CCP and GSIDC ▪ Infrastructure Master plan for Panaji prepared by GSIDC
Urban Planning	<ul style="list-style-type: none"> ▪ Outline Development Plan for Panaji, NGPDA and TCPD ▪ Regional Plan 2021, TPCD ▪ DPR on Urban Renewal in Panaji, CCP
Heritage conservation	<ul style="list-style-type: none"> ▪ DPR for Heritage Conservation for Panaji prepared by CCP ▪ DPR for Conservation of Mala Heritage area prepared by CCF.

Source: *Discussions with Officials of the CCP*

2.8 Key process undertaken for CDP preparation

CRISIL Risk & Infrastructure Solutions Limited (CRIS) has been appointed by Ministry of Urban Development (MoUD) for the preparation and revision of City Development Plans for 13 selected cities under Package 1 and 17 selected cities under Package 2. A kick-off meeting was organized by MoUD to review the work plan and approach for the assignment. The meeting was chaired by Ms. Nisha Singh IAS, Joint Secretary and Project Director and was attended by senior officials from MoUD, PMU from CBUD and officials from TCPO, CPWD.

CRIS Team made a presentation on the following aspects

- Experience in Preparation of CDPs
- Details of Assignment Coverage
- Approach - Revised CDP toolkit
- Proposed Teaming

The minutes of the kick off meeting have been provided in **Annexure-5**

2.8.1 Data Collection

The data collection stage involved preparation of sectorwise checklist, consultation formats, approaching the concerned departments for the data required as per the checklist and detail discussions with the officials to understand the present scenario and related major issues. The secondary data on various sectors was collected from the respective departments such as Kadamba Transport Corporation, North Goa Planning and Development Authority, State Public Works Department, State Roads and Building Department, (Panaji Circle), State Water Resources Department, Goa State Electricity Board, RTO, Health Department, Education Department, Department of Tourism, Goa State Housing Board, Goa State Pollution Control Board, Panaji Traffic Cell along with detailed discussions on respective officials of each sector.

Other major documents such as 1st generation City Development Plan, proposed detailed project reports of various urban services proposed under previous CDP, other city level project reports of the various studies conducted by CCP and other agencies, municipal budget (last five years), action and physical progress of on-going projects proposed under 1st level CDP as well as details of projects proposed under other central/state funding was collected. CRIS team carried out consultations with various stakeholders of the city, officials of various departments, CCP officials etc. and also carried out City level assessment which includes the Strength, Weakness, Opportunity and Threat (SWOT) analysis.

2.8.2 Committee Formation

CCP had to formulate the policy and technical committees in line with the GoI's revised toolkit. The policy committee had to be constituted with Municipal Commissioner as the chairman and CCP, NGPDA Vice Chairman, Superintending engineer, CCP and Deputy Commissioner, CCP, TPCD, PWD, PHED, Directorate of Health, Education, Electricity department, KTC, Department of Tourism, heritage and conservation department and agencies as members of various committees.

Further, five technical committees were proposed to be formed such as spatial planning, environment and heritage, local economic development, urban services (water supply, sewerage and sanitation, solid waste management, storm water drainage and traffic and transportation), municipal finance and urban governance, social infrastructure and urban poverty. The CCP Formulated the CDP Committees and the same is presented in Annexure 13 of this report.

2.8.3 Stakeholder's consultation

To ensure a participatory and inclusive development process CRISIL team carried out wide range of stakeholder consultations and focus group discussions with the city stakeholders of the city. The exercise involved mapping of the key stakeholders in the city followed by discussions on city level issues. One to one consultations were carried out with the Government officials, business and trade organisations, academicians and community based organisations (CBOs). Thus, the consultants carried out number of stakeholder consultations at various stages of the Draft Final Report formulation. The Table below lists the various consultations held during the report preparation and the purpose for the same.

Table 4: List of consultations conducted

S. No,	Stakeholder Consultation	Month	Purpose of the Consultations
1	Kick Off Meeting	October, 2013	The meeting was organized at CCP office to

S. No,	Stakeholder Consultation	Month	Purpose of the Consultations
			brief the various stakeholders about the objectives of Revised CDP and the approach and methodology to be followed for its preparation. The checklist of data required was also discussed in the meeting.
2	Focus Group Discussion with the various stakeholders and citizen groups	November, 2013	The FGD was conducted at various levels during the process of data collection. The main objective of FGDs was to get an insight into the present scenario and the major issues pertaining to various sectors
3	Interim Meeting	February, 2014	The meeting was conducted to present the Interim stage studies and analysis prepared by CRISIL team. The Interim Report inferences were presented and discussed with various stakeholders. The stakeholders suggested their concerns and projects which can be included in the CDP.
4	Consultations with various stakeholders for discussion of the sector wise proposals for projects	April, 2014	The CRISIL team consulted various officials of the concerned departments to discuss the list of proposed projects and suggest potential projects to be taken up in the CDP report. The suggestions given were considered in the DFR report.
5	Consultation with Commissioner, CCP	September, 2014	The discussions were held to discuss the final content of DFR and incorporation of various sector level studies carried out by the CCP in the DFR report.
6	Consultations with officials of various concerned department and CCP to discuss the project proposals to be included sectorwise.	December, 2014	The discussions were organized with assistance of CCP which mainly focused on the discussions and finalization of the project proposals under the various sectors in consultations with the concerned officials and CCP. Apart from this, there were consultations with the Charles Correa foundation, Heritage cell of TCPD related to various projects proposed for heritage conservation. The CCP shared various study report and project proposals which had been prepared for Panaji to be included in the CDP proposal.

There are two stakeholder meeting conducted as per the requirement of the CDP exercise which includes the Inception stage meeting and Interim stage meeting.

1. Kick Off/ Inception Meeting

In Panaji, the process of Revision of CDP was commenced in October, 2013. CRIS team had conducted an inception meeting with CCP officials on 24th October, 2013 to appraise on the revision of CDP process and the way forward. Subsequently, the review of 1st generation CDP had been carried out and inception report had been submitted to MoUD and CCP on **30th October 2013.** (Refer Annexure 5)

Figure 4: Inception meeting on 30th October 2013 in Panaji

2. Interim Meeting

Further, CRIS in association with CCP organised a city level stakeholder workshop on 19th February, 2014 at CCP Council hall. The objective of the workshop was to discuss about status and performance of service delivery mechanism in Panaji, city SWOT analysis, to understand aspirations of the citizen on city development and framing of the vision for Panaji city. The workshop was attended by 35 numbers of participants who included the representatives from parastatal agencies involved in the operations of various infrastructures in the city, NGOs and academicians. (Refer Annexure 7)

The Draft stage meeting will be conducted after the completion of the Draft Final Report as per the client's requirements and incorporation of suggestions from various stakeholders received during discussions.

Figure 5: Interim Level Consultation - Panaji

Figure 6: Interim Level Consultation - Panaji



Figure 7: Interim Level Consultation - Panaji



3. Draft Stage Consultation

A stakeholder consultation at draft stage was conducted on 9th February 2015 at CCP Corporation Hall. The consultation was dedicated for the representatives from the CDP committees of the CCP. The consultation had 15 participants from the various departments functioning in the City. The Nodal officer from the CCP chaired the consultation and welcomed the gathering. The CRIS team made a presentation on city level assessment, sector wise demand gap analysis, projects identified and capital investment plan for the city. Further, CRIS team discussed on the financial sustainability of CCP to take-up the identified projects under the capital investment plan. CRIS team also requested the stakeholders to provide their inputs/ suggestion on the proposed projects for the city. In addition to this either in writing or through email of the CRIS team member. The minutes of the meeting is presented in the Annexure 8 of this report.

Figure 8: Draft Stage Consultation



Figure 9: Draft Stage Consultation



3. INTRODUCTION TO THE CITY

3.1 Regional Setting

The state of Goa is located in the Western region of India. It shares its borders with the Arabian Sea to the West, Maharashtra to the North and Karnataka to the South and the East. Goa has a coastline of about 104 km and inland waterways of about 255 km.

The state is traditionally known as a tourist paradise for its natural scenery, unique beaches and cultural diversity. As per the statistics available from the Department of Tourism, Goa, in the year 2013, 31,21,473 tourists visited Goa of which 26,29,151 tourists were domestic (84% of total tourists) tourists and 4,92,322 were foreign visitors (16% of total tourists). Goa has a well-developed social, physical and industrial infrastructure and virtual connectivity. It has an international airport that facilitates faster access to the region for leisure, entertainment and other purposes. It also has significant port infrastructure.

Goa's gross state domestic product (GSDP) was about Rs.23,096 crore during 2011-12¹ (in current prices). Goa's economic growth is driven by the strong performance of industrial sectors such as tourism, mining, and pharmaceuticals.

The state was liberated from Portuguese rule in 1961. It was a part of Union territory of Goa, Daman and Diu till 30th May 1987 when it was carved out to form a separate State. Goa covers an area of 3702 km² and comprises two revenue districts, North Goa and South Goa with headquarters at Panaji and Margao respectively.

North Goa district spans over a total geographical area of 1736 km². It consists of six taluks namely, Tiswadi, Bardez, Pernem, Bicholim, Satari and Ponda. The provisional population of the district according to 2001 Census was 8,58,884 which has decreased to 8,17,761 in 2011. The rural population of district is 3,24,927 (40%) and urban population is 4,93,081 (60%) as per 2011 census. It is a relatively densely populated district in the state with an overall density of 471 persons per km² which is more than the state average density of 394 persons per km². The district has totally 213 villages and 27 urban town settlements out of which one is Municipal Corporation, while six are Municipal Councils.

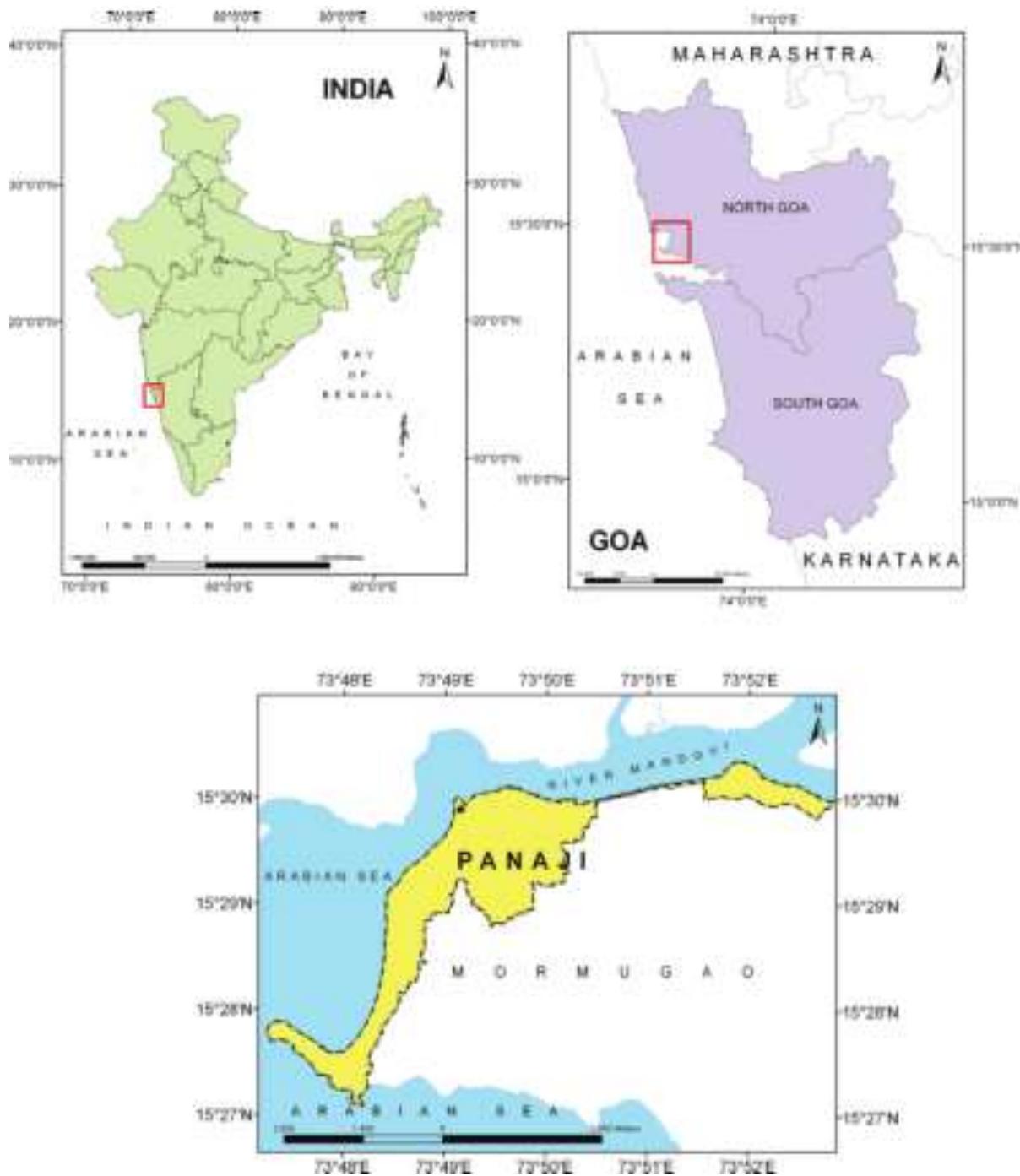
Tiswadi is among the six talukas of North Goa in which the capital city of Panaji is located. Apart from Panaji City Corporation it has four town municipal councils within its jurisdiction. The taluka comprises of 213.5 km² of area and has a total population of 1,77,219 as per 2011 census. Out of the total population its rural population is 37,549 (21%) while urban population of 1,39,670 (79%). Thus, it is highly urbanized with average density of 830 persons per km². The sex ratio of the taluk is 1035 which is slightly lower than the district average of 1038. The literacy rate observed in the taluk is 82% almost same as the district average of 81%. The total number of worker population is 73,468 with a work participation rate of 41.5%.

Panaji is a City Corporation located in Tiswadi taluk of North Goa district. It is the state capital of Goa and district head quarter of North Goa district. The Panaji CCP area has been reduced and confined only to the core city and its surroundings after the formation of Corporation in 2002. The CCP covers

¹Economic Survey Report for Goa, 2012-13

an area of 8.12 km² with total population of 40,017 as per Census 2011. The city mainly functions as administrative and tourist hub of the state.

Figure 10: Schematic Map-Regional Setting Panaji



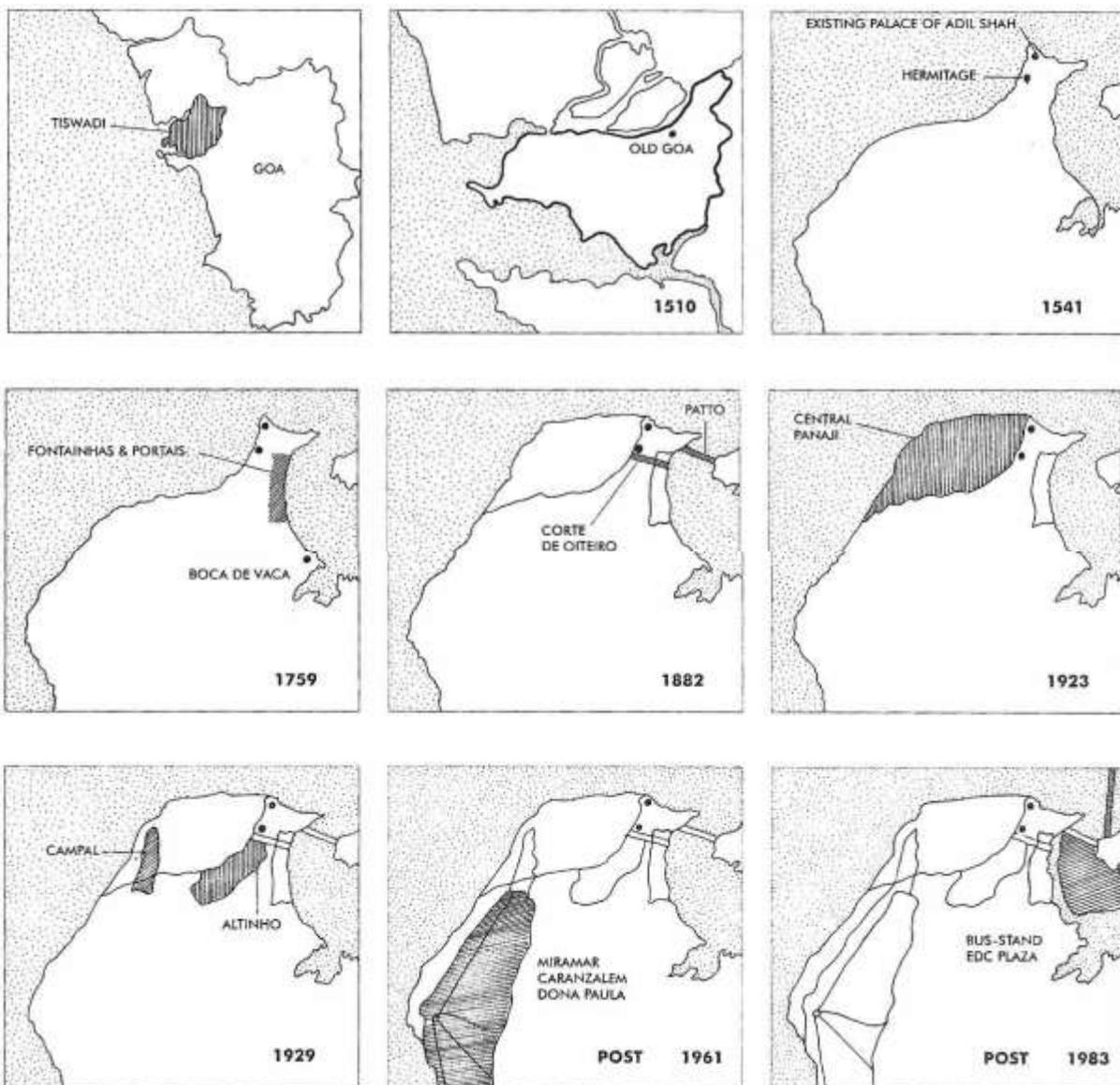
3.1.1 History and Regional Importance

Panaji was annexed by India with the rest of Goa and the former Portuguese territories in the invasion of 1961. Between 1961 and 1987, it was the capital of the Union Territory of Goa, Daman and Diu. Panaji became a state-capital on Goa's elevation to statehood in 1987. A new Legislative Assembly

complex was inaugurated in March 2000, across the Mandovi River, in Alto Porvorim. The growth of the city over the years has been described in the Table below.

Table 5: Growth of the city over the years

Period	Context
Before 1510	Gandagopal Kelima entrusted with the administration of Panaji by the Kadamba king, Shasthadeva (1007-1050). Largely a marshy land with fishermen temporary hutments, Yusuf Adil Shah builds castle and harem on the river bank, as the summer place in 1500.
1510-1631	Old Goa captured by Portuguese Castle used as check point for incoming ships to old Goa. Builds the Panaji church in 1541 (rebuild in 1584). Built the fort of Gasper Dias
1632-1780	Viceroy, Count de Linhares, Dom Miguel de Noronha built the 3.2 km causeway linking Panjim to Ribandar village It exists even today and is known as 'Pointe de Linhares' and at a time it was constructed, was the longest bridge in existence. Manorial estate houses built by Nobles – lands are privately owned as coconut groves On 1st December 1759, the then viceroy, Dm Manuel de Saldanha de Albuquerque, shifted abode to Castle of Adil Shah after modifying it and his shift was recorded has that the old Goa is Unhygienic.
1781-1843	1784 settlements developed in the coconut grove at the foot of the hill – Organic Profile 1818 Temple built and the settlements grew around. Construction of custom house, Large police station, collector complex was built 1831 acquisitions of land for expansion of the City Panaji taken place Panjim became the capital of Goa and was called 'Nova Goa' by a royal decree on 22nd March 1843 and its status was elevated to a "CITY"
1781-1843	1784 settlements developed in the coconut grove at the foot of the hill – Organic Profile 1818 Temple built and the settlements grew around. Construction of custom house, Large police station, collector complex was built 1831 acquisitions of land for expansion of the City Panaji taken place Panjim became the capital of Goa and was called 'Nova Goa' by a royal decree on 22nd March 1843 and its status was elevated to a "CITY"
1844-1909	More Buildings came up. Some are Fazenda, Municipality and Pavilions Planned Development activities are stressed construction of new roads and squares taken place
1909- 1961	New settlements Altinho, Campal (1930) developed and expansion of city slowly took place Basic Public services introduced Water Supply, Electricity. The Goa then incorporated into the Union of India in December 1961.
1961 – 1987	During the year between 1961 and 1987, The City Panaji was the capital of the Union Territory of Goa, Daman and Diu. The City Panaji became a state capital on Goa's elevation to statehood in May 1987.
2002	The Panaji Municipal Council was declared as the City Corporation of Panaji

Figure 11: Spatial Growth of Panaji over the decades

Panaji has been the administrative centre from the time of Portuguese rule. It is presently the state capital of Goa and the only urban centre in the state with the status of Municipal Corporation. Panaji is the third largest city of the state after Margao and Vasco. It has rich historical, political, commercial, educational, cultural and tourist importance. The city is major tourist hub of the state as well as trade and commerce centre of the region.

The city of Panaji is well connected with two National Highway passing through it. The only airport of Goa, the Dabolim Airport is at a distance of 35 kms and the nearest railway station of Karmali is 14 kms away. The Madgoan railway station is located at a distance of 40 kms from the city. The adjoining cities of Margao, Mapusa, Vasco da gama, Verna are located within 60 km radius from Panaji. They are connected with intercity bus services from Panaji. The unique location of the city by the Mandovi River and the Arabian Sea enables it to have the services of inland waterways and a state port. Panaji is Goa's fastest growing city after Vasco and Madgaon. It is spotted as one of the most attractive

tourist destination centers in India, and attracts around 2.0 lakhs national tourists and 0.35 lakhs international tourist annually².

The city being the administrative capital has most of the state level government office head quarters, departmental guest houses, along with the private sector branch offices and their activities. Most of the people employed in these offices or involved in the activities are either settled in Panaji or keep commuting on daily basis to the city. But the main economic base of the city is trade and commerce, of these the tourist related facilities viz., hotels, restaurant; shopping malls are worth mentioning. Panaji also serves as market center for nearby small towns for supplying various commodities especially building materials and consumer electronics items. There are few specific market locations which are known for wholesale commodities located in the city.

3.2 Administrative Boundaries

Panaji is the state capital and the district headquarters of North Goa district. It is a Class III town and the largest urban centre in terms of population in the North Goa district. It is Goa's third largest city after Vasco and Madgaon. It has rich historical, political, commercial, educational, cultural and tourist importance. Panaji is tourist hub attracting tourists from all over the world and country. It was upgraded from Municipal Council to Corporation in 2002. The Corporation of City of Panaji is the municipal body in charge of the civic amenities in the city.

Panaji CCP has a total geographical area of 8.12km² which is divided into 30 administrative wards. It has total population of 40,017 as per 2011 Census with density of 4,928 persons per km². The total population of the Panaji city along with the urban agglomeration areas is 1,14,759 as per 2011 Census and comprises a total area of 86 km². The Panaji urban agglomeration area (PUA) consists of CCP area as well as adjoining urban pockets which includes seven outgrowth areas and four census towns (CTs). The seven out-growth areas are Panelim, Morambi-o-Grande, Renovadi, Morambi-o-Pequeino, Cujira, Taleigao, Durgawado; and four CT are Chimbel, Murda, Calapor and Bambolim. All the adjoining 11 habitations representing rapidly urbanising settlements are independent or part of one of the village panchayats. The Table below depicts the administrative boundaries and demographic features in Panaji urban agglomeration area. The Fig-5 below shows the administrative boundaries within the Panaji city region.

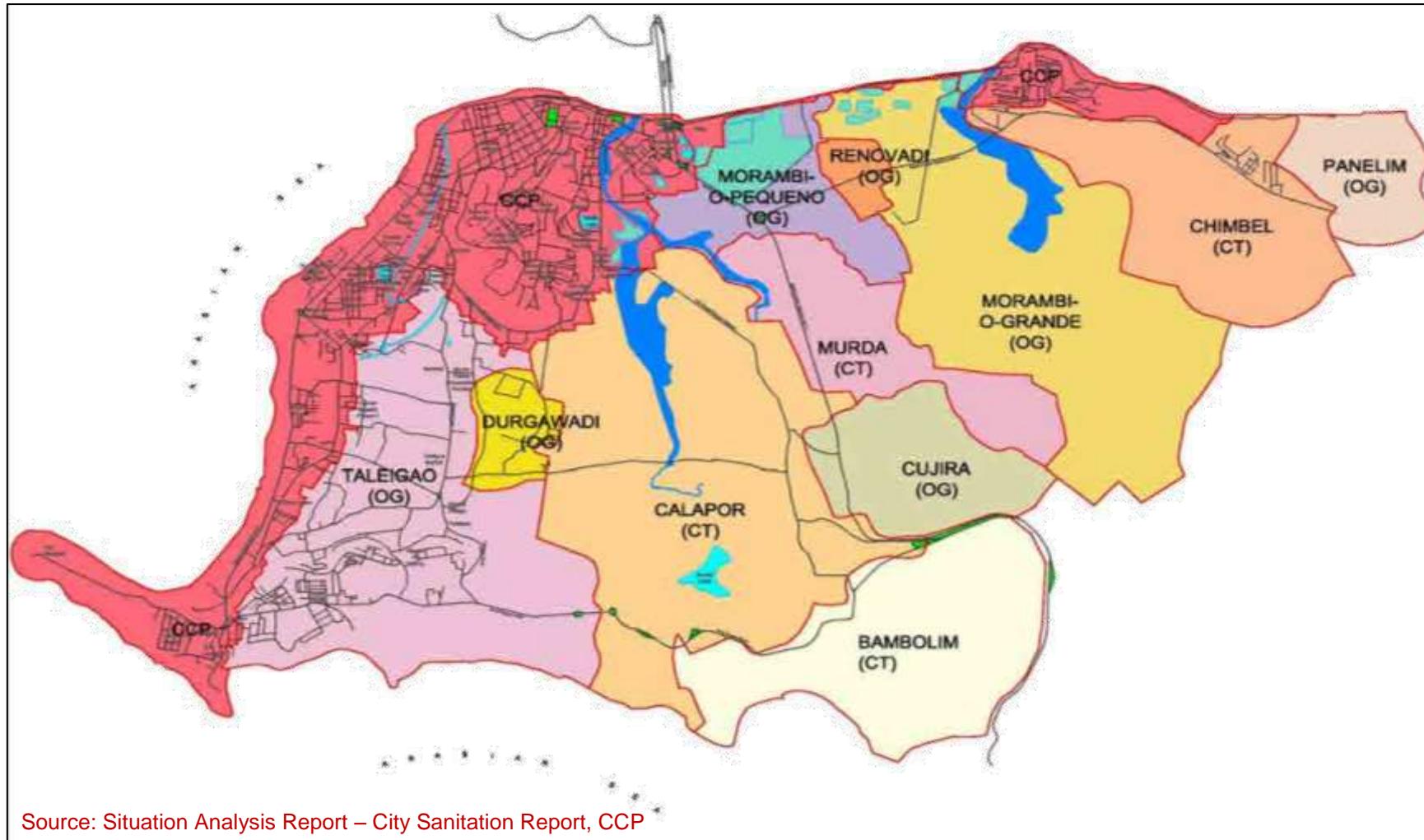
Table 7: Administrative set-up of Panaji Region

Particular	Goa	North Goa	Panaji CCP	OG +CT	Panaji Urban Agglomeration
Administrative Unit	State	District	Urban Local Body	Outgrowth areas and census town	CCP +OG+CT
Area in km2	3702	1736	8.12	78.5	86.00
Population (Census 2011)	1458545	8,18,008	40,019	74,742	1,14,759
Population Density	394	471	4928	952	1334

Source: Annexure – 5 of ECONOMIC SURVEY 2013-14, Directorate of Planning, Statistics and Evaluation- Goa

²DPR for BSUP for Panaji under JnNURM, 2019-10

Figure 12: Panaji Urban Agglomeration Area



3.3 Location and Connectivity

Panaji lies on the bank of the River Mandovi and is also bounded by two creeks, locally called "poi". It is located at 15.29° N Latitude & 73.49° E Longitude. It is at an average elevation of seven meters above mean sea level (MSL). It is located 40 km from Margao the district headquarter of South Goa. The other towns located near Panaji are Mapusa, Ponda and Vasco.

The total length of the roads in the district is 5044.58 km. Out of the total length, the national highways (NH) comprises of 264 km (5.2%), state highways(SH) of 279.40 km (5.5%) and major district roads (MDR) 733.07 km (14.5%). Apart from this, it comprises of 3768.17 km (74.7%) of rural village roads.

Figure 13: Schematic Map for Regional setting and connectivity



Being Goa's capital city and administrative headquarter, Panaji is well connected by road to the towns and cities within the state and with important towns in neighboring states by major regional roads viz. NH-17(Panvel - Mahad - Panaji - Karwar - Mangalore - Cannanore – Calicut - Ferokh - Kuttipuram-Pudu – Ponnamli – Chowghat - Cranganur) and NH-4A (Belgaum-Anmod-Ponda-Panaji) which also forms the major spine of the city road network. The city lacks direct rail linkage. The nearest railway station is Karmali located at a distance of 14 km. Other major railway stations viz. Vasco da Gama and Madgaon are located at distance of about 40 km.

The Kadamba Transport Corporation (KTC) operates regional as well as city level bus transport in the state. As Panaji is located along the River Mandovi, inland waterways have also developed to some extent. The airport is located at Dabolim, which is about 35 km away from the city of Panaji. It is well connected by airways from Mumbai, Bangalore, Cochin, Delhi, Chennai, Secunderabad, Jaipur, Mangalore and Trivandrum. Thus, the city of Panaji is well connected by good

network of regional roadways which also connects it to the major transport nodes viz. the airport and the railway stations. The city having the locational advantage of waterfront is favourable for development waterways to connect to adjoining urban centres in the state.

3.4 Defining the study area

The jurisdiction of CCP was restricted from 22.63 km² to 8.12 km² in 2002. However, considering the urbanization trend over the years, non availability of developable land within the CCP area with no scope for future expansion and the economic interdependence of the surrounding region with the city, the Revised CDP proposal has taken into consideration the area under Panaji CCP and its seven outgrowth areas. The outgrowth areas (OGs) include Taleigao, Morambi-o-Grande, Morambi-o-Murda, Bambolim Pequeno, Cujira, Panelim, Durgavado and Renovadi. The existing population of the study area as per the Census 2011 is 70,991.

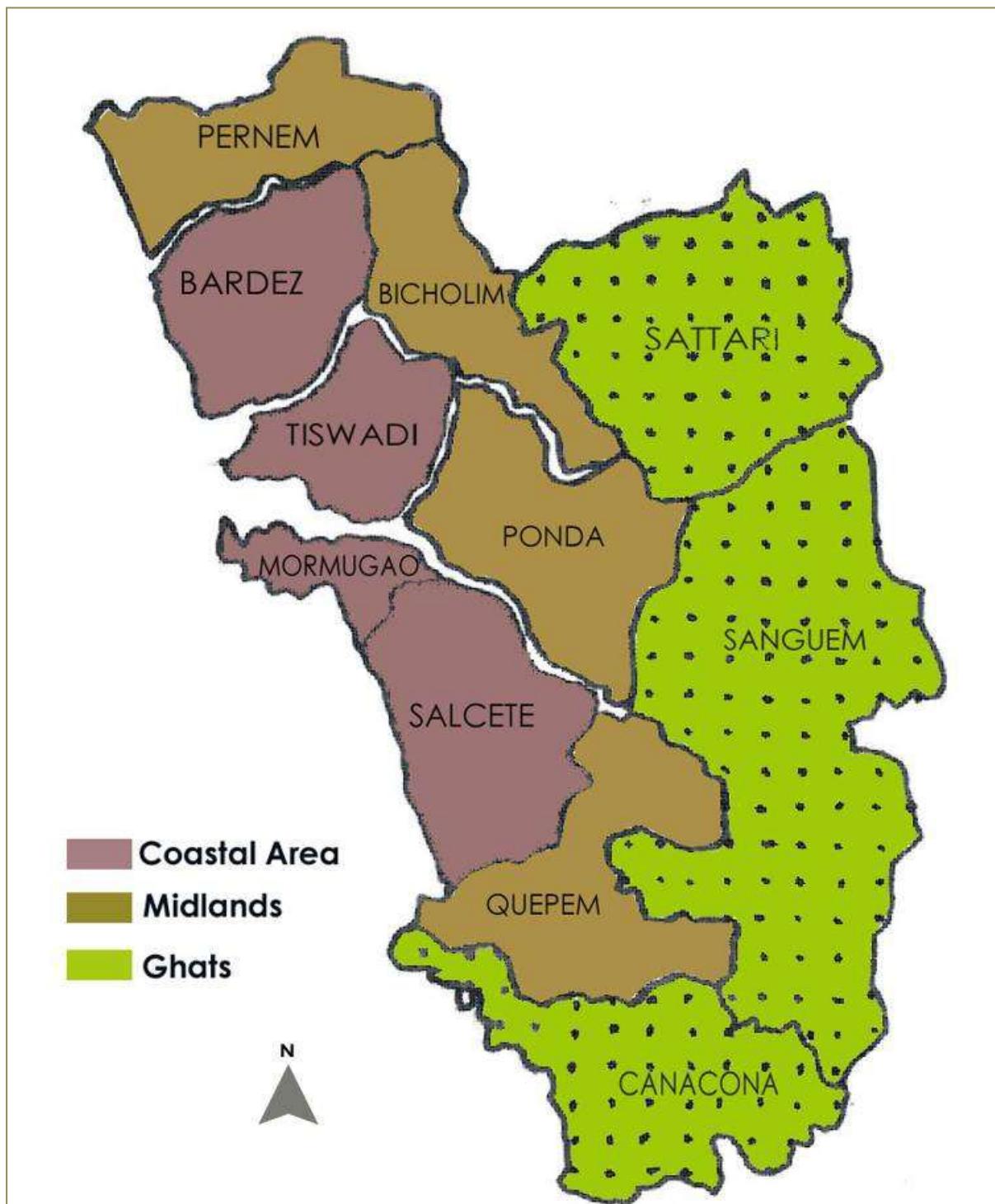
3.5 Physical Setting

3.5.1 Topography and Geology

Physiographically the North Goa district can be broadly divided onto four distinct morphological units from West to East as listed below. The **Fig** shows the physical division of the state w.r.t the physiographic characters.

- i. Coastal plain with marine land forms on the West (coastal area), Vast stretch of plains adjoining the coastal plain (coastal area),
- ii. Low dissected denudational hills & tablelands towards the East, (mid lands) and
- iii. Deeply dissected high Western Ghats denudational hills along the Eastern most part of the district. (ghats)

Saline soil in the district occurs in the flood plains of Zuari and Mandovi rivers in Tiswadi, Bardez, Pernem and Ponda taluks which includes Panaji city also. The soil in this region is deep, poorly drained and less permeable. It is saline, high in pH and contains humus and organic matter. The major crops grown are paddy, cereals, millets, pulses & oil seeds, sugarcane, coconut, arecanut and cashewnut.

Figure 14: Schematic Map for Physical Divisions in the state

3.5.2 Climate Parameters

3.5.2.1 Temperature

Due to maritime influence, the diurnal range of temperature during the day is not large. The diurnal range is the least being 4 to 6° C during monsoon season and increases to the maximum of 10 to 20°C during December & January. May is the hottest month where the mean daily temperature

increases to 30°C. January is the coolest with mean daily temperature of about 23°C. It is noted that the day temperature is the lowest in monsoon months of July and August and not in the cool winter months of December and January. The temperature is highest (around 33°C) in pre – monsoon months of April & May and again in post monsoon months of November & January.

3.5.2.2 Humidity

Due to proximity to the Arabian Sea, humidity throughout the year in Panaji is more than 60% with range from 80 to 90% during monsoon period. The relative humidity is higher during the months of July to September. During the months of December and January the difference between the Relative Humidity (RH) recorded at 08:30 hours and 17:30 hours is quite significant, as winter sets during these months. The weather is mostly foggy during dawn and at dusk during the rainy season.

3.5.2.3 Rainfall

Panaji receives rainfall from South-West monsoon between the months of June to September. As a result of orographic influence, rainfall increases towards the Western Ghats. Over 90% of annual rainfall occurs during monsoon months of June to September. About 32% of the annual rainfall is received during July. The average annual rainfall observed in the city is 3124.06 mm which is higher than the district average of 2932 mm. The Table below depicts the average rainfall data in Panaji city over the period of last five years.

Table 8: Rainfall pattern in Panaji

Year	2008	2009	2010	2011	2012
Rainfall in mm	2829.8	3103.5	3862.6	3027.8	2796.6

Source: Meteorology department, Panaji, 2013

3.5.2.4 Wind Directions

Throughout the year the wind flow in the morning is generally from East towards North – East direction during the months of October to April while it flows from West to North –East side in month of May. In the afternoons, the wind blows towards West or North West direction due to the influence of sea breeze along its coast. In the monsoon season wind direction is mostly westerly throughout the day. The winds are strong during monsoons while moderate rest of the year.

3.5.3 Water Resources

The principal perennial rivers draining through the district are Terekhol, Chapora, Mandovi and Zuari and non – perennial (seasonal) river Baga. The river basin of all these Westerly flowing short rivers originate from Western Ghats and drain in the Arabian Sea in the West under estuarine environment. The city of Panaji is located along the Mandovi River estuarine. The important lakes in North Goa are Mayem, Chimbolim, Carambolim and Calapur. The city is located only seven meters above the Mean Sea level and has a gradual slope from East to West along the flow of the River Mandovi. The major water bodies located in and around the city are River Mandovi, Zuary estuarine, Mala Lake, Qurem creek and St Inez drain.

3.5.4 Forest Resources

The state of Goa has a total area of 3702 km² out of 1224.46km² (33%) of area is under forests. Out of the total forest area, 354.48 km² (29%) is located in North Goa district while 869.98 km² (71%) of

forest area is located in South Goa District. Out of the 354.48 km² of forest area in North Goa district, only 1.78 km² of forest area exists in Tiswadi taluk.

There are no identified protected/reserve forests within Panaji CCP's jurisdiction. As per the existing Outline Development Plan the area under natural resources is about 2.09%. Salim Ali Bird Sanctuary located in the village of Chorão, near Panaji, has rare and endangered bird species—both migratory and resident.

4. DEMOGRAPHIC PROFILE

4.1 Background

Panaji is the state capital and head quarter of the North Goa district. The city is the major tourist hub in the state due to good tourist infrastructure facilities and good accessibility to the various tourist destinations. This has been supported by various trade and commerce establishments, hotels and restaurants, tours and travels and tourism based art and artifacts. The growing importance of the city as tourist destination has increased the tourism based economic activities by many folds over the years. The city is also a major trading center for agricultural products and other commodities coming from the neighboring smaller towns and rural areas.

4.2 Urban Population and urbanisation pattern

Key facts in 1st generation CDP

- CCP had a population of 0.59 lakhs as per Census 2001 with an average population density of 7,212 persons per sq. km, spread across an area of 8.12 sq. km.
- The population has grown from 0.35 lakhs in 1960 to 0.59 lakhs by the year 2001 with growth rate ranging from < 1 % to a maximum of a 2.66%. The average annual growth rate is 1.09 % and an average decadal growth rate is 10.9 %.
- The sex ratio of Panaji was 975 in 2001 which was higher compared to the prevailing sex ratio of the state (960) and North Goa district (968).
- According to the 1991 & 2001 census, the literacy rate in Panaji was 78.59% and 80.01 % respectively, which is slightly lower than the state and district figures of 82.32 % and 84.12% respectively.

The CDP had put forward the following observations:

- Floating population (approximately 5,886 per day) in 2006 and projected to 12,346 per day in 2030.

4.2.1 North Goa District

The North Goa district consists of a total area of 1736 sq. km. It is divided into six talukas viz. Tiswadi, Bardez, Bicholim, Satari, Pernem and Ponda. It consists of 213 numbers of villages and seven numbers of urban centers. The Out of the seven urban centers six are Municipal councils (MC) while Panaji being the state capital has been upgraded to the status of City Corporation (CC) in 2002. Panaji remains the most populated urban center followed by Mapusa and Ponda. The table below presents the administrative status, population and class (as per urban and regional design plan formulation and implementation guidelines) of these urban centers in North Goa district.

Table 9: Major urban centers in North Goa district

S. No	Name of the ULB	Admin status	Class	Population (2011 Census)
1	Pernem	Municipal Council	VI	5,021
2	Mapusa	Municipal Council	III	39,989
3	Panaji	City Corporation	III	40,017
4	Bicholim	Municipal Council	IV	16,986
5	Sanquelim	Municipal Council	IV	13,651

S. No	Name of the ULB	Admin status	Class	Population (2011 Census)
6	Valpoi	Municipal Council	V	8,532
7	Ponda	Municipal Council	III	22,664

Source: CDP Panaji, 2006 and Census of India, 2011

Note: Population size – Class: Class I: 100,000 and above; Class II: 50,000 to 99,999; Class III: 20,000 to 49,999; Class IV: 10,000 to 19,999; Class V: 5,000 to 9,999 and Class VI: Less than 5,000 persons.(Source: UDPFI Guidelines)

4.2.2 Panaji City

Panaji is the administrative head quarter and a major tourist centre of the state. It is the second-largest city in the state in terms of population. Panaji population houses for 2% of the total state's urban population and 16% urban population of the North Goa district.

4.3 Population Growth Trend

The city population growth has been fluctuating over the past five decades mostly due to the changes in the area under jurisdiction of CCP. The total population of Panaji is 40,017 as per Census 2011 which shows decline of population from Census 2001 population of 59,066. This is due to exclusion of Taleigao and Durgawado, which were part of Panaji Municipal Council in Census 2001 are made outgrowths in Census 2011. In 2002 when Panaji gained the status of Municipal Corporation by incorporation of the Corporation of City of Panaji Act 2002, these areas were excluded from the jurisdiction of Panaji resulting in reduction of population. The Table below presents the population growth trend in last five decades.

Table 10: Population Growth Trend

Year	Population Nos.	Decadal Growth Rate
		%
1971	34,953	-
1981	43,165	23.49
1991	43,349	0.43
2001	59,066	36.26
2011	70,991 ³ (CCP+OG)	20.19
2011	40,017 ⁴ (CCP)	N.A. ⁵

Source: Census of India and CDP Panaji, 2006

³Population of the city with Urban Outgrowths (Taleigao, Morambi-o-Grande, Morambi-o- Murda Bambolim Pequeno, Cujira, Panelim, Durgavado, Renovadi) for 2011

⁴Population of the CCP as per 2011 Census

⁵Since the initial years (1991-2001) population covers the CCP and its OGs the growth rate for 2001-11 has been calculated taking into account the population of the CCP+OG for 2011.

4.4 Population Density

Panaji city is spread across an area of 8.12 km² and consists of 30 administrative wards with high density varying being highest in the core city area to medium density towards the new extensions.⁶ The city area has been changing over the years in last four decades as a major commercial and tourist hub apart from being the administrative capital from time of Portuguese reign. In 1971 the density was 4623 persons per km² which increased to 5786 person per km² in 1981. In 1991 the city area was increased drastically from 7.46 km² to 22.63 km² due to which the average density of the city shows a decline to 1916 person per km². This is mainly due to the inclusion of the urban agglomeration population to the municipal area of Panaji and development of new areas in the surrounding villages of Panaji. In 2002, the CCP area was again confined to 8.12 km². At present average density in the city is 4928 person per sq.km² which shows high density pattern. In absence of city ward map and wardwise area, the wardwise density pattern in the city has not been possible to be assessed. However, the wards comprising of the core city area and its surrounding residential areas are the most densely populated. The ward wise population in the city has been depicted in Annexure 1. The Table below shows the density pattern in the city for last four decades.

Table 11: Decade wise Population and Density

Year	Population	Area	Gross Density		
			Nos.	km ²	Persons/ km ² .
1971	34,953	7.56	4,623		
1981	43,165	7.46	5,786		
1991	43,349	22.63	1,916		
2001	59,066	22.63	2,610		
2011	70,991 (CCP+OG)	22.63	3,137		
2011	40,017 (CCP)	8.12	4,928		

Source: Census of India and CDP Panaji, 2006

4.5 Average Household Size

The total number of households in the Panaji CCP and its outgrowth areas is 17,807 and the average household size is 3.9. It is lower than the taluk average of 4.2 and district average of 4.3.

4.6 Literacy Rate

The literacy rate in Panaji city has increased gradually from 79% in 1991 to 87% in 2011. The average literacy rate in the Panaji city region is 85%. Thus, the average literacy rate of the city as well as the city region is higher than the taluk average of 82% and district average of 81%. The city is major educational centre with having educational facilities like pre-primary, primary, secondary, higher secondary schools and degree colleges.

⁶Data on Ward wise population and Ward Map not available to elaborate the intra city density pattern

Table 12: Literacy rate

S. No.	Year	Population	Total literates	Literacy rate
		Nos.	Nos.	%
1	1991	43,349	34,069	79
2	2001	59,066	47,256	80
3	2011	40,017 (CCP)	34,653	87
4	2011	70,991 (CCP+OG)	60,071	85

Source: *Census of India and CDP Panaji, 2006*

4.7 Sex Ratio

The average sex ratio (number of females population per 1000 males) of the CCP has increased considerably from 882 in 1971 to 981 in 2011. The average sex ration in the city region is 973 as per 2011 census. The average sex ratio in CCP as well as city region is lower than the district average of 1,038 and taluk average of 1,035. Hence the city shows a increase in healthy sex ratio from 1971-2011 decade. The Table below shows the increase in sex ratio over the last four decades.

Table 13: Sex ratio of Panaji

S. No.	Year	Male	Female	Sex ratio
		Nos.	Nos.	per 1000 males
1	1971	18,577	16,376	882
2	1981	22,798	20,367	893
3	1991	22,542	20,807	923
4	2001	29,911	29,155	975
5	2011	20,197	19,820	981 (CCP)
6	2011	35,988	35,003	973 (CCP+OG)

Source: *Census of India and CDP Panaji, 2006*

4.7.1 Age Sex Pyramid

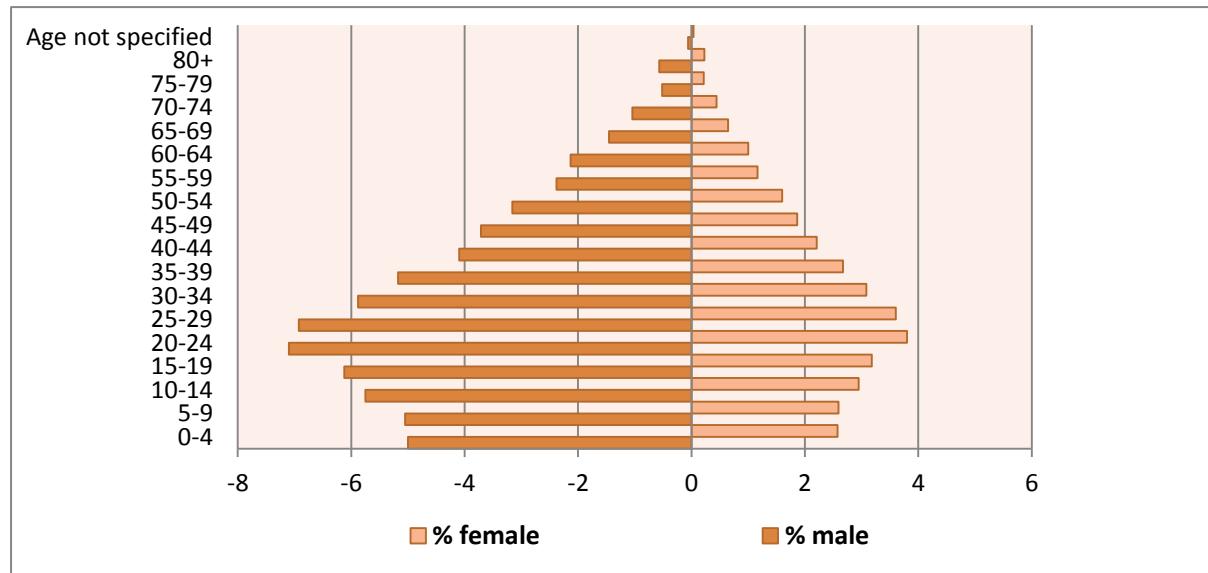
An analysis of an age sex pyramid has been carried out to estimate the working group population, and further to determine the dependant population. According to Census 2001, age-wise population⁷ has been considered and the relative proportion of the population in each age group has been determined. For the purpose of the analysis, 0 to 19 years age group is considered as child dependants; 20 to 59 years age group is considered as working age; while above 60 age group is considered as aged dependants.

As indicated in the figure below, 34% of the males were child dependants and 7% of the males were aged dependants; about 59% of the males were in the working age group. In the case of females,

⁷Census 2001 age wise population data for city is not available hence the District level data has been taken into consideration.

33% were child dependants and 9% were aged dependants; about 57% were in the working age group category.

Figure 15: Age-sex pyramid



Source: Census of India, 2001

4.8 Scheduled Caste and Scheduled Tribe Population

The total schedule caste population in the CCP is 563 (1.4%) while it is 1707 (2.4%) in the city region as per 2011 census. The scheduled tribe population in CCP is 1,340 (3.3%) and in the city region it is 4,586 (6.5%). Thus the total SC and ST population in CCP is 1,903 (4.8%) with total male population of 996 and total female population of 907 and in the city region it is 6,293 (8.9%) with total male population of 3169 and female population of 3124 respectively. .

4.9 Migration

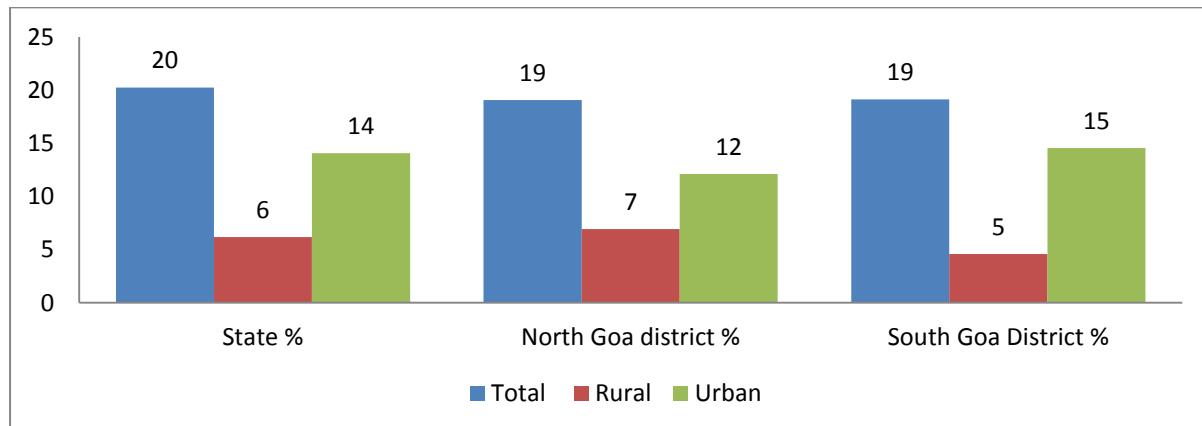
4.9.1 Migration Trend in the District

Migration is movement from one place to another place during a time period. It is thus place and time specific. It has also direction, from and to. Migration is one of the most important components of population change. As per the 2001 census, the state's migrant population was 2,72,731 which is scattered in the two districts viz. North Goa and South Goa. The migrant population in North Goa in which Panaji is located is higher than that in South Goa. However, urban migrants are higher in South Goa than in North Goa. Migration data for Panaji city is not available hence not taken up for analysis and comments. However, Panaji being the state capital, a major tourist destination and having highest population among all the urban centres in the district attracts lot of local as well as population from the neighbouring states for employment opportunities. The Table and figure below depicts the migrant population data for state and the two districts categorised in rural and urban areas.

Table14: Migrant Population Details

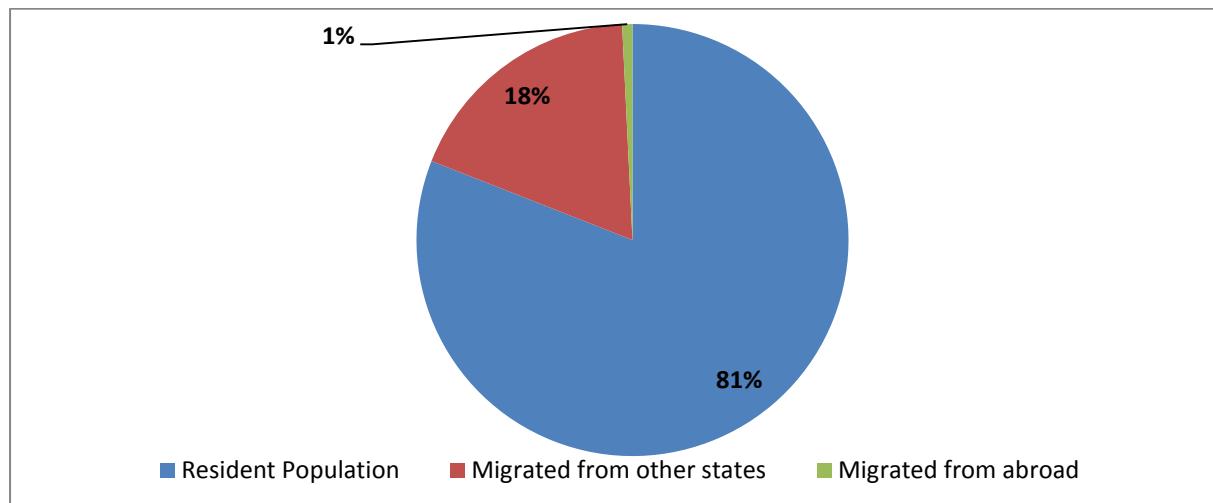
Area Name	Migrants Population		
	Rural	Urban	Total
State	83,271	1,89,460	2,72,731
North Goa District	52,555	91,889	1,44,444
South Goa District	30,716	97,571	1,28,287

Source: *Census of India, 2001*

Figure 16: Migrated population details

Source: *Census of India, 2001*

The breakup of population in the North Goa district depicts 81% of the population is resident population while 19% of the population is migrant population. Out of the 19% of migrant population 18% have migrated from other states, maximum from neighbouring states of Karnataka and Maharashtra while only 1% of the population has migrated from abroad. The Figure below depicts the breakup of population w.r.t the migrant population in North Goa district.

Figure 17: Breakup of population w.r.t migrant and resident population, North Goa

Source: *Census of India, 2001*

4.9.2 Migration Trend in Panaji City

In absence of migration data at city level the migration has been estimated as a difference between the decadal change and natural growth during the particular period. The natural growth in population has been calculated from the actual number of registered births and deaths for the period 1971-2011 to estimate the natural growth in the city.

It can be observed that in-migration has been increasing, except during the period 1981-91. During the period 1971-91, the city had witnessed average in-migration of about 5,810. The in-migration was due to increase in trade and commerce activities in the city.

However, the case was unlike during the period 1981-91, when the city witnessed out-migration of about 1,488. The out-migration was due to the change in the administrative status of Goa from Union territory to state. It was detached from Diu and Daman and made separate state.

During the decade 1991-2001, the natural increase was within the range of the previous decade. But, the city had reported significant increase in decadal growth as compared to the previous decades. The city has accounted an in-migration of about 13,380 during this period highest in last five decades. The city being the state capital and tourist destination was subjected to high economic activities which started growing within the city limits. The city profile of just an administrative centre changed to major economic centre w.r.t trade and tourism.

There is a considerable decline in the decadal population growth as well as growth due to natural increase in 2001-2011. The share of migrant population shows a decline from 23% in 1991-2001 to 16% in 2001-2011. This can be attributed to the saturation of the city, limited availability of developable land for the expansion of city limits and high cost of rental. Presently, there is large section of people staying in the suburban and rural areas around the city who commute daily for their occupation to the city. The decadal change and birth and death registration and migration data for the Panaji city have been recorded in the Table below.

Table 15: Migration details from 1971 to 2011

Year	Population	Decadal Change	Births	Deaths	Natural increase	Migration
		(a)			(b)	a-b
1971	34,953	-	3,084	920	2,164	-
1981	43,165	8,212	3,498	1,056	2,402	5,810
1991	43,349	184	3,407	1,735	1,672	-1,488
2001	59,066	15,717	2,925	588	2,337	13,380
2011	70,991 (CCP+OG)	11,925	929	534	395	11,530

Source: CCP, Panaji

4.10 Key Observations

- The city's population and growth trend has been fluctuating over the past four decades mainly due to the change in the administrative area due to either inclusion or exclusion of adjoining urban pockets within the CCP area.

- As per 2011 census, the Panaji city region (CCP+OG) population accounts to 4.9% of the total state's urban population and 8.7% of the North Goa district urban population. It comprises of 40.1% of the total population in the North Goa district.
- Considering the geographical settings and topography of the CCP area it has no scope for future expansion. At present a very high density pattern is observed within city with maximum concentration in the core city area and surroundings residential areas.
- There is healthy trend of increasing literacy rate and sex ratio in the city over the last four decades
- The average household size in the city is lower than the district average of 4.3.
- The present SC and ST population contributes to 4.8% within CCP while 8.9% within the city region to the total population in the city as per 2011 census
- 59% of the males while 57% of females out of the total population are in the working age group category as per 2001 Census which indicates high availability of human resource in the city.
- The share of migrant population shows a decline from 23% in 1991-2001 to 16% in 2001-2011. This can be attributed to the saturation of the city, limited availability of developable land for the expansion of city limits and high cost of rental.

4.11 Population Projections

Population projections form an important base for estimating the requirements of basic infrastructure services to the citizen. Initially various proposed project reports prepared for the city and its surroundings were referred to analyse the population projections.

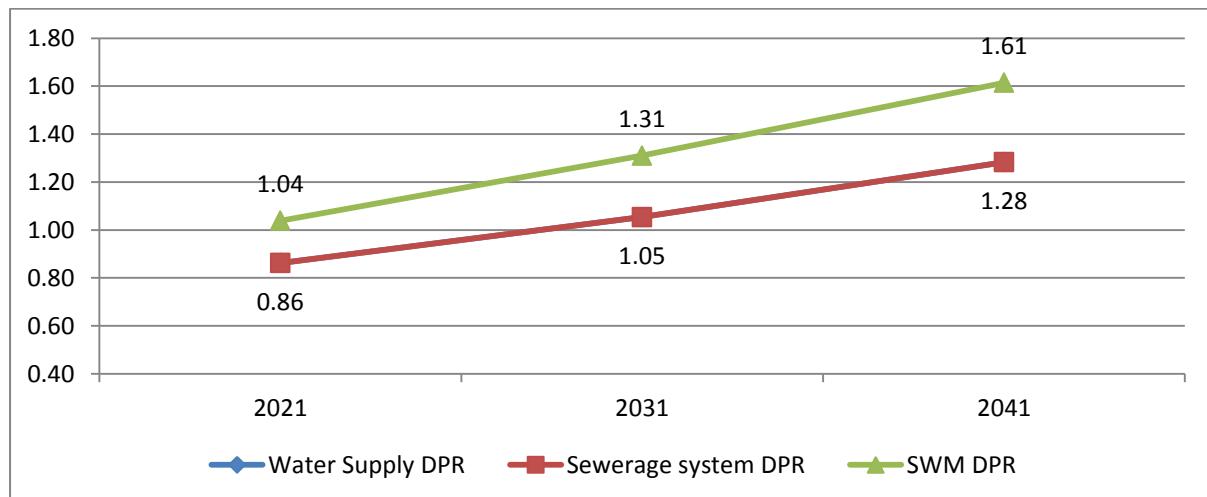
4.11.1 Methodology Adopted For Estimation of Population

Population of the Panaji city region has been projected considering the influx of the tourist visiting the region as well as the floating population coming to the region for work purpose.

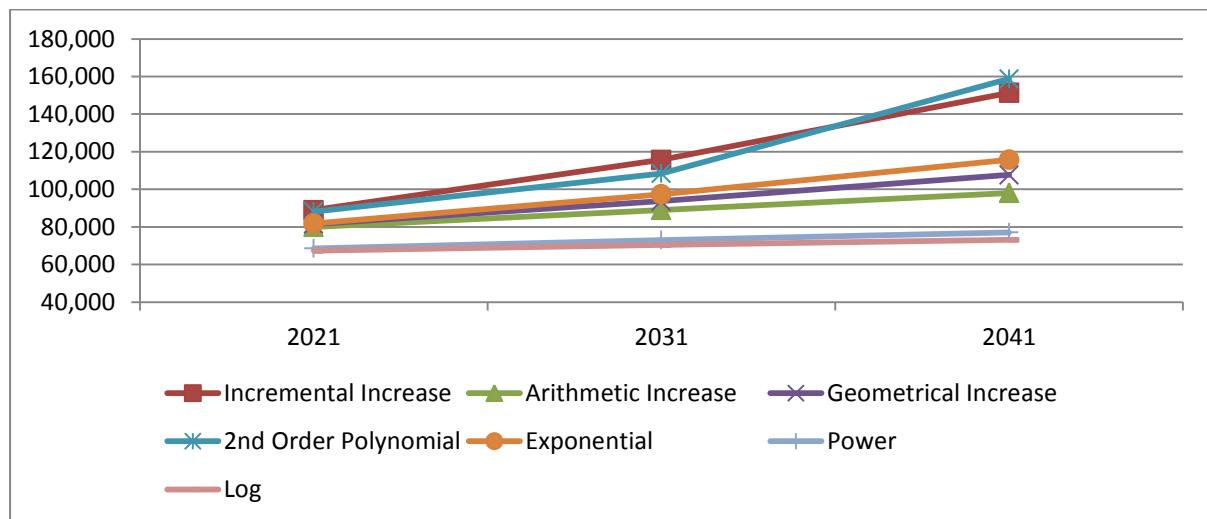
- The Department of Tourism, Goa (DoT) has provided the information w.r.t the tourist in the State of Goa during last 15 years. Also, the DoT has provided figures w.r.t the tourists visiting the Tiswadi Taluka. Based on the available information from the DoT, it was analysed that in span of last four years, on an average 28% of the domestic tourists visiting Goa visit Tiswadi Taluka and in the same manner 25% of the foreign tourists visit Tiswadi Taluka.
- The number of Tourist visiting Goa was projected based on the average growth rate of during the last five years. Also a consultation was undertaken with the DoT w.r.t the growth rate to be adopted for Tourists. Based on the past tourist arrival information and the growth rates, the number of tourists visiting the state were projected. As per assessment, it is projected that the number of tourists visiting Goa would increase from 31.21 lakh in 2013 to 48.83 Lakh in 2021 and the same would be 85.72 Lakh in 2031 and 151 lakh in 2041.
- For the purpose of assessing the population projections for the Panaji city region, it was considered that of the total tourists visiting Goa, 28% domestic and 25% foreign tourists would visit Tiswadi Taluka and all tourists visiting Tiswadi taluka are considered as a tourist population within the city.
- Similarly for projecting the floating population for the city, it was considered that there would be an average 2% growth in the floating population as undertaken in the detailed project report for Solid Waste Management prepared by the CCP.
- As per the 1st generation CDP, the projected population of Panaji has been estimated to 1.11 lakhs in 2030 with overall population density of 137 persons per hectare (PPH). Apart from

this, the detailed project report (DPR) for water supply and sewerage for Panaji and its surrounding areas has estimated a projected population of 1.28 lakhs in 2041. The proposed DPR for Panaji for solid waste management (SWM) has estimated a population of 1.33 lakhs in 2040.

Figure 18 : Population projections in various studies



The base population adopted includes the population of CCP and the seven outgrowth areas as discussed earlier as per 2011 Census. Based on decadal population of the city region from 1971 to 2011 the population projections for 2041 have been estimated using various methods. Various population projection methods like incremental increase, geometric progression, arithmetic method, exponential method have been used to estimate the future population of the city for 2041. The population projection estimated by incremental method and 2nd order Polynomial method are on higher side while the projections by arithmetic, geometrical, power method and log method have been found on lower side. Hence population projections according to these methods are not considered. The population projections by incremental method and 2nd polynomial method have been found close to the population estimated in the DPR for water supply and SWM. Out of these, the incremental method is found more appropriate which estimates population of 1,51,367 by 2041. The population projections through various methods for the next three decades are presented in the Fig and Table below.

Figure 19: Population projections as per various methods**Table 16: Projected Population**

Method/ Year	2021	2031	2041
Polynomial 2nd order	88,149	1,08,415	1,58,781
Arithmetic	80,001	89,010	98,020
Incremental	88,892	115,684	151,367
Geometric	81,565	93,714	107,672
Exponential	81,882	97,356	115,755
Power	68,550	73,017	77,120
Log	67,268	70,402	73,117

Source: Analysis

4.11.2 Basic Assumptions for Population Projection

While adopting the population for the next three decades, the following factors were considered which would influence the city's future growth:

- Urbanization trends in the district and the city;
- Economic activities such as trade and commerce, and tourism;
- Spatial growth pattern and scope of vertical development;and
- Scope to accommodate the future population since the density is on the lower side.
- Floating population in the city

The population projection has been done in two parts. One part includes projection based on the natural growth trend observed over the last five decades while the other part includes projections based on the increase in the floating population over the same period.

- Panaji is a major tourist hub and receives considerable numbers of domestic as well as foreign tourists throughout the year. As the tourist statistics for 2011, Tiswadi taluka received 1,13,6861 tourists which comprised of 6,90,926 domestic tourists and 4,45,935 foreign tourists. Given the fact that Panaji is one of the prime tourist destinations in the taluk, it can be

assumed that the city receives maximum amount of Taluka level tourist's arrivals throughout the year.

- The DPR for SWM has projected the floating population on the basis of the following assumptions:
 - ◆ The city receives 80% of the total tourist recorded in the Tiswadi Taluk (2007)
 - ◆ The working population from the adjoining areas of the city as per 2001 is 11012 and 50% of it communicate to the city on daily basis for various services.
 - ◆ Average annual growth rate of 2% for the floating population
 - ◆ Projected population for city by 2040 is 1,33,778
 - ◆ The projected floating population arrived for Panaji city by 2040 is 27,659.

4.11.3 Recommended Population Projection

Among all the methods, the population projection obtained by incremental method has been considered most appropriate. Thus, the projected population estimated for Panaji CCP for 2041 has been arrived considering the population projection as well as the estimated floating population which sums up to 1,73,756. Considering the same the estimated density of the city will increase from 4,928 persons per km² to 22,048 persons by 2041 which needs to be addressed towards prior planning and expansion of the city area with provision of required infrastructure facilities.

Table 17: Recommended Population Projection – Panaji

	2014 (Estimated)	2021	2031	2041	Growth (21-31)	Growth (31-41)
Base Population (CCP+OG)	75,945	88,892	1,15,684	1,51,367	30.14%	30.85%
Floating Population (Daily)	6468	7430	9059	11043	21.92%	21.90%
Tourist Population (Daily)	2480	3690	6458	11346	75.01%	75.69%
Total Population	84,893	1,00,012	1,31,201	1,73,756		

Source: CRIS Analysis

5. ECONOMIC PROFILE

5.1 Background

Panaji was the head quarter when it was part of the three union territories Goa, Diu and Daman. After that when Goa was declared as separate state it became the state capital and administrative centre concentrating all the administrative offices within the city. The state started getting prominence w.r.t tourism and this contributed to city's economy to a large extent. Tourism and its related proliferating economic activities viz. trade and commerce, tourism related informal activities, hospitality / hotel and restaurants, tours and travels etc. has become the major economic activity in the city during last two decades. Panaji also has significance for tourism based art and artifact trade. It also acts as a major trade centre in the region for agricultural and other commodities from the neighboring small towns and rural areas.

5.2 Overview of economic situation of the state and the city

One of the fast developing states in India, Goa enjoys a high standard of living. The major food crops in the state are rice, paddy, maize, jawar, bajra and ragi. While, main cash crops are coconut, cashew nut, areca nut, sugarcane and fruits like pineapple, mango and banana. Out of the total geographical area of 3702 km², the state has a rich forest cover of about 1424.46 km². Of this, 1224.46 km² has been classified as Government forest (of which about 62% has been brought under Protected Areas (PA) of Wildlife Sanctuaries and National Parks) and the rest as private forests.

The state mainly comprises of industrial potential in the sectors of mining, tourism, agriculture and small/medium scale industries. The land away from the coast is rich in minerals and ores and mining forms the second largest industry. Mining in Goa focuses on ores of iron, Bauxite, manganese, clays, limestone and silica. The Mormagao Port handled 35.13 million tonnes of cargo last year, and accounts for over 39% of India's Iron Ore exports. Tourism is Goa's primary industry; it handles 13% of all foreign tourist arrivals in India. Tourism is generally focused on the coastal areas of Goa, with decreased tourist activity inland. The tourism sector contributes close to 33% to the state's GDP. About half a million people are dependent, directly and indirectly on it. It contributes Rs 1500 crores as taxes to the state and centre combined.⁸ Goa's tourism contributes to 15% of India's total foreign exchange earnings.

Agriculture, while of shrinking importance to the economy over the past four decades, offers part-time employment to a sizable portion of the populace. Rice is the main agricultural crop, followed by areca, cashew and coconut. Fishing is another traditional and important economic activity of the State. Goa, being located on the west coast of India, has a coastline extending over 100 km and inland waterways of another 250 km rich in marine wealth.

Large and Medium scale industries in the state include the manufacturing of pesticides, fertilizers, tyres, tubes, footwear, chemicals, pharmaceuticals, wheat products, steel rolling, fruits and fish canning, cashew nuts, textiles and brewery products. The total number of micro, small and medium enterprises registered in the state from 2006 to 2012 is 3,576. The total number of small scale units

⁸ Coa Chamber of Commerce

as on January 2013 is 7,621. The High Powered Co-ordination Committee (HPCC) has approved/cleared proposals of 13 units during the current year with total investment of Rs.413.4 crore, generating employment to 1,368 persons. The total number of large scale industries as on January 2013 is 189.⁹

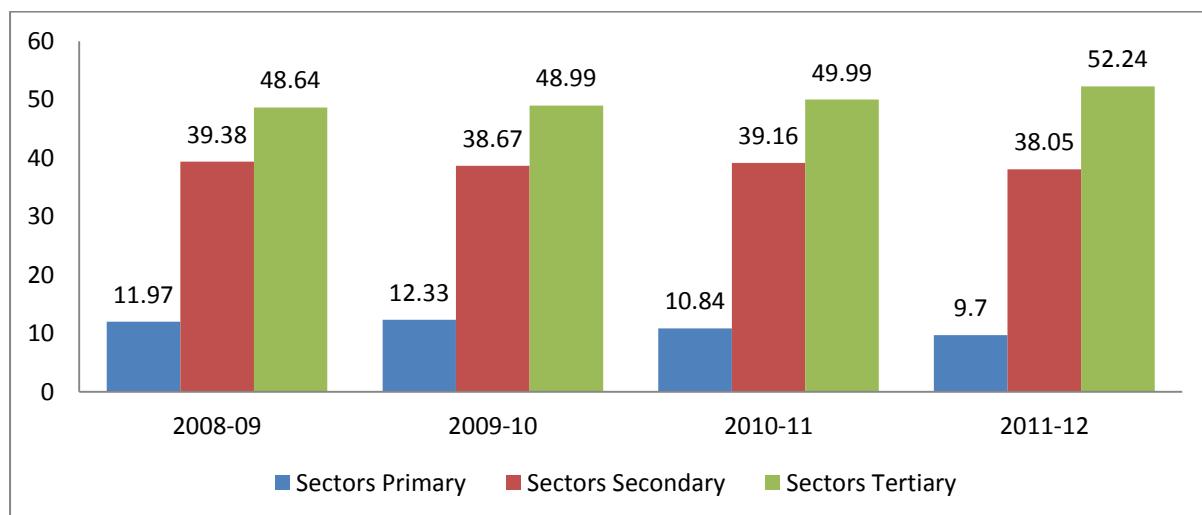
5.2.1 Goa Economic Profile

A. Gross State Domestic Product

The state's economic profile has been analysed on the basis of district-wise data available at constant price in the state. As indicated in the figure below, the tertiary sector has been the major contributor to the state's Gross Domestic Product (GDP). The share of the tertiary sector increased from 49% in 2008-09 to 52% in 2011-12.

The contribution of the secondary sector has decreased from 39% in 2008-09 to 38% in 2011-12. The contribution of the primary sector shows a constant decline from 12% in 2008-09 to 10% in 2011-12.

Figure 20: Sector-wise contribution to the state GDP



Source: *Economic Survey Report for Goa, 2011-12*

Sector wise growth of GSDP for 2011-12 shows that primary sector registered a negative growth of 2.52% while secondary and tertiary sectors grew by 4.22% and 12.06 % respectively. Under the sub-sector of primary sector, fishing had the highest growth rate of 41.81% followed by agriculture with 7.88 %. Forestry and logging depicts a growth of 1.95 % while mining and quarrying showed a negative growth of 7.54 %.

Under the sub-sectors of secondary sector, manufacturing registered a growth of only 2.75% while electricity, gas and water had the highest growth rate of 9.79%. Construction had a growth rate of 7.43%. Under the sub-sectors of tertiary sector, community, social and personal services depict the highest growth of 20.07 %followed by financing and business services which registered a growth of 16.02 % and the sub-sector of transport /storage / communication and trade/ hotels / restaurant had a growth rate of 12.63 % and 2.36 % respectively.

B. Gross District Domestic Product (GDDP)

⁹*Economic Survey Report for Goa, 2011-12*

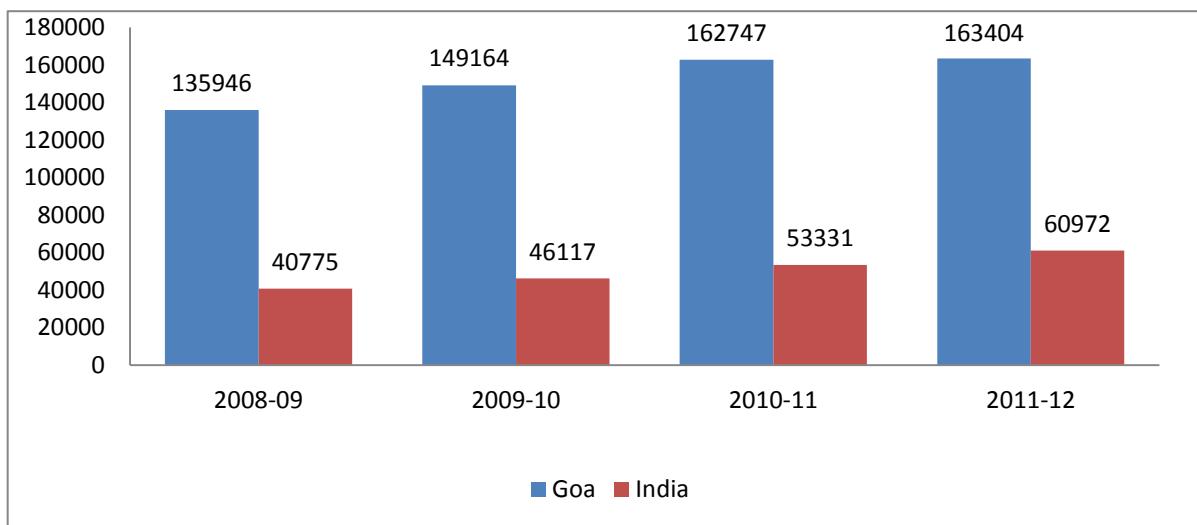
The State Domestic Product (SDP) and its related aggregates reflect the status of economic development of the State. The estimates of State Domestic Product, over a period of time depict the extent and direction of changes in the levels of economic development of the State.

The GSDP at constant (2004-05) prices for the year 2011-12 (quick estimates) is estimated at Rs.23096.82 crore as against Rs. 21201.88 crore for 2010-11 (provisional estimates) reflecting a growth of 8.94 % as compared to 10.15% in 2010-11(P). The GSDP at current prices for the year 2011-12 (Quick estimates) is estimated at Rs 35134.58 crore as against Rs. 33174.83 crore for 2010-11 (Provisional estimates) reflecting a growth of 5.91 % as compared to 13.90 % in 2010-11(P)¹⁰.

C. Per capita Income

The per capita NSDP and NDP comparison of Goa and India at current prices during the years 2008-09 to 2011-12 shows that the per capita income of state during each year of the above said period, was higher than the national level by more than three folds, except for the year 2011-12 where it is 268 % of the NDP¹¹. The Figure below shows comparison of per capita income for state and India.

Figure 21: Per-capita Income comparison Goa-India



Source: Economic Survey Report for Goa, 2011-12

Note: Per Capita Income data for the district/ taluka is not available.

5.2.2 Industrial Policies and Incentives

The State of Goa envisages catalysing economic growth through accelerated industrial development. The mission is to create sustainable employment opportunities mainly to the local people of Goa. It also includes environment friendly industrial development ensuring balanced growth of regions.

The Industrial Policy, has been formulated by the State government with a view to achieve overall economic growth of the State through accelerated industrial development. The policy focuses on the creation of sustainable employment opportunities for the people of the State. The main objectives of the policy are:-

- Promote industries specifically identified as 'Thrust Areas' in the State

¹⁰Economic Survey Report for Goa, 2011-12

¹¹Economic Survey Report for Goa, 2011-12

- Provide industries an access to high quality infrastructural and marketing facilities
- Promote industries which would consume locally available raw materials, have consumption pattern within the State and neighbouring areas
- Develop Goa as the 'Export/Import Hub' and thus encourage export-oriented industries
- Develop self-employment opportunities for the local youth especially in rural and semi urban areas
- Promote and encourage the agro-based industries to give a boost to the rural economy
- Encourage development of handicraft products to give boost to local artisans
- Create a healthy climate for the growth and promotion of small-scale and cottage industries
- Accelerate the process of technological upgradation/ automation in the existing units as well as in new industries so that need of migrant labour is gradually reduced
- Create cluster development centres in rural areas around which traditional livelihood earning professions can develop and thrive
- Encourage industries which can convert existing and generated industrial waste such as mining rejects, slag etc., into useful products
- Encourage participation of women entrepreneurs in the industrial development of the State
- Ensure balanced growth to address regional economic and social disparities in the State
- Promote all such industries that are environment friendly and do not indulge in wasteful consumption of resources
- Facilitate revival and rehabilitation of sick industrial units by devising suitable schemes
- Promote Research and Development (R&D) to enable the industry to have access to state of art technology etc.

Another important policy being, the Information Technology (IT) Policy, which has been announced in order to encourage the IT/ITES (IT enabled Services) industry in the State in a big way. Goa has an ideal advantage to make the State a preferred destination for attracting software and hardware companies as well as promoting local IT companies. It has good infrastructure for promoting IT. Thus, Goa is well placed to move towards being a knowledge society/ economy. Keeping in view such facts, the Government of Goa has designed this policy, which aims to:-

- Create employment opportunities for an increasing proportion of population of the State in diverse sectors of the economy
- Enhance welfare conditions of the citizens of Goa by providing them easy access to required information
- Optimally leverage IT to restructure government-citizen interface with the objective of providing good governance
- Promote IT education in schools, colleges and other educational institutions in the State
- Increase the penetration of personal computers (PCs) in the society
- Facilitate entry of major industry players into the State economy.

5.2.3 North Goa district's Economic Profile

There are about 4595 SSI units in North Goa district out of which 793 SSI units are located in Tiswadi Taluk. However, only 1904 units are functional at district level while 239 units at taluk level. The Table below lists the details of industrial units in the North Goa district.

Table 18: Details of industrial units in North Goa district

S. No	Head	Unit	Particulars
1	Registered industrial unit	No.	4595

S. No	Head	Unit	Particulars
2	Total industrial unit	No.	51,492*
3	Registered medium & large unit	No.	60
4	Estimated avg. No. of daily worker employed in small scale industries	No.	7
5	Employment in large and medium industries	No.	16,000
6	No. of industrial area	No.	12
7	Turnover of small scale industries.	In lakhs	464177**
8	Turnover of medium & large scale industries	In lakhs	NA

Source: "Brief Industrial Profile of North Goa District", Government of India, Ministry o f MSME, Goa. 2012

The SSI units in the district mainly comprises of food products, metal products and parts, wood product and wooden furniture/ fixture, paper products, rubber/plastic/petroleum and coal products, electrical machinery and apparatus, repair/services and beverages and tobacco products. The Table below presents the breakup of the SSI units w.r.t. the products in the district.

Table 19: Details of existing micro & small enterprises and artisan units in the district

SL. No.	Product Group	No. of units
1	Food Products	840
2	Beverages & Tobacco products	272
3	Jute, hemp & Mesta Textile	10
4	Textile Products & Garments	156
5	Wood Products & Wooden Furniture, Fixture	328
6	Paper Products including Printing/publishing	392
7	Leather & Leather Products	26
8	Rubber, Plastic, Petroleum and coal products	374
9	Chemical Products (except 300 Petroleum and coal products)	300
10	Non Metallic Minerals	234
11	Basic Metal & Alloys	141
12	Metal Products & parts (except M/c. & transport eqpt.)	593
13	Machinery, Tools & Parts (except & electrical m/c.)	58
14	Electrical Machinery & Apparatus & Supplier Parts	311
15	Transport Equipment & Parts	48
16	Other Mfg. Industries	220
17	Repair/Services	292
	Total	4,595

Source: "Brief Industrial Profile of North Goa District", Government of India, Ministry o f MSME, Goa. 2012

Apart from this, there are 19 numbers of major large scale industries/public sector undertakings and 18 numbers of medium scale enterprises in the district. The Table below lists the large scale and medium scale industries in the district.

Table 20: List of Large scale and medium scale industries in the district

Large scale/ Major industrial units	Medium scale industrial units
1. United Breweries Ltd., Bethoda, Ponda, Goa	1. Menezes Fish Net Industries, Merces, Tiswadi
2. Glenmark Pharmaceuticals Ltd., Kundaim Ind. Estate, Goa	2. Zenith Magnetic Pvt. Ltd., Porvorim, Bardez
3. Syngenta India Ltd., Corlim, Tiswadi	3. De Nora India Ltd., Kundaim Ind. Estate
4. Madras Rubber Factory (MRF), Usgao, Ponda	4. Ravish Infusion Pvt. Ltd., Kundaim Ind.
5. Sanjivani Sahkari Shakar Kharkana, Tisk, Usgao	5. Rayalseema Concrete Sleepers Pvt. Ltd., Navelim, Bicholim
6. Automobile Corporation of Goa Ltd., Honda, Sattari	6. Goa Glass Pvt. Ltd., Colvale, Bardez,
7. GKB Optilmics, Tivim Ind. Estate	7. Alcon Cement Ltd., Kundaim
8. Goa Antibiotics and Pharmaceuticals Ltd., Tuem, Pernem	8. Guala Closures India Pvt. Ltd, Bicholim
9. Crompton Greaves Ltd., Bethoda Ind. Estate	9. Berger Paints Ltd., Ponda,
10. Funskool India Ltd., Corlim, Tiswadi	10. Nebula Home Products Ltd., Pilerne, Bardez,
11. Sesa Goa Pvt. Ltd., Amona, Bicholim	11. Oriental Containers Ltd., Kundaim, Goa
12. Hytech Lenses Pvt. Ltd., Tivim Ind. Estate	12. Teracom Ltd., Kundaim
13. Nestle India Ltd., Tisk, Usgao	13. B. T. Components Ltd., Madkai, Ponda
14. Unichem Labs Ltd., Pilerne Ind. Estate	14. Excel Caps and Closures, Mapusa, Bardez
15. Procter & Gamble Hygiene & Health Care Ltd., Kundaim Ind. Estate	15. Seagram India Pvt. Ltd., Bicholim
16. A.W. Faber Castel Stationery Pvt. Ltd., Corlim, Ilhas	16. High Mark (India) Pvt. Ltd., Pilerne, Bardez
17. Marico Ind. Ltd., Khandepar, Ponda	17. Goa Formulations Ltd., Honda Ind. Estate
18. Finolex Cable Ltd., Tisk, Usgao	18. Centaur Pharmaceuticals, Karaswada, Mapusa
19. Ranbaxy Laboritories Ltd., Madkai Ind. Estate	

Source: "Brief Industrial Profile of North Goa District", Government of India, Ministry of MSME, Goa. 2012

5.2.4 Panaji City Economic Profile

The economy of Panaji is based on tourism, hospitality or hotel and restaurants and trade and commerce of the city. Apart from this, the tourism based art and artefacts also contribute towards the economy of Panaji. The administrative activities being the administrative centre largely influence the economy of the city. It also forms the market center of the adjoining towns and cities.

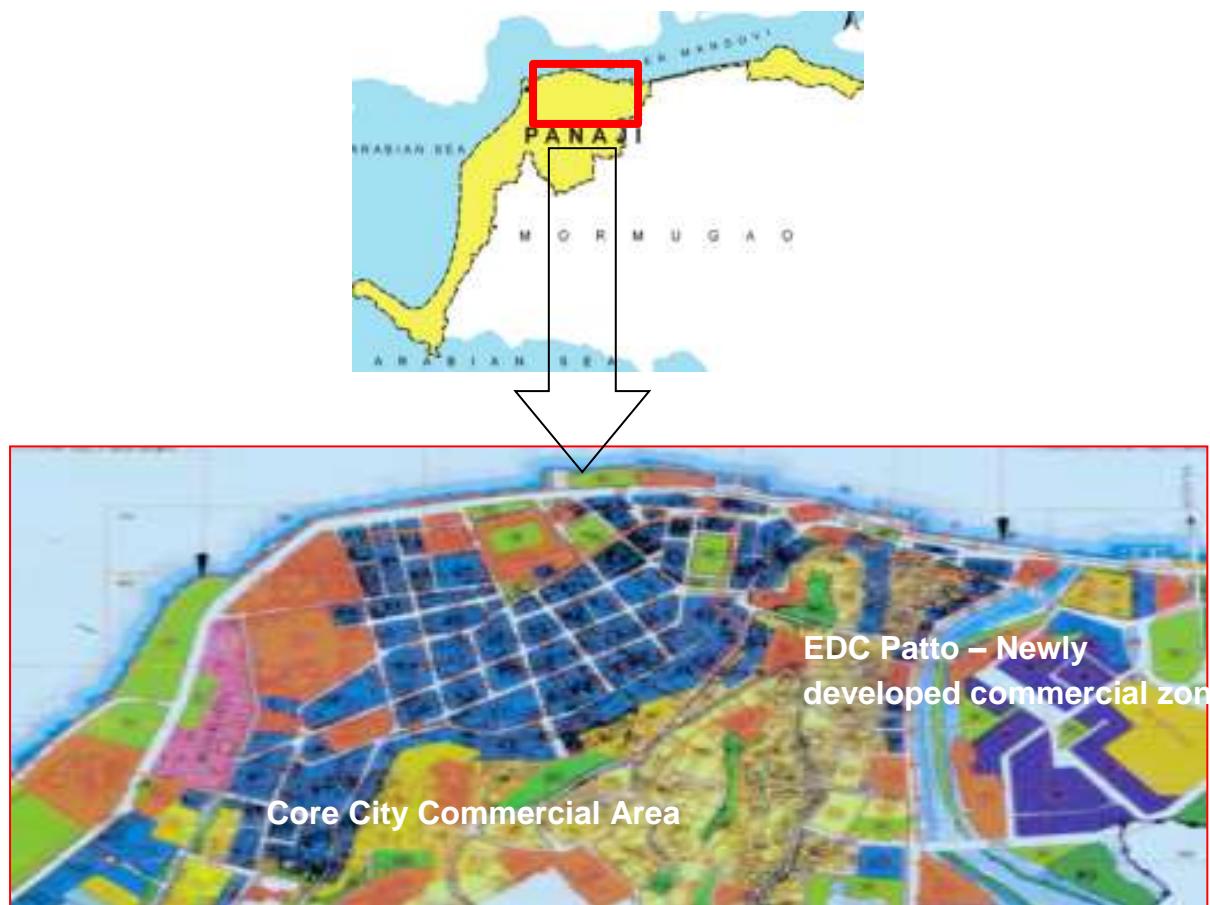
5.3 Economic Infrastructure

5.3.1 Industrial and Commercial Activities

Panaji is majorly a commercial and administrative centre and has large portion of city under commercial activities. As per 2011 Census, about 98% of the city population were engaged in tertiary sector. The commercial areas and markets are concentrated mostly in the Northern part of the city. The core city area of Panaji has evolved into the commercial area due to the tourism potential and related commercial activities. Apart from this new commercial area have been developed in the out growth areas of the city at EDC Patto which is emerging as administrative hub with majority of government offices and departments located in this area.

Various items pertaining to consumer needs, especially electronic goods and building materials are sold in Panaji. Apart from this, there are several hotels, restaurants, food joints, shopping plazas etc to meet the demands of the tourist visiting the city throughout the year. Among the important shopping areas in Panaji are Municipal Building (near Elorado Theatre), St Inez, new municipal market, Praca de commercial building etc. are prominent. The CCP has developed a market building located in the core city area which facilitates all the vegetable, fruit, grocery and other useful commodities to be sold at one place. The mutton market and fish market is separate located adjacent to the Market Complex. The Fig below shows the location and concentration of commercial establishments in the city.

Figure 22: Location of commercial establishments in the city



Source: ODP for Panaji

The city of Panaji does not possess any industrial establishments; yet there are number of industries at a range of 15 km from the city. The Corlim Industrial estate is one of the important industrial

estates located near Panaji which has about 58 industrial units that enhances the economic prospects of the city. The city is ecologically sensitive zone and not favourable for heavy and medium industries. Handicraft and cottage industries supporting tourism is prevalent in the city.

5.3.2 Tourism

Tourism is Goa's primary industry handles 12% of all foreign tourist arrivals in India. Due to the rule of the Portuguese for over 450 years and the consequential influence of Portuguese culture, Goa presents a unique multicultural identity to the foreign visitor than other parts of the country. Apart from that the state is also famous for its excellent beaches, churches, and temples. The total tourist arrival in the state for 2011-12 was 27.88 lakhs with 23.37 lakhs domestic and 4.50 lakh foreign tourists¹².

Panaji is one of the prime tourist attractions in the state having good geographical setting, administrative centre, availability of good tourist infrastructure and its good accessibility to other tourist destinations. The city's economy thrives on various economic activities supporting tourism sector. As per the data from Department of Tourism for 2011 the city of Panaji received 6.90 lakh domestic tourists and 4.45 foreign tourists. The tourist arrival in the city has increased by 10% from 2008-2011 which is quite phenomenal. Hence, tourism will remain the backbone of the state as well as the city's economy in the coming future.

5.3.3 Informal Commercial Activity

The informal sector employment generally consists of employees without formal contracts, worker benefits or social protection employed by formal /informal enterprises/ employers or by households. The latter are mostly casual laborers, temporary or part time workers; paid domestic workers; unregistered or undeclared workers; and industrial out workers (also called home workers) (Chen et al 2006). Tourism is a source of economic opportunity for a large number of people in the informal sector. It opens occupational avenues where people do not require much capital to enter, thereby providing an entry point into the market.

Based on the data from the Economic Census reports of Goa for 1977, 1980, 1990 and 1998, it can be easily observed that in Goa the informal sector employment, especially in the non-agricultural sector has been rising over a period of time. If the persons employed in the informal sector as a percentage of the total workers (main and marginal) in the economy is taken one finds that informal workers were 43.42% of the workers in 1981 and by 1991, their share rose to 53.13%. According to the 55th round of NSSO on Employment and Unemployment workers in the unorganized sector, comprise 75.36 percent of all workers while organized workers are only one fourth of the total workers 24.64% in Goa.

In Goa, the informal sector is dominated by services in the community and social sector, the trade, hotel and tourism sector and the manufacturing and repair works sector. Thus informal service sector in the economy seems to have picked up momentum due to;

- (i) the large public sector presence in community services which led to the expansion of employment in this sector initially, but later many private sector enterprises, came up in the decade of the 1990s to provide personal services like laundries, hair dressing salons, tailors and domestic services,
- (ii) the forward and backward linkages in tourism, trade and transport resulting in the growth of hotels and restaurants,

¹²Department of Tourism, Goa

- (iii) the increase in consumer demand in favor of durable goods and the inability of the manufacturing sector (due to the state's industrial policy) to meet the growing demand has resulted in the increase in regional trade and transport,
- (iv) the durable goods and vehicles accumulated by the households in the 90s have generated the growth of services in the informal sector for the repair, maintenance and servicing of these goods and
- (v) the mushrooming of private institutions in health and education has also contributed much to the growth of other services during the period.

However, this pattern of growth has led to more demand for consumer-based goods and services rather than producer goods. Thus, growth of tourism services, manufacturing, and repairs services has created a large informal sector economy in Goa. The informal sector in Goa contributes significantly to its total employment but workers under it do not enjoy any social security net, job security and protected employment.

The state is one of the most sought destinations and to ensure the safety and security of the tourists the state government with the assistance of Travel and Tourism Association of Goa (TTAG) has implied restrictions on the operations of informal commercial activities in the state. "TTAG's position is to ensure that tourists are not harassed and therefore to not allow vendors on the beach. The government can earmark positions/ vending zones every kilometer / a couple of kilometers from where the vendors can operate."

In 1999, TTAG started its active role towards the cleaning up of towns and now they are working towards making the beaches free of informal sector. To quote from an article featured in 1999, "public streets and markets in Goa's major towns now look more spacious and clean, but at the cost of over 5000 hawkers and kiosk-runners being deprived of their livelihood".

The municipal authorities in the state have moved into action to obey the high court order to clean the illegal structures against which the traders have moved to the Supreme Court with a request to postpone the deadline till the authorities rehabilitate them in an organised manner.

The government authorities in the meanwhile also admit that they have not applied mind to create satellite markets in the growing cities like Panaji, Mapusa, Vasco, Margao and Ponda due to increasing urbanisation in the tourist state." In 2010, there were security personnel deployed at popular beaches and other spots and were given the task to ensure that beggars and vendors are kept away so that they do not irritate tourists.

- In Goa, the informal activity is carried out by vendors which can be categorised in two groups. First, are stationary vendors who run their business in a tiny shop/ or at a permanent location and the other mobile vendors who roam around the beaches / village to sell the products.
 - ◆ Street vending spans the rural-urban divide and attracts a large number of people selling goods and services on streets or footpaths near temples, heritage sites, beaches, parks, museums. They offer goods and services such as fresh fruits, vegetables, cooked food, snacks, clothing, guide books, jewelry, tattoos, and souvenirs at low prices making them an indispensable feature of the tourism landscape. The state is a popular tourist destination among both foreign and domestic tourists. There long history of engagement of civil society organisations with the issues of tourism as well as street vending in beach areas.
 - ◆ Given the present outlook and stern steps towards the informal sector growth in the state, Panaji also is presently not experiencing any major informal activities within its jurisdiction.

- ◆ The city core area as well as the other residential areas of the city do not have existence of hawkers and vendors occupying or lined up along the city roads or city pockets. However, at Dona Paula there is a stretch of 64 stalls operated by Goanwomen for many years. The stalls are open throughout the year except for about two weeks when the water comes up from the sea. In the past, vendors at Dona Paula have faced evictions. The Municipality has provided a space near the police station, away from the beach. However, as the tourists do not venture into that area, the vendors are not keen on shifting and continue to stay where they are.



- The city of Panaji is tourist hub with complex tourist related activities which forms the economy of the people. Apart from the formal and informal commercial activities prevalent in the city, there are other economic activities like hiring of private vehicles for the tourists which are always in high demand. There are various options available for the tourists which includes, motorcycle pilot bike, private bikes, private cars as well as taxis. The operators need to register the operations to the appropriate authority. However there are lot of operators which operate without registration due to lack of strict enforcement of rules for such operations.



- Similarly other informal activities includes operations of water sports activities, tourist guides, etc. The water sports activities has been recently banned in the state due to death of tourists during one such activities which was not having proper license for operating water activities.
- There is also lack of proper information based system to hire a tourist guide developed by the state government/ department of tourism where all such people are registered and the tourists can have easy and reliable access to this facility.
- Licensing Policy for the shacks on the coastline of Goa, Code of Ethics for Responsible Tourism are few of the initiatives taken by civil society organisations to address the issues arising out of tourism.

5.4 Workforce Participation Rate

According to the provisional Census of 2011, the total number of workers in the Panaji city is 17,077 while 14,441 are non-workers. However, due to the exclusion of adjoining OG from the city area since 2002, the present workforce shows a sharp decline from 23,177 in 2001 to 17,077 in 2011. In order to estimate appropriate present workforce the total workforce including CCP and OGs is considered for 2011. In 2001, the work participation rate was 39.23%. The work participation rate (WPR) shows an increase from 39.23 % to 42.56% since 2001 to 2011 respectively. It is higher than the WPR of district and Tiswadi Taluk which is 40% and 41.4% respectively. The increase in economic activities and employment opportunities has caused the increase in work participation rate in 2011. The Table shows the work participation rate observed over last two decades in Panaji city.

Table 21: Work Participation Rate

S. No.	Details	2001	2011
1	Total workers (main + marginal)	23,177	30,220
2	Total Non-workers	35,889	40,771
	Work Participation Rate (WPR)	39.23	42.56

Source: *Census of India and CDP Panaji, 2006*

5.5 Work Force Classification

The composition of the work force conveys a picture of the way of life of the people and their social and economic activities. The workers' classification has been carried out on the basis of main workers' data available from 2001 to 2011. The workers have been classified into the primary sector, secondary sector and tertiary sector. The primary sector workers comprise agriculture and cultivation labourers. The secondary sector comprises of manufacturing and household industries. The tertiary sector comprises workers involved in the service sector, trade and commerce, and informal business activity.

The total work force in the city has increased from 23,177 in 2001 to 30,220 in 2011. The total workforce consists of 91.7% of main workers and 8.3% of marginal workers engaged in primary, secondary and tertiary activities as per 2011 census.

5.5.1 Primary sector

The primary sector work force has been minimal in 2001 and 2011. In 2001 merely 184 workers were engaged in primary sector which increased to 383 workers in 2011. The major reason for its least

contribution can be due to the highly urbanisation of the city from the past years, city's economic activities and the geographical setting due to which agriculture and related activities are not practiced in the city.

5.5.2 Secondary sector

The secondary sector work force in the city also has been very less in 2001 and 2011. In 2001 the total secondary work force was 372 which increased to 424 in 2011. The city is mainly a tourist destination and administrative centre. The city is not well known for any household industry and related works. Moreover, the city's population is mostly engaged in various service sector jobs supporting tourism and the administrative activities of the city. Hence, the workforce engaged in the secondary sector has been very less in the last two decades.

5.5.3 Tertiary sector

The majority of the work force in the 2001 was predominately engaged in tertiary sector (97.6%). which has been almost same in 2011 with 97.32 % of the total work force in the tertiary sector. The city's economy is predominantly dependent on tourism and related activities which serves as the state's tourist hub. The city has been also administrative centre of the state and houses all the government offices. Apart from this, it is also a major trade and commerce centre with high concentration of commercial activities. All these combined involves a large section of work force. Hence, tertiary sector has been predominant in the city in the last two decades. The table and figure below depicts the work force classification of the city's population for the years 2001 and 2011.

Table 22: Details of Workforce

S. No.	Sector	2001		2011	
		No.	%	No.	%
1	Main workers	21,761	93.89%	27,709	91.69%
2	Marginal workers	1,416	6.11%	2,511	8.31%
	Primary sector	184	0.79%	383	1.27%
	Secondary sector	372	1.61%	424	1.40%
	Tertiary sector	22,621	97.60%	29,413	97.33%
Total work force (Main +Marginal)		23,177		30,220	

Source: Census of India and CDP Panaji, 2006

There is no major change in the work force classification pattern of the city in the last decade. In 2011, the workforce engaged in primary and secondary sectors has changed minimally. The tertiary sector has been predominant in 2001 and 2011 including to more than 95% of the total work force. The Figure below depicts the sectorwise performance in the city in 2001 and 2011.

5.6 Key Issues/ Observations

- Tourism is the major economic driver of the city which acts as a tourist hub for the tourists visiting the state. Apart from this second highest contributor to its economy is trade and commerce.

- The work participation rate (WPR) shows an increase from 39.23 % to 42.56% since 2001 to 2011 respectively. The work force participation of the city is 43% which is higher than the district and taluk average WPR.
- Very minimal work force employed in primary and secondary sectors (3%) while 98% of work force employed in tertiary sector. The city is administrative centre, trade and commerce centre and tourist hub. This economic profile of the city is the main reason for the high % of work force engaged in the tertiary activities. This also indicates very high level of urbanization in the city. There are no major industries within or in the surroundings of the city. The city being located in the CRZ zone and ecologically sensitive zone has not been favourable for industrial development. However, this has been favourable for the growth of tourism activities which now is the major economy of the city.
- There is lack of adequate policy level measures for regularise and benefit the informal sector activities within the state inspite of being one of major contributor in the economy.
- The hawking and informal commercial activities are restricted in the city to ensure safety and no harassment be caused to the tourists by the state government. This has also restricted the littering activities within the cities.
- The high concentration of commercial activities in the city causes various city level problems like traffic congestion, on street parking activities, air pollution, noise pollution etc which needs to be addressed.
- The presence of wholesale markets and godowns within the core city attracts goods traffic into the city which adds to the traffic congestion and circulation within the city. There is no alternate area or market area which can accommodate these activities which need not be functioning within the city core.

6. PHYSICAL PLANNING ANDGROWTH MANAGEMENT

6.1 Background

In Goa, the Town and Country Planning Department (TCPD), Government of Goa and North Goa Planning and Development Authority (NGPDA) are the agencies responsible for the urban planning function for Panaji. The role of TCPD is statutory under the Town and Country Planning Act (T&CP Act) 1974 and advisory in nature for all the developmental activities. The TCPD is a physical planning and development control department for the State government of Goa, with an objective to implement various plans mentioned below;

- Regional Plan - For the entire State of Goa.
- Outline development plans (ODP) /zoning plans -For all the notified planning areas (NPA),non-PDA towns and villages for which plans are prepared.
- Traffic and Transportation Plan.
- Conservation Area Plans.
- Development Plans for areas around Railway stations.
- Consultancy and Technical services for Government/Semi-Government agencies- Rehabilitation/Layout plans for Residential/Industrial developments.
- Landscape Architecture services and Landscape Plans.
- Listing of Heritage buildings/ sites in the state of Goa

The spatial planning of Panaji was initially governed by zoning plans prepared in the post-liberation period. The ODP was finalized by the NGPDA in 1989 and revised later in 1997. There is no revised master plan for the city after the 1997 ODP. The ODP for the city has mapped the existing and proposed land use pattern in the city limits with all the amenities, road network, major natural features and building footprints.

6.2 Critical appraisal of Outline Development Plan (ODP)

The ODP has been prepared for the city which includes the mapping of the all the city areas with existing and proposed land use, amenities and road network. The ODP for Panaji includes the following.

- Indicate broadly the manner in which the land in the planning area is proposed to be used;
- Allocate areas or zones of land for use —
 - ◆ For residential, commercial, industrial and agricultural purposes;
 - ◆ For public and semi-public open spaces, parks and playgrounds; and
 - ◆ For such other purposes as the Planning and Development Authority may think fit;
- Indicate, define and provide—
 - ◆ For existing and proposed national high-ways, arterial roads, ring roads and major streets; and
 - ◆ For existing and proposed lines of communications, including railways, tram-ways, airports and canals;

- Regulate within such zone, the location, height, number of storeys and size of buildings and other structures, the size of yards, courts and other open spaces, and the use of buildings, structures and land.

However, based on the discussions it was understood that the ODP for Panaji has been prepared in the earlier years for regulating the urban growth within the city's limit. The ODP is required to address the future requirements of urban growth and expansion of the city due to high urbanization over the years which is found missing in the current plan. Also there has been no revision w.r.t to the inclusion of the surrounding outgrowth areas of Panaji in the ODP and integration, of Panaji as well as the out-growth areas, towards a regional approach towards urban planning for better administration and proposing regional infrastructure such as connectivity, tourism development, transportation etc. The ODPs looked upon as entities confined to the city jurisdiction they are implied on are missing on the regional development approach. The state government, taking into account these short comings of the ODPs initiated Regional Plan for Goa for the horizon year 2021 which will address to the present requirement of development and growth and facilitate development of the overall region in a planned and equity based manner. The existing ODP is presented in Figure 24 which shows the land use pattern proposed for Panaji.

6.3 Building regulations proposed as per the Outline Development Plan (ODP)

The building regulations proposed as per the Outline Development Plan for Panaji have been listed in the Table below.

Table 23: Building Regulations applicable to various zones as per The Goa Land Development and Building Construction Regulations, 2010

Zone	Min width of road	Max permissible coverage	Max permissible F.A.R.	Min front setback	Max permissible height
Residential (ODP/ Zoning Plan)					
S4/R4	6.0 m	40%	50	3.0 m	7.6 m
S3/R3	6.0 m	40%	60		9.0 m
S2/R2	6.0 m	40%	80		11.5 m
S1/R1	6.0 m	40%	100		15.0 m
Commercial					
C4	8.0 m		80	5.0 m	9.0 m
C3	8.0 m		100		14.0 m
C2	8.0 m	40%	150		20.5 m
C1*	10.0 m		200	10.0 m	24.0 m
CS	10.0 m	40%	250		28.0 m
Recreational					
R	6.0 m	5%	5	5.0 m	3.0 m
Public (Institutional and Recreational)					
P	6.0 m	33 1/3%	100	5.0 m	15.0 m

Source: Official Gazette, Government of Goa, 2010

Notes:

- 1) C1* zones shall be restricted to Central Business District (CBD) areas of Municipal Council/ /Corporation areas of Panaji, Margao, Mormugao, Mapusa and Ponda only. ODP's shall demarcate such areas in the plans.
- 2) Wherever commercial use is proposed in Zones S1, S2, S3, & S4, the minimum front setback stipulated shall be 5.00 m.
- 3) Farm houses within A1 and A2 zones shall be permitted, provided these lands are not classified as "Rice" (Paddy field) in Survey Records and "Forest" under Forest Act.
- 4) In zones where the coverage is specified as 40%, the same may be relaxed to 50% if the construction is restricted to ground and one upper floor only.
- 5) Wherein basement is not provided 50% of the covered area in buildings falling in zones C1 and C2 have to be compulsorily reserved for parking on stilts.
- 6) In case prescribed parking area is provided on the plot itself, Compulsion of Stilt/Basement should not be insisted upon.
- 7) Wherever construction of basement is possible beyond the ground floor coverage, for parking purpose, additional basement area extending beyond the ground floor coverage may be permitted, which shall not be considered in coverage calculation.
- 8) In case of areas falling within CRZ shall be strictly governed as per CRZ Regulations in force.
- 9) In the settlement zone in Regional Plan, the normal uses permitted are residential and its complimentary uses, commercial and its complimentary uses, recreational, public utilities and services only. Any other uses may be permitted on special grounds by the Government on merit of each case.
- 10) In case of special commercial the clear space of the 5 mts. shall be left all around the building. In case of a building with dead wall on one side a clear way of 5 mts. shall be kept and the clear height of 4.5 mts.
- 11) In all buildings only one stilt floor either on the ground floor or on the first floor shall be counted free for FAR purpose.
- 12) All the areas outside the ODP (Outline Development Plan) shall conform to the classification of settlements as approved in the finally notified Regional Plan for Goa 2021.
- 13) In IT parks established by Department of Information Technology, Government of Goa, IT/ITES shall be allowed on all plots/premises abutting on roads of more than 10 meter with a maximum FAR of 150.
- 14) In Zone P building shall be allowed with FAR of 100 on all plots fronting roads having width less than 8 meter, however on roads having width of more than 8 meter the FAR shall be 125. The maximum height of building in Zone P shall be 16 meters.

6.4 Constituents of Planning Area

The Panaji city which is covered under the revised ODP covers a total area of 8.30 km² which covers entire city and parts of outgrowth areas. The city area was restricted to core city after gaining the status of City Corporation which comprises a total area of 8.12 km².

6.5 Projected Population under Outline Development Plan

The ODP for Panaji has been prepared for the CCP jurisdiction. The ODP does not project population growth over the years and is been a tool to regulate the physical growth, building bye laws and land use zoning within the city as per its zoning regulations

6.6 Spatial Growth Trends

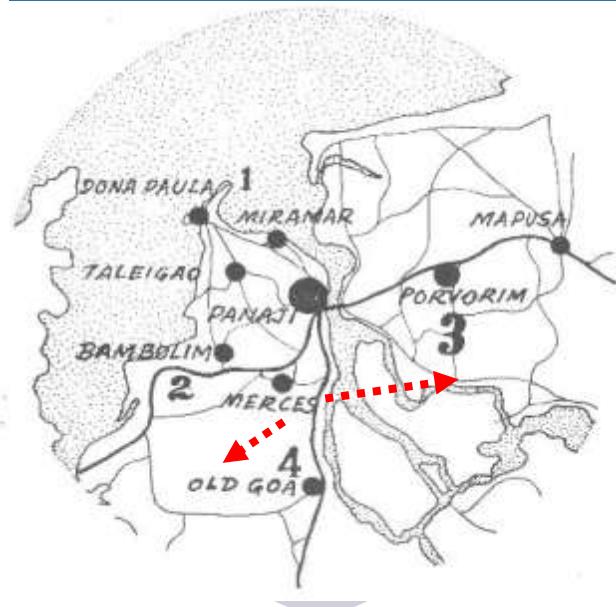
Panaji, when found, was well defined by the River Mandovi, the Ourem Creek and the Altinho hillock. Naturally, these formed physical barriers for the city's expansion. Consequently, initial outlets for growth were along Miramar and Caranzalem.

As the city grew, peripheral villages Taleigao, St. Cruz, Merces and Bambolim fled the pressure of this natural expansion. Development of strong linkages in the form of bridges across the River Mandovi provided a sitting for the induced expansion at Porvorim. As a result, the population of Porvorim, then consisting of four small villages, now has a population that almost equals Panaji's population.

The natural expansion of the city in the direction of Miramar-Caranzalem has been shifted to some extent on account of the reservation of a large portion of available land (230 hectares) on the plateau for the use of Goa University. As a result, this area has also become a low-density, posh residential area. The only option therefore was for Porvorim to gain importance as a major satellite of Panaji. This has been compounded by the fact that Goa's new Legislative Assembly complex located at the Porvorim Plateau is essentially being used for residential purposes and bears the typical characteristic of a dormitory town with a few scattered institutional buildings. As a consequence, commercial ribbon-development along the NH17 has taken place. This is an undesirable trend, which needs some measure of control. Another trend that is developing is that of conurbation between Panaji and Mapusa diminishing the rural-urban distinction.

The city is highly dense and will keep growing over the years putting pressure on the land use. The city is has already changed its residential character to commercial and institutional being the administrative and economic hub. The high influx of tourist throughout the year has caused high increase in commercial establishments catering to the needs of the tourists. The residential areas in the city have shifted towards the new areas which were proposed and developed under the proposed ODP. Due to the high real estate price, congestion and densification there is shift of residential areas to the adjoining outgrowths of the city. It is therefore important to plan the future development of these adjoining outgrowth areas along with the city area in a planned manner and with the view of reducing the load on Panaji.

Figure 23: Spatial Growth Trends - Panaji



6.6.1 Land Rates

Since many decades, Goa has been considered as the most popular destination for owning a holiday home – both by Indians and foreigners alike. The pristine beaches, white sands, colourful flea markets, and most importantly the architectural diversity make Goa a holiday home buyer's ultimate paradise.

Real estate in Panaji is booming due to the rising number of monumental structures, residential complexes and educational institutes. Land property in Panaji needs to be expanded as industries, hotels, tourist-spots are growing in huge numbers. The city is located very close to the River Mandovi hence the weather is very pleasant and cool. Thus, increasing number of people are investing on Panaji land property. Tourists coming from various parts of the world are gradually setting up their base in the capital city of Goa for more than one reason. Real estate industry players confirm that the prices of flats, apartments and bungalows in the tourist belt and urban areas of Goa have got hotter in the last five years. Land prices are also being revalued every six months, inevitably escalating the cost further. Experts admit that the prices in localities like Dona Paula, near Panaji, which is overlooking the Arabian Sea have gone out of bound for middle or upper middle class families.

With several million tourists visiting the state each year, Goa gives very high rental returns. Most of the foreign tourists who come to Goa stay for longer periods, thus renting a holiday home is more practical option. Additionally, hotels of Goa are unable to accommodate the huge rush the state sees during peak season. As such holiday homes become the only alternative for tourists.

The available data on land rates has been examined to understand the real estate growth/trends in the city. As indicated in the Table below, Altinho, Dona Paula, Miramar and Porvorim are the prime areas having a land value of ranging from about Rs 3000 - Rs. 39000 per sq. ft. The commercial areas of the city possess property values ranging from Rs 3000 – Rs 9500 per sq. ft. The Table depicts average land rates prevalent for properties for various areas within the city as well as in its emerging developments.

Table 24: Land rates in per square feet in various zones in the city and its surroundings

Sl. No	Name of the area	Zone	Flats/Apartments	Individual houses	Plots
1	Panaji Bazaar	Central	5500	9500	600
2	Panaji city	Central	7000	3500	1000
3	Dona Paula	South	9500	6000	5750
4	Miramar	South	9000	-	-
5	Altinho	Northern	3000	19000	-
6	Caranzelam	North	3500	-	-
7	Kadamba Circle	North - East	7500	4500	1200
8	Porvorim	North	4000	39000	-
9	Taleigaon	South	6500	6500	2000

Source: Sulekha properties

6.7 Spatial Distribution of Population

Panaji, being the state capital and district head quarter and also tourism hub, has the maximum pressure of development activity. The central area of Panaji has grid-iron pattern and was initially dominated by a large number of buildings of administrative, civic and religious uses later changed into a commercial areas due to sharp increaseof price of land in the central area. As a consequence, there is a high intensity land use which has generated traffic congestion, breakdown of civic infrastructure and marginalization of the pedestrian movement. The rapid growth of city without increase in its physical area has resulted in many problems like gap between the demand and supply of basic

infrastructure and amenities. This has further disturbed the circulation system as well as the drainage system.

6.8 Land Use Analysis

The existing land use for Panaji CCP has been analysed to assess the present urban growth and area allocation earmarked for various land uses as per the URDPFI norms. The city area has 66% of developed area while 34% of undevelopable area. The city's landuse is predominantly of residential type (50.91%) with a high concentration of commercial land use within the core city area (15.45%). A major portion of the city is part of eco sensitive zone consisting of 4% land under water shed, 4% land under conservation while 25% of the land under natural resources. These totally consume 34% of the total city area which is not permissible for urban growth and expansion. The city has no industrial set ups hence no land is under industrial land use. The land use pattern for the city has been compared and assessed with the URDPFI guidelines in the further section. The Table 21 below gives the breakup of the existing land use within the city.

Table 25: Existing Land use for Panaji

S. No	Land use	Area in sq. km.	%
1	Residential	2.80	50.91
2	Commercial	0.85	15.45
3	Industrial	-	
4	Institutional/ Government	0.75	13.64
5	Transport/ Communications	0.30	5.45
6	Parks/ Playground	0.80	14.55
	Developed Area	5.50 (66%)	100%
7	Natural Resources	2.09	
8	Conservation/ Preservation	0.34	
9	Defence land	0.07	
10	Watershed	0.30	
	Undevelopable area	2.80 (34%)	
	Total	8. 30¹³ (100%)	

Source: CDP Panaji, 2006

6.8.1 Comparison with URDPFI guidelines

The existing land use has been compared with URDPFI guidelines to assess the adequacy of existing areas under various category/zones. As indicated in the Table below, the city lacks adequate land use share under recreational and transportation landuse. The residential, commercial and public and semi-public use is meeting URDPFI guidelines but exceeds the norms. The residential character of the city is predominet. However, high percentage of area under commercial and public-semi public is

¹³ The area in the table under, adding upto 8.30 km² is as per the Outline Development Plan (ODP) prepared by the North Goa Planning Authority.

mainly due to the city's commercial growth and existence of all state administrative offices in the city. The Table below shows a comparison of the existing land use in the city with URDPFI guidelines.

Table 26: Existing land use and comparison with URDPFI guidelines

Category	URDPFI guidelines	Existing	Meets the benchmark
Residential	40-45%	50.91%	exceeds
Commercial	3-4%	15.45%	exceeds
Industrial	8-10%	0%	Nil
Public & Semi Public	10-12%	13.64%	exceeds
Recreational	18-20%	14.55%	no
Transportation	12-14%	5.45%	no

Source: *URDPFI guidelines, 2014 and CDP, 2006*

6.8.1.1 Residential Use

The residential area contributes to 50.91% of the total land use in the city. As per URDPFI guidelines 40 to 45% of the total land use should be under residential purpose. Hence the residential area in the city is adequate and in excess. The residential area of the city is mainly concentrated towards the Southern part of the city. The residential areas include areas of Altinho, Campal, Miramar, Donapaula, Caranzalem, St. Inez etc.

6.8.1.2 Commercial Use

The total commercial land use in the city is 15.45% which is mainly concentrated in the old city area of Panaji which is much higher than the URDPFI norms. The city is the commercial and tourist hub with 98% work force employed in the tertiary sector. As seen in the figure above the commercial area of the city is spread across entire core city area occupying more area than the norms. The commercial areas include the core city area and newly proposed commercial area at EDC, Patto.

6.8.1.3 Industrial

Presently no industries/industrial estates located within the city limits and its surroundings.

6.8.1.4 Public and Semi-public zones

The public and semi-public areas contribute to about 13.64% of the total land use which is slightly higher than the URDPFI guidelines of 10 -12%. Being administrative centre it has concentration of all government offices and other public utilities like auditoriums, community halls, public library, educational institutions, churches, temples etc. . The public and semi-public areas are mostly concentrated in the central core city along with the thriving commercial areas.

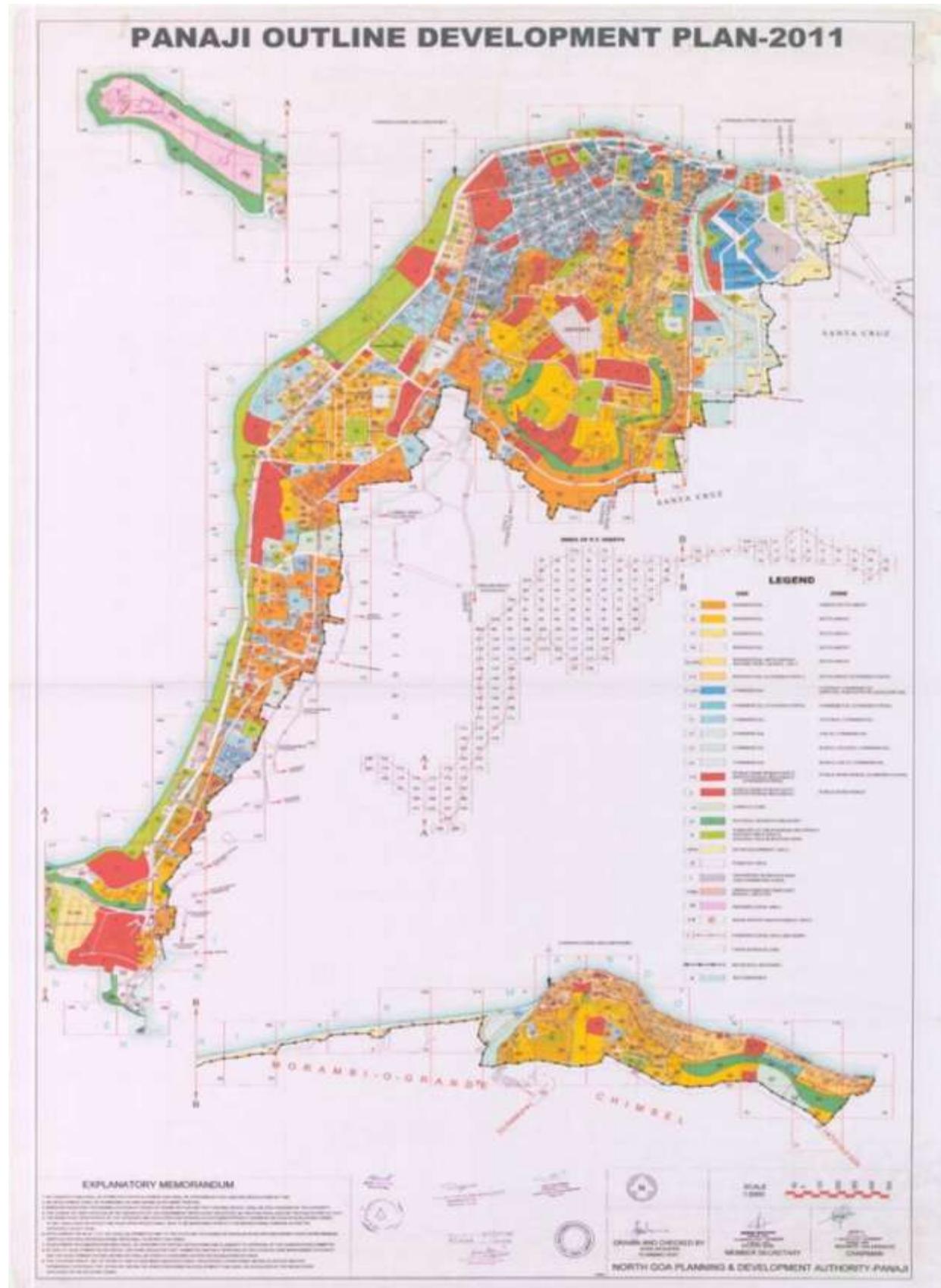
6.8.1.5 Recreational

As per the URDPFI guidelines a minimum of 18-20% of the total city area should be allocated for recreational purpose. Hence, Panaji has inadequate parks, playgrounds at present which covers only 14.55% of the city area scattered all over the city. Moreover, these areas lack recreational activities/focal point which can attract the locals as well as tourists. The parks also lack adequate infrastructure like landscaping, children play area, jogging tracks, cafeteria etc. The details of the parks located in the city has been explained further in detail in Section 7 of this report

6.8.1.6 Transportation

The roads and transportation zone contributes to only about 5.45% of the total land use which is inadequate when compared to the guidelines. As per the URDPFI norms at least 12-14 % of the land should be under roads and transportation zone. The road network of the city comprises of major spine road NH-4A passing throughout from North to South. Grid iron pattern road network planned during the time of Portugal rule forms the city core of the city. The city roads have no scope for expansion due to inavailability of adequate land in the city limits.

Figure 24: Outline Development Plan for Panaji



6.9 Regional Plan - Goa 2021

In Goa, there are five planning areas viz. Panaji Planning area, Mapusa Planning area, Vasco Planning area, Margao Planning area and Ponda Planning area which are administered and controlled through the ODPs and the relevant sections of the TCP Act 1974 by the respective planning and development authorities (PDA). A number of plans in form of ODP and Zonal Plans (ZP) have been prepared in the past, implemented and used for development control. A frequent overlapping of the Regional Plan 2001 vis-à-vis the Zoning Plans, ODP etc. has been observed. There have been frequent alterations of administrative boundaries of the PDAs resulting in to issues pertaining to lack of congruence between multiple plans and lack of transparency among the public. Recently the state Level committee (SLC) has recommended streamlining of present scenario by discontinuing the old practice of ODPs and the zoning Plans and bringing all the areas (outside the Planning Areas) into a single platform of the Regional Plan for Goa (RPG) 2021. After the RPG is implied all other plans shall not be applicable for the development areas within the state.

The state level committee has prepared the Report for RPG-2021 and at present it is under the process of amendments after which it will be taken up for implementation. RP 2021 is a plan that promotes growth within a framework of conservation. It recognizes the environmental problems that the two major sectors viz. mining and tourism, have caused to the state. The main thrust of the plan has been creating Eco-Sensitive Zones so as to conserve the natural and cultural heritage of the state. Further in order to correct imbalanced development within the state as well as to separate Goa-destined and non Goa-destined traffic, the roads in the midlands are proposed to be upgraded and 3 new hubs are planned at intersections of road and rail networks. New hubs are proposed in the midland areas in Pernem, Usgaon-Dharbandora and Quepem. Midlands are being developed through infrastructure development.

The Pernem hub is in the vicinity of the newly proposed international airport at the Northern tip of Goa- at Mopa, Pernem. Also planned is a commuter train service within Goa which will help a number of daily commuters within the state, who often depend on erratic bus services for their commute. It is hoped that this will lead to a reduced growth rate in the coastal belt and an accelerated growth rate in the midlands. Settlement plans are to be developed by the settlements in keeping with the spirit of the 73rd/74th CAA. A tourism master plan is to be put in place and for tourist hot-spots critical area plans are to be prepared. Mining leases which are in EcoSensitive Zones are to be phased out.

Figure 25: Regional growth and landuse as per Regional Plan 2021

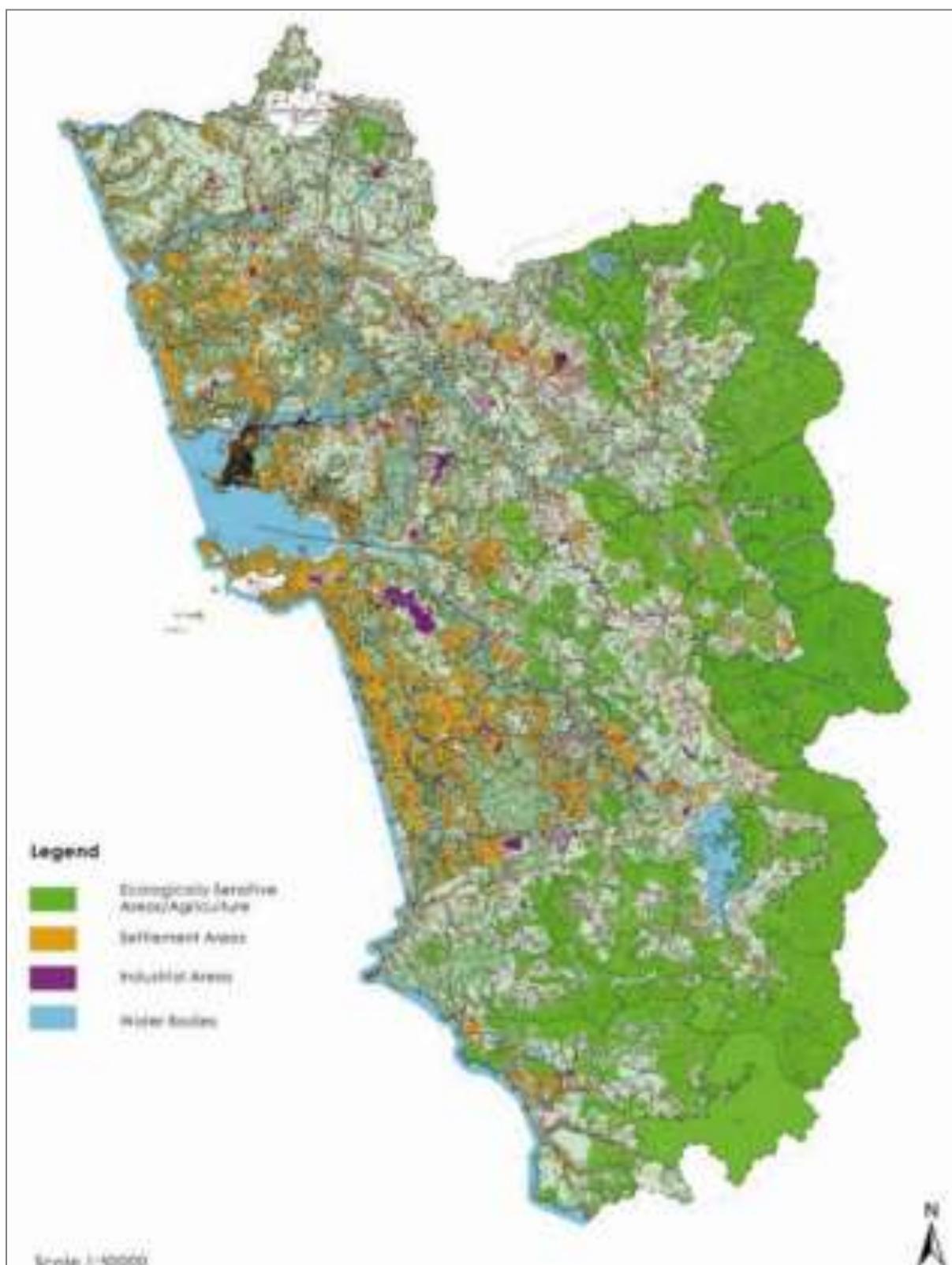
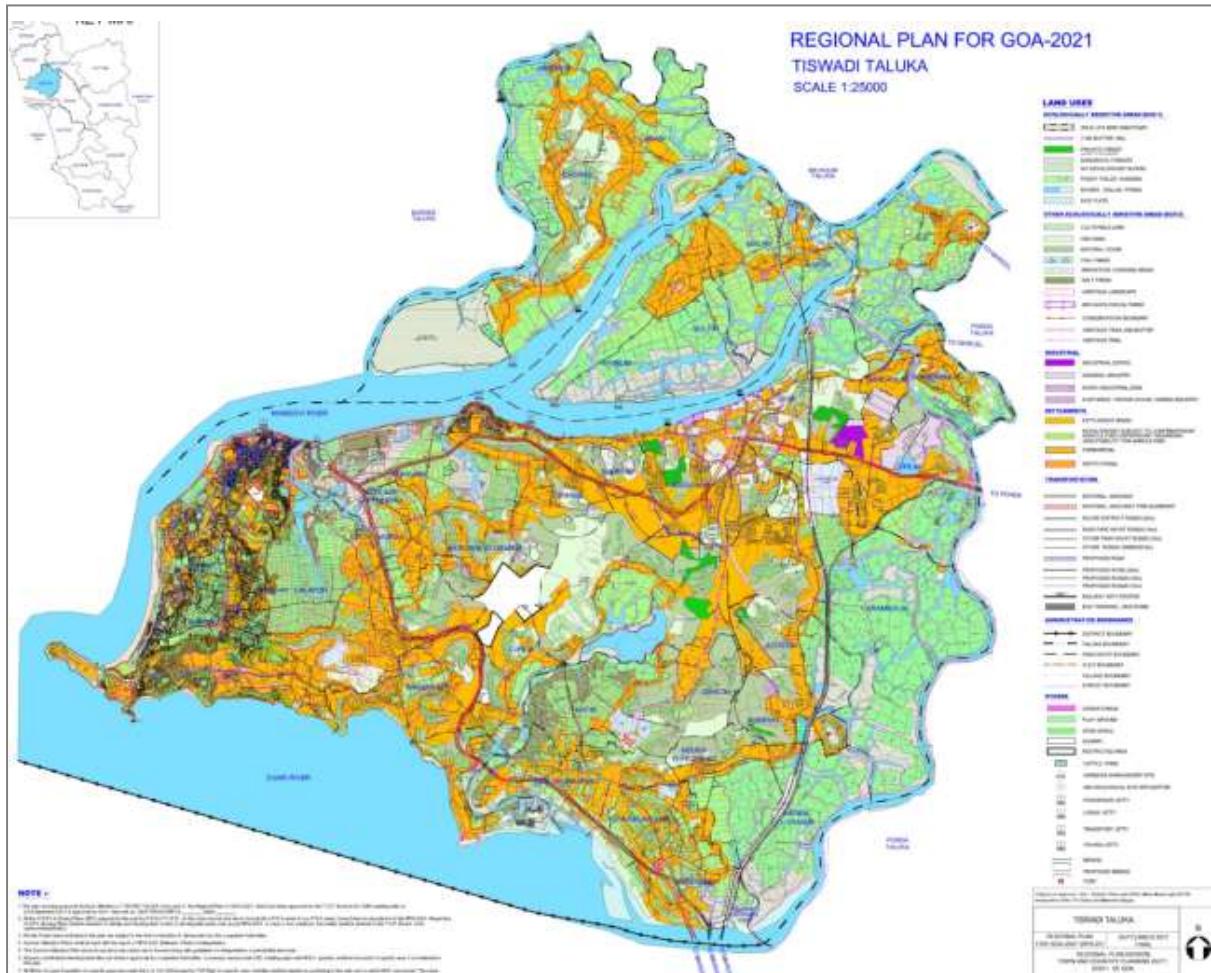


Figure 26: Regional Plan for Tiswadi Taluka

Source: *Regional Plan 2021*

6.10 Urban planning functions and reforms

The responsibility of urban and land use planning in Goa is vested on the Town and Country Planning Department (TCPD). The Town and Country Planning Department is statutory body formed under the T&CP Act, 1974 and responsible for all the developmental activities under the other relevant Acts, Regulations/Byelaws/Rules framed under them applicable in the state. It is a physical planning and development control department for the state, with an objective to implement various development plans like regional plan, outline development plans/ zoning plans, traffic & transportation plan, conservation area plans, development plans for areas around railway stations, rehabilitation/ layout plans for residential/ industrial developments, landscape planning and listing of heritage buildings/ sites. The TCPD is headed by a Chief Town Planner (CTP) who reports to the chairman who is the Minister in charge of town and country planning. The CTP is assisted by Town Planning Officers (TPO) and further by the department staff at the main office such as town planning supervisors and draftsmen.

In, Goa under the ambit of TCP Act 1974, two development authorities viz. North Goa planning and development authority (NGPDA) and South Goa planning and development authority (SGPDA) are constituted with a mandate of planning and development control in their area. Panaji, being situated in the North Goa district, comes under the purview of NGPDA. The primary function of the development

authority is to prepare land use plans, area development plans, regulate and ensure that the building byelaws are followed as per the ODP for the city.

6.10.1 Goa Town and Country Planning Act

a) Town and Country Planning Department

The functions of the TCPD is to guide, direct and assist the Planning and Development Authorities, to advise the Government in matters relating to the planning, development and use of rural and urban land in the state, and to perform such other functions as the Government may, from time to time, assign to the Board.

- Direct the preparation of development plans by the Planning and Development Authorities;
- Undertake, assist and encourage the collection, maintenance and publication of statistics, bulletins and monographs on planning and its methodology;
- Co-ordinate and advice on the planning and implementation of physical development programmes within the state;
- Prepare and furnish reports relating to the working of this Act; and
- Perform such other functions as are incidental, supplemental or consequential to any of the functions aforesaid or which may be prescribed.

b) North Goa Planning and Development Authority

The major functions of North Goa Planning and Development Authority are as follows:

- To prepare an Existing Land Use Map;
- To prepare an Outline Development Plan;
- To prepare a Comprehensive Development Plan;
- To prepare and prescribe uses of land within its area; and
- To prepare schemes of development and undertake their implementation,

For these purposes, it may carry out surveys of the planning area, prepare report/ survey reports and perform such other functions as required.

c) Heritage committee under Town and Country Planning Department

The Outline Development Plan 2011 (ODP) of Panaji has declared five areas as "Conservation Zone", and marked as "F" category. They are (1) Campal, (2) Mandovi river fronts (3) Fontainhas & Portais, (4) Altinho and (5) Fondevem, Ribandar. These five conservation areas consist of distinct heritage value (comprising of 1000 odd buildings) within the city.

The TCPD has formed a heritage committee whose main function is to work towards the conservation and preservation of the heritage areas, sites and structures within the state. The Town and Country Planning Department (T&CP) has surveyed the structures in the city and listed all the structures and sites in the city having heritage value. As per this list there are about 118 heritage structures/ sites in Panaji itself located in the heritage zones earmarked. (Refer Annexure 4). The TCPD is in process of formulating regulatory guidelines to regulate the development in these areas with the assistance of Charles Correa Foundation (CCF).

6.10.2 Corporation of City of Panaji Act, 2002

a) Corporation for the City of Panaji (CCP)

The city of Panaji Corporation Act 2002 has been enacted under the Goa Municipalities Act, 1968. The Act has been implemented taking into consideration the 74th Constitutional Amendment Act. Although the act defines the power, discretionary and obligatory functions of municipality, most of the

functions are still performed by the state level departments. As per the CCP Act, 2002, responsibility of CCP is only to the extent of providing services w.r.t. construction licenses, solid waste management, and birth and death registration.

6.10.3 Reforms

The Goa Town and Country Planning Act has witnessed several amendments/ reforms as per the changing scenario of land development in the state. The same has been applicable for the city of Panaji.

The Constitution of India was amended in 1992 (73rd for Rural India and 74th for Urban India) to ensure down-top participatory governance (through Municipalities and Village Panchayats) with the support of on-going top-down legislative and financial dispensations through the Center and the States of the Union. The state of Goa is no exception despite a 1996 model Urban and Regional Planning and Development Plans Formulation (URDPFI) guidelines as recommended by the Ministry of Urban Development, Government of India and subsequent stress on Governance reforms (2002) as a prerequisite for accessing JNNURM funds. On these lines, the state government has constituted a Committee (2010) to propose a new/ amended Town and Country Planning Act (no time-frame has been indicated in the notification).¹⁴

6.10.4 Roles and responsibilities of CCP and Parastatals

The function of town planning has not been transferred on real-time basis to CCP. As mentioned earlier; TCPD and NGPDA are responsible for the urban planning function within the state and city. The key roles and responsibilities of the agencies are indicated in the table below.

Table 27: Roles and responsibilities of CCP and para-statal agencies in urban planning

Agency	Roles and Responsibility
TCPD and NGPDA	Under the city planning functions, urban planning and preparation of master and land use plans is the responsibility of the parastatals agencies viz. Town and Country Planning Office (TCPO) and North Goa Planning and Development Authority (NGPDA)
CCP	The function of building plan approval and issue of construction license is executed by CCP.

6.10.5 Key Observations/ Issues

- Out of the total area of 8.30 sq. km 5.5 sq. km. (66%) is developed while 2.8 sq. km. (34%) is under non developable land. Hence, the city is facing an acute shortage of developable land at present with no scope for future expansion.
- The city has predominantly residential character with 50.91% of area under residential land use. The city has high percentage of area under commercial and public and semi public use being a major tourist hub and administrative centre of the state.
- There is high deficit of area under traffic and transportation 5.45% as compared to the URDPFI guidelines norms of 12-14%. This is due to the city's growth along the water front

¹⁴ "The recommended Goa Development Planning Act – 2010", Fr. Maverick Fernandes -Executive Secretary, Council for Social Justice and Peace,

which is served by one major road. The other roads are mainly the commercial and residential roads inter connected and linked to this major spine passing throughout the city. There is no land available for the expansion of the present road network within the city.

- The recreational areas within the city contribute to 14.55% of the total developed area which is at present inadequate as per URDPFI guidelines and needs to be improved with proper infrastructure facilities.
- The city lacks a proper land use planning for the future growth and expansion of the city. At present the ODP for Panaji covers only the CCP area and its outgrowth areas which have already urbanized. There is lack of proper mapping of the administrative boundaries within the CCP area and surrounding outgrowth areas.
- The CCP has a very minimal role in the development planning of the city

7. SOCIAL INFRASTRUCTURE

7.1 Background

Panaji houses major educational and health facilities. The city has number of primary, secondary and higher secondary schools in the city. Apart from this, the city has various colleges and technical institutions. The health facilities of the city are taken care by the Goa hospital located in Bambolim which also has the Medical College. Apart from this, there are plenty of health facilities in the city provided by the private sector. The city has number of parks and playground facilities to cater to the needs of the people. Presently CCP is not having a major role in the provision of various social infrastructures except maintenance of few city level parks.

7.2 Health Facilities

The Directorate of Health Services, Goa is the government body is providing and operating the public health facilities in the city. The CCP has no role presently in the provision of the health facilities in the city.

7.2.1 Existing Situation

The city of Panaji is well equipped with good health facilities. There are number of private multi-specialty hospitals, clinics and dispensaries which are adequate to cater to the city's present need. Goa Medical College hospital is the government hospital which is located in Bambolim adjacent to the CCP area. There is one urban health centre maintained by Directorate of Health Services, Goa with a staff of 95 employees including 6 nos. of doctors and 40 nos. of nurses within the Panaji CCP. On an average it receives 80 to 100 patients per day. Apart from this, there is one medical laboratory at Campal. The health facilities in the city are mainly located in the areas adjoining the core city area towards the Northern part of the city. The Northern part of the city is equipped with major city level health amenities and remains accessible for the city as well as the adjoining urban centres and rural areas due to good connectivity. Thus, at present the health facilities catering to the city region are adequate. The health facilities in the city are presented in Table below.

Table 28: Health facilities in Panaji

S. No.	Health facilities	Number
1	Goa Medical College Hospital in Bambolim	1
2	Urban Health centre, Panaji CCP	1
3	Medical Laboratory, Panaji CCP	1
4	Health centre	3
5	Family Welfare Centre	3
6	Nursing home	5
7	TB clinic	1
8	Other Medical institutions	11

Source: Panaji CCP and *ibid*

7.2.2 Public Health Indicators

The health indicators which represent the health conditions in the city have been listed in the Table 29 and 26. Total births and occurred in the city has been almost the same over the past years except in 2012-13. The infant mortality rate is quite low in the state in comparison to the national average.

Table 29:Health Indicators

Description	2008-09	2009-10	2010-11	2011-12	2012-13
No. of births	929	968	929	952	1058
No. of deaths	563	508	534	520	608

Source: PanajiCCP

Table 30: Comparison of Health Indicators

Indicators	Goa state (2011)	India (2012 -13)
Life expectancy at birth	NA	NA
Infant mortality rate (%) ¹⁵	11	44
Maternal mortality ratio ¹⁶	NA	212
Total fertility rate	NA	2.4

7.2.3 Role of CCP in Health Programmes

The CCP is not involved in health programmes or schemes for the welfare of the people. The Health Department is only body taking care of the health facilities in the city.

7.2.4 Comparison with URDPFI norms

The health facilities within the city at present includes adequate numbers of nursing homes, child welfare and maternity centres, general hospital and urban health centre/ diagnostic centre. However, the city has inadequate numbers of dispensaries and no facilities like polyclinic, veterinary hospital and vet dispensary. The Table below lists the existing health facilities in comparison with the URDPFI norms.

Table 31: Health Facilities

Health care facility	UDPFI Guidelines	Requirement as per guidelines	No. of hospitals	Met the Benchmark
Dispensary	1 for 15000 population	5	1	No
Nursing home, child	45000 to 1 lakh population	2	8	Yes

¹⁵The Infant mortality rate (IMR) which is the number of deaths of children less than one year of age per 1000 live births.

¹⁶Maternal mortality ratio defined as pregnancy-related death of a woman per 1000 live births

Health care facility	UDPFI Guidelines	Requirement as per guidelines	No. of hospitals	Met the Benchmark
welfare and maternity centre				
Polyclinic	1 for 1 lakh population	1	1	Yes
General Hospital (NBC)	1 for 2.5 lakh population	1	1	Yes
Urban Health centre Diagnostic centre	1 for 0.5 lakh population	2	4	Yes
Veterinary Hospital for pets and animals	1 for 5 lakh population	2	4	Yes
Dispensary for pet animals and birds	1 for 1 lakh population	8	8	Yes

7.2.5 Key Issues

- The present health facilities for the city lack health facilities like dispensaries, polyclinic, veterinary hospital and dispensary for pet animals and birds as per URDPFI norms.

7.3 Educational Facilities

7.3.1 Existing Situation

The public educational facilities within the city are managed under the Directorate of Education, Goa. Panaji is educational centre and houses well known educational institutes. The city's educational institutes offers various degree courses, professional education courses and technical courses. There are nine higher secondary schools, one open school and three special schools in the city. Apart from this, there are two degree colleges, nine professional education colleges, six public libraries and two technical institutes in the city.



The city educational facilities comprises of well known schools and high schools viz. •Don Bosco High School, Sharada Mandir at Miramar, Rosary High School at Miramar, Mary Immaculate Girls High School at Fontainhas, Santa Cruz High School at Santa Cruz, Peoples High School at Mala etc. The Goa Medical college is located in Bambolim which lies in the outskirts of the Panaji city. Other prestigious educational institutions like Goa College of Architecture, Goa College of Arts & Sciences, Goa College of Pharmacy, Dempo College of Commerce and Economics at Altinho, Dhempe College of Arts and Sciences at Miramar, V. M. Salgaocar College of Law at Miramar are also housed in Panaji. The city also has other educational facilities like public libraries. The Goa University is located at Taleigao in the vicinity of the city limits.

The educational facilities in Panaji are adequate with sufficient number of educational institutes and teaching staff. The high literacy rate of 87% in Panaji city as per 2011 Census confirms availability of adequate educational facilities in the city. The major concentration of the educational facilities is also towards the Northern and Eastern part of the city. The major educational institutions like Polytechnic college, Goa college of Arts and Goa medical college and well known schools like Don Bosco, Mary

Immaculate Girls High School etc are located around the core city area in the Northern and Eastern part of the city. However, given the city's area the educational facilities are easily accessible to the entire city. The Table below shows the details of educational facilities within the city.

Table 32: Educational facilities

S. No	Educational facilities	Numbers	Enrolment			Teachers			Student to Teacher Ratio
			Boys	Girls	Total	Boys	Girls	Total	
1	Primary	18	-	-	3543	-	-	130	27
2	Secondary	13	-	-	8199	-	-	276	30
3	Higher Secondary schools	9	737	685	1422	-	-	149	10
4	Special schools	3	91	77	168	5	23	28	6
5	Open Schools	1	136	66	202	0	0	0	-
6	Degree colleges	2	675	1205	1880	26	50	76	25
7	Professional Education colleges	9	910	1530	2440	46	70	116	21
8	Technical Institutes	2	1050	279	1329	64	33	97	14

Source: Directorate of Education, Goa

7.3.2 Comparison with URDPFI norms

The educational facilities within the city at present includes adequate numbers of pre-primary, nursery school, primary school, senior secondary school, degree colleges, technical education centres, medical college and other professional course colleges. This indicates the city is well equipped with good educational facilities. The literacy rate in the city is also high with 87% literates as per 2011 Census. However, the city lacks facilities like integrated school (with hostel facility), schools for physically challenged and mentally challenged, engineering college and nursing and paramedical institute. The Table below lists the existing educational facilities in comparison with the URDPFI norms.

Table 33: Existing education facilities' comparison with URDPFI norms

Educational facilities	URDPFI Guidelines	Actual requirement for 2013	Existing 2013	Met the Benchmark
Pre-primary to secondary education				
Pre-primary, nursery school	1 for 2500 population	28	33	Yes
Primary school	1 for 5000 population	14	18	Yes
Senior secondary school	1 for 7500 population	10	27	Yes

Educational facilities	URDPFI Guidelines	Actual requirement for 2013	Existing 2013	Met the Benchmark
Integrated school (with hostel facility)	1 for 90000 to 1 lakh	1	0	No
School for physically challenged	1 for 45000 population	1	0	No
School for mentally challenged	1 for 10 lakh population	1	0	No
Higher education				
College	1 for 1.25 lakh	1	11	Yes
Technical education	1 for 10 lakh population	1	2	Yes
Professional education				
Engineering college	1 for 10 lakh population	1	0	No
Medical college	1 for 10 lakh population	1	1	Yes
Other professional college	1 for 10 lakh population	1	1	Yes
Nursing and paramedical institute	1 for 10 lakh population	1	0	No

7.3.3 Key Concerns

- The high literacy rate in the city indicates good access to educational facilities in the city.
- Assessing the educational facilities w.r.t the city region population as per URDPFI guidelines the present educational facilities in the city is good with adequate preprimary, primary, senior secondary, degree colleges, technical education institute, medical college and other professional courses colleges.
- However, the city lacks educational facilities like engineering college, school for physically challenged, school for mentally challenged, integrated school facility and nursing and paramedical institute.

7.4 PAWS – Panaji Animal Welfare Society

PAWS - Panjim Animal Welfare Society is an NGO animal shelter. PAWS rescues and brings the dogs for treatment and eventually for adoption at their shelter located St.Inez, Panjim. The dogs are taken care of and nursed to health if they are sick. If they dogs are healthy, they are immediately put up for adoption on the social networking website of the PAWS.



Photographs of the animals put up for adoption on the page of PAWS on the social networking website

7.5 Recreation

7.5.1 City-Level Parks and playgrounds

The green spaces in Panaji are managed and maintained either under CCP or Forest department, Government of Goa. There are 14 numbers of parks and 25 numbers of other lawns / landscaped traffic islands in the CCP area. As per the present land use pattern 0.80 km² of the city area is under parks and open spaces which is 14.55% of the total area. This does not suffice the minimum allocation of 18-20% under recreational zone as per urban and regional design plan formulation and implementation (URDPFI) guidelines. Hence, the city has inadequate number of parks and open spaces.

Miramar is the only recreational area within the municipal limits which is extensively used as a recreational area by the residents, visitors, both domestic and international tourists. Apart from this, there are city level parks and playgrounds which are less preferred by the locals due to lack of proper infrastructure and poor maintainence. The city is equipped with other recreational facilities like 3 cinema halls and 11 auditoriums. The prominent among these is the Kala Academy which is well known internationally for its cultural programmes.

Table 34: List of Parks and Open spaces

S. No	Parks/ Open space	Locality
1	Garcia De Horta (Municipal Garden)	Church square
2	Peixe Mulher Garden	Opposite Tourism residency
3	Menezes Braganza	City centre
4	Salvador Souza	-
5	Francisco Luis Gomes	Campal
6	Opposite Collectors Office	Panaji
7	Near River Navigation	Panaji
8	Military Garden	Campal
9	Garden Esperanca Hospital	Miramar

S. No	Parks/ Open space	Locality
10	Bogolin Villas Garden	Miramar
11	Around Transformer	Miramar
12	Rotary Garden	Miramar
13	Opp. Baban Naik's Residence	-
14	Island around D.B Monument	-
15	Joggers Park, Altinho	Altinho
16	Peixe Mulher Garden	-

Source: Panaji CCP

7.5.2 Comparison with URDPFI norms

The parks facilities within the city at present include adequate numbers of housing area park, neighbourhood parks and community parks. However, the city lacks city and district level parks within the city. The city has 14.55% of the land use under open spaces and parks which is inadequate as per the norms. The area of the parks within the city is not available hence the breakup of various hierarchies of park area's adequacy or deficit as per the URDPFI norms has not been assessed. The Table below lists the existing parks facilities in comparison with the URDPFI norms.

Table 35: Comparison of existing parks with URDPFI guidelines

Category of park	No. of parks required	Unit area in Ha	Required area in Ha (2013)	Existing facilities (nos.)	Met the Benchmark
Housing Area Park	1 for 5000 population	0.5	7	16	Yes
Neighbourhood park	1 for 15000 population	1	5		
Community park	1 for 1 lakh population	5	5		
District park	1 for 5 lakh population	25	25	0	No
Sub city park	1 for 10 lakh population	100	100	0	No
Total			292	80	

Source: ODP, Panaji and URDPFI guidelines

7.5.3 Sports centre and Stadiums

The Sports Authority of Goa is the administrative body which is responsible to plan, develop, construct, acquire, take over, manage, maintain and utilize sports infrastructure, facilities , ancillary buildings, play fields, grounds etc in Goa, as per the directives of the Government of Goa.

Presently there is an indoor stadium in the city located at Campal developed by Sports Authority of Goa. It has facilities for athletics, swimming table tennis, boxing, judo and volleyball. A number of sports events take place inside this state-of-the-art facility.

7.5.4 Comparison with URDPFI norms

Table 36: Comparison of existing facility with URDPFI guidelines

Playground	UDRFI Guidelines	Area in Ha	Required area in Ha 2013	Existing facilities (nos.)	Met the Benchmark
Residential unit play area	1 for 5000 population	0.5	7	N.A.	N.A
Neighbourhood play area	1 for 15000 population	1.5	7	1	Yes
District sports center	1 for 100000 population	8	8	1	Yes
Divisional sports center	1 for 1000000 population	20	20	0	No
Total			42	2	

Source: *URDPFI guidelines*

7.5.5 Commercial facilities

Panaji has a total commercial area of 0.85 km² which constitutes 15.45% of the total city land use. Panaji is a major trade centre as well as the tourist hub which has given thrust on increase in the commercial establishments in the city. The city core has been predominantly become the commercial hub of the city. There is one market building in the city which is built by CCP Panaji which includes the vegetable market, fish market, fruit market and other commodities. Apart from this, the Panaji CCP possesses four commercial properties, eight municipal plots and five petrol pumps in the city. The detail of the same has been listed in the table below.

Table 37: Municipal Property/ Commercial Complexes

Location	Purpose Used For	Number of Shops
1. Commercial buildings		
Near Old Eldorado	Cinema hall	1
Tonca Municipal Building, Talaegaon	Commercial	1
Office building of Panaji CCP	Administration	1
Praca de Comercio	Commercial	1
2. Municipal land		1
Cafeteria plot at Panjim	Commercial	1
Municipal plot at St. Inez		1
Municipal Plot at Cine National Hall	Commercial	1
Municipal market plot surrounding the CCP office	Commercial	1
Municipal plot at Ninho Infantil Fountainhas	-	1
Municipal plot at Azad Maidan	-	1

Location	Purpose Used For	Number of Shops
Municipal plot at Boca de Vaca	-	1
Plot at Sao Pedro village panchyat	-	1
3. Petrol pumps	-	
Sinary Petrol pump	Commercial	1
Umesh Keni petrol pump	Commercial	1
Contoco petrol pump	Commercial	1
Mr Dalvi Petrol pump	Commercial	1
P.P. Agency Petrol pump	Commercial	1

Source: Panaji CCP

7.5.6 Other facilities

The other amenities include one post office with two sub post offices, three cinema halls, one stadium, eleven community halls, five numbers of public libraries and six numbers of reading rooms. The city is also well equipped with major banks, ATM outlets, commodity shops and markets. The city being tourist hub has adequate number of accommodation facilities viz. hotels, guest houses, resorts, tourist homes etc of all income groups, restaurants, taxi and two wheeler hire groups, tour guides, signage and other essential tourist facilities. There is one burial ground and one Hindu crematorium located at St. Inez which is maintained by CCP.

7.5.7 Fire and Emergency services

The Fire Service in Goa has been constituted under the Fire Force Act 1986. Under section 4 of the Act, the superintendence and control of the Fire Force vests with the Director of Fire and Emergency Services. Operationally fire service consists of one headquarter, three sub divisions and a fire prevention and training Cell, each headed by a gazetted officer.

A fire station is the basic unit of fire service organisation. Two or three appliances of the above description and an ambulance are provided under the charge of a station officer / assistant station officer depending on the risk potential and area to be covered by the station. In order to ensure effective command and control, fire stations are grouped under command of Asst. Divisional Officer for operational activities. There are three sub-divisions viz Panaji, Ponda and Margao each under the control of respective Assistant Divisional Officer's for mobilisation.

At present there are twelve numbers of fire stations and one headquarters with an approved technical strength of 524 personnel and 44 articulated vehicles of various nomenclature. The fire stations are located in the state at Panaji, Margao, Vasco, Curchorem, Canacona, Pernem, Mapusa, Ponda, Bicholim, Valpoi, Old-Goa and Verna.

The district fire station Panaji includes the urban centres of Panaji, Mapusa, Pernem, Vasco and Pilerne and located in St Inez. It has a fire station and a training academy. It caters to Panaji city and the surrounding areas for firefighting and other emergency services. The district fire station of Panaji is well equipped at present for the firefighting mitigation in the city and the other urban centers under its purview. The Table below lists the firefighting equipments located in District Fire station of Panaji.

Table 38: Fire fighting facilities in Panaji

S. No	Fire fighting equipments	Total	Panaji Fire station
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S. No	Fire fighting equipments	Total	Panaji Fire station
1	Water Tender	07	02
2	Heavy water tender	01	-
3	Multipurpose tender	01	-
4	Break down Van	01	-
5	Rescue Tender	01	-
6	Fire Hydrants	30	01
7	Motorcycle	04	01
8	Ambulance	04	01
9	Quick Response Vehicle	01	-
	Total	20	05

Source: District Fire station, Panaji

Table 39: Staff details of District Fire station, Panaji

S. No.	Staff details	Total	Panaji Fire station
1	AssistantDivisional Officer (ADO)	01	
2	Station Fire Officer (SFC)	05	01
3	Sub Officer/Asst. Station Fire Officer (ASFO)	08	03
4	Lift/Fire Fighters	26	06
5	Watch Room Operator (WRO)	07	-
6	D/OPT	29	08
7	Fire Fighters (F/F)	69	15
	Total	145	33

Source: District Fire station, Panaji

7.5.8 Key Concerns

- High percentage of city area under commercial use (15.45%) with adequate number of shopping centres, markets, vegetable market and fish market.
- The city is well equipped with tourist amenities and acts as the tourist hub for the tourists visiting the state.
- As per the URDPFI norms, there are inadequate city level recreational and open spaces (14.55%). Moreover, the present parks are not developed as multi recreational facilities which can be used by the locals as well as the tourists and less preferred by the locals
- Some of the city parks are still under the maintenance of the Goa State Forest Department. Maintenance of these parks needs to be transferred to the CCP for better management and development of parks within the city.
- The fire fighting services in the city are adequate.
- The city lacks proper soft infrastructure like public information system which includes websites and information about the various tourist activities, major events, festivals, cultural shows, sports events etc which will keep the locals as well as the tourists to the ongoing activities across the city at a time.

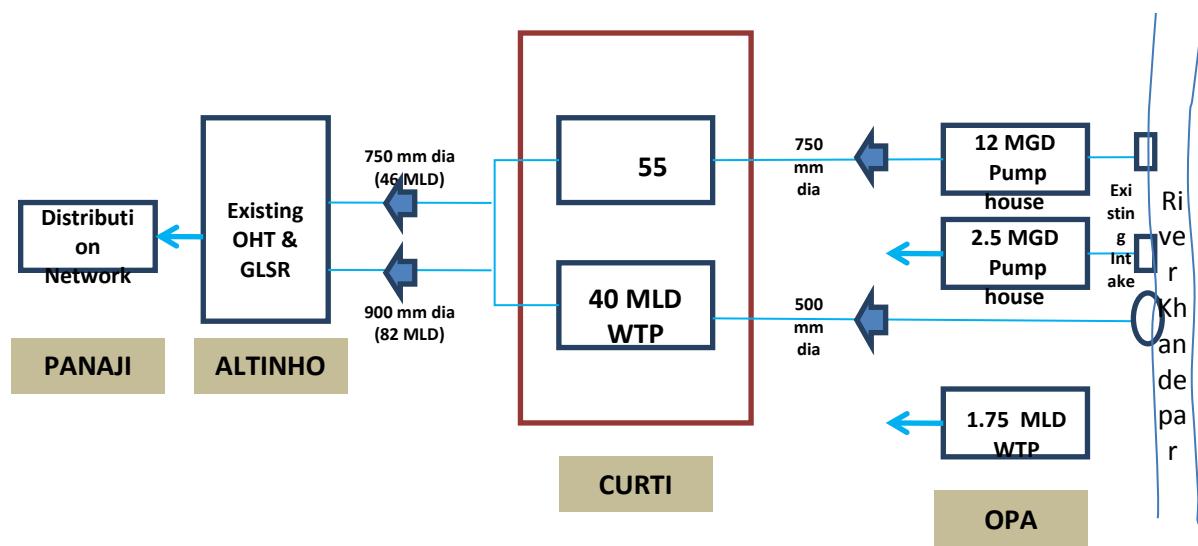
8. INFRASTRUCTURE AND SERVICES

8.1 Water Supply

8.1.1 Existing Situation

In Goa the state's Public Health Engineering Department (PHED) undertakes the functions of provision of water supply to the city. Panaji city's water supply source is River Khandepar which is a perennial source. It is covered under the regional water supply scheme from Opa water works on River Khandepar. This water supply scheme also caters to the water demand in Tiswadi and Ponda talukas. In view of the increasing demand from the industrial growth in Ponda taluk and domestic as well as institutional demands in the Tiswadi taluk, the Opa scheme has been augmented over the years to meet their demand. The Fig below shows the water supply system from Opa water works to the city.

Figure 27: Water supply source for Panaji city



Source: Water Supply Project for CCP under JnNURM, 2013

8.1.1.1 Source



The main source of Opa water supply scheme is River Khandepar which originates in Karnataka and flows through Dudhsagar water fall. The other tributary joining the 'Khandepar River' is 'Kalem River' which flows from Sangem. The Opa WSScheme is situated at Opa Khandepar in Ponda taluka about 37 km from Panaji. The raw water capacity of River Khandepar is 123.0 million liters per day (MLD) while the quantity drawn at present is 115.0 MLD. Further augmentation from this source is not feasible in future.

The Opa weir was constructed in 1972 to raise the water level and also as storage reservoir during lean period from March to June. The weir height is 2.42 m with a total length of about 82 m across the river. The existing water supply to Panaji city region is 24.2 MLD out of which 15.0 MLD is supplied to CCP area. The present gross water supply to the city region is 308¹⁷ litres per capita per day (lpcd). However these estimates are could not be considered as accurate as the substantial portion of the

water supplied to the region caters to the floatation as well as the tourist population.

Table 40: Details of Water Supply Sources

Parameter	Details
Location	Opa, Khandepar in Ponda taluka
Type of Source	Surface Water - River Khandepar
Capacity	123.0 MLD
Quantity drawn	115.0 MLD
Quantity supplied to Panaji City Region (CCP +OG)	24.2 MLD
Present per capita supply (Gross) for Panaji city region (CCP and its urban agglomeration)	308 lpcd
Quantity supplied to Panaji CCP	15.0 MLD
Present per capita supply (Gross) for CCP area	375 lpcd

Source: PHED, Panaji and DPR for water supply under JNNURM, 2010

8.1.1.2 Transmission

The transmission main system of Opa scheme consists of four line systems out of which two line systems viz. green line system and blue line system cater to Tiswadi talukas. The green line system consists of 750 mm diameter Cast Iron (CI) pipelines running from Opa to Marcel, Banastarim to

¹⁷ This supply rate is considering the population of 78,679 (estimated population for CCP + OG areas in 2014) for the Panaji city and its outgrowth areas as per Census 2011 and 24.2 MLD of daily water supply to CCP area.

Altinho reservoirs and reaches up to Dona Paula. The blue line system consists of 1000mm, 900 mm and 700 mm diameter Ductile Iron (DI) pipelines from Opa water treatment plant (WTP) to Altinho and carrying capacity of 80 MLD. This transmission system is newly laid and completed in 2008.

Table 41: Existing pipelines and material details

Type	Diameter	Material
Transmission Mains	750 mm	CI pipeline
	1000mm	DI pipeline
	900 mm	DI pipeline
	700 mm	DI pipeline

Source: DPR for water supply under JNNURM, 2010

8.1.1.3 Treatment

The Opa scheme consists of four WTPs which are classified as per their capacity viz. 8 MLD plant, 12 MLD plant, 55 MLD plant and 40 MLD plant. The original 8 MLD capacity plant in Opa has been augmented with capacities of 12 MLD in 1967, and subsequently 55 MLD in 1972 with allocation of 35 MLD water for Ponda and 40 MLD of water for Tiswadi taluka.

The raw water is treated by conventional treatment processes comprising of aeration, clariflocculation, rapid sand filtration and disinfection with chlorine. The raw water of River Khandepar is highly turbid with presence of Manganese and Iron, etc. Hence, the existing treatment plant has been equipped with aeration, coagulation, filtration, chlorination, etc., to meet the drinking water standards of central public health and environmental engineering organization (CPHEEO). The treated water from the treatment plant is collected in the underground reservoir of capacity 1350 m³ at Opa and pumped to master balancing reservoir (MBR) at Curti for distribution. The treatment plants along with the clear water reservoirs of Opa scheme are located at hillock of Curti which is at 160 m reference level (RL) and about 2 km from Opa. The high altitude location of storage reservoir at Curti enables 95% of water supply through gravity. The treated water is pumped from the plant to Curti and subsequently it flows through gravity to Altinho and to Panaji city.

Table 42: Details of Water Treatment Plants at Opa water works

S. No.	Details	Year of Commission	Capacity
			MLD
1	Water Treatment Plant 1 at Opa	1954	8
2	Water Treatment Plant 2 at Opa	1967	12
3	Water Treatment Plant 3 at Curti	1972	55
4	Water Treatment Plant 4 at Curti	2004	40
	Total		115

Source: PHED, Panaji

8.1.1.4 Storage

Panaji city consists of 14 numbers of storage reservoirs and the overall storage capacity of the existing reservoirs is 12800 m³. The city is divided into three water supply zones viz. Altinho, Ribandar and Taleigaon. The Zone 1 in Altinho consists of six GSLRs and two OHTs with total capacity of 10100 m³. It covers major area under Panaji CCP. The Zone 2 consists of 2 GLR located in Ribander

with total capacity of 450 m³. The Zone 3 consists of 3 OHTs located in Taleigao area with a total storage capacity of 2250 m³. The water from these service reservoirs is supplied to the city through gravity. The storage tanks at Altinho are in dilapidated condition and require rehabilitation and repairs works. The water is distributed to the service connections in the city by gravity using the topography of the region. The details of the storage reservoirs in Panaji CCP area and adjoining areas are presented in the Table below.

Table 43: Details of Service Reservoirs in Panaji city region

Reservoir Type	Zone	Location	Capacity in m ³	Quantity of water Supplied
Water Storage Tank No 8	Zone1	Altinho	5000	15.0 MLD
ground level service reservoir (GLSR) 1	Zone1	Altinho	800	
GLSR 2	Zone1	Altinho	800	
GLSR 3	Zone1	Altinho	800	
GLSR 4	Zone1	Altinho	800	
GLSR 5	Zone1	Altinho	800	
Overhead tank (OHT) No 6	Zone1	Altinho	450	
OHT No 7	Zone1	Altinho	650	
Ribandar (GLSR)	Zone 2	Ribandar	150	1.2 MLD
Ribandar (GLSR)	Zone 2	Ribandar	300	
Nagali (sump and OHT)	Zone 3	Nagali	200	8.0 MLD
Taleigao (2 nos. of OHTs)	Zone 3	Caranzalem, Dona Paula and part of CCP area in Taleigao.	1600	
Taleigao (OHT)			650	
Total storage capacity			13000	24.2 MLD

Source: DPR for water supply under JNNURM, 2010

8.1.1.5 Distribution network

The total distribution area of the city is divided into three water supply distribution zones viz. Panaji CCP, Ribander and Taleigaon as per the location and area covered by the existing storage reservoirs. The total length of distribution network in the city is 77.0 km. The water is supplied daily to the city by gravity for about two hours at the rate of 198 lpcd. The residential areas towards the tail end of the distribution network and areas located at higher elevations get water supply for shorter duration. There is deficit of adequate water supply in the areas of Taleigao, Ribandar and central market of the city. The distribution system of Panaji is more than 40 years old consisting of asbestos cement (AC) pipes in few sections. These pipes are more prone to damage due to excavation works while laying of other utilities lines. The AC pipes are replaced in few sections but still the distribution network has not been replaced totally by new pipeline which makes it vulnerable to damage and further to contamination of water leading to health hazards.

As per the 2011 Census data, 16,244 number of water connections exist in the city region. There is no break up of the type of connections. Out of this, 15,256 connections (94%) are tapped water connection from treated source, 238 numbers (2%) are tapped water connections from untreated source, 129 numbers from covered wells (1%) and 234 (1.5%) numbers from uncovered wells, Few connections also depend on other sources viz. hand pumps, tubewells, spring, river/canal and lake.

The treated water is distributed from the service reservoirs through the distribution network to the households through house service connections (HSC). In all, there are 8,829 water connections within CCP area. Out of these, 8,003 are domestic connections, 825 are commercial connections and only one public stand post in the city. All the service connections are metered with 100% coverage. The house service connections in the city are mostly of galvanized iron (G.I) and either corroded or prone to corrosion causing leakages. The details of the distribution network have been listed in the Table below.

Table 44: Existing Distribution System

S. No.	Item	Unit	Description
1	No. of water supply zones	Numbers	3
2	Litre per capita per day (CCP+OG)	lpcd	308
3	Total supply per day	MLD	15
4	Total Length of distribution network	km	77
5	Total No. of Residential connection	Numbers	8,004
6	Total No. of Commercial connection	Numbers	825
7	Total No. of Industrial connection	Numbers	0
8	Total No. Public stand posts connection	Numbers	1

Source: PHED, Panaji

8.1.1.6 Coverage of System

The present supply to the Panaji CCP is 15.0 MLD while 24.2 MLD for the city region. The coverage of water supply distribution pipeline network w.r.t. the existing road length in the city is 100% within the CCP area and presently 79%¹⁸ of the households within the CCP area are provided with HSCs. The coverage of HSC in the city region is not possible to assess due to non availability of data giving the break up of water connections.

8.1.1.7 Water Charges

The water charges are collected on basis of monthly volumetric consumption. The charge for domestic water supply connection is Rs.40 minimum per month for the residential connection and Rs.300 minimum per month for the commercial connection. The Table below presents the water tariff structure for the different categories of the water connections.

¹⁸ Considering 10,158 numbers of households in CCP as per 2011 census

Table 45: Tariff structure for water supply connections

S. No	Type of Consumer	Water Charges (Consumption base) KL	Existing Tariff (Rs./KL)	Minimum charges (Rs.)
1	Domestic	0-25	2.50	40.00
		25-35	7.00	
		35-50	10.00	
		50+	15.00	
2	Student hostels / hospitals/ educational institutions	Flat rate	7.00	70.00
3	Student hostels / hospitals/ educational institutions outside Goa	250	15.00	140.00
		250+	18.00	
4	Small Hotels	80	17.00	170.00
		80+	22.00	
5	Small Restaurant	80	17.00	170.00
		80+	22.00	
6	Defence	Flat rate	17.00	170.00
7	Fishing Boat owner	Flat rate	15.00	180.00
8	Market at Margao	Flat rate	15.00	180.00
9	Akhil Gomantak Nabhiik Samaj	Flat rate	15.00	150.00
10	Small/ medium/ large scale hotel	Flat rate	30.00	280.00
11	Commercial/ theatre/ shops/ building construction	Flat rate	35.00	300.00
12	Public Tap in Municipal / Panchayat area			300.00
13	Tankers (per trip)	Small (6m ³) - per trip		700.00
		Big (6-10m ³) - per trip		900.00

Source: PHED, Panaji

8.1.1.8 Cost Recovery

The operation and maintenance for the present water supply system as well as responding to the repairs or breakdowns is carried out by the PHED. Although regular maintenance (such as oiling and greasing) and periodic maintenance is carried out, it is not recorded and does not follow a formal procedure. There is lack of preventive maintenance system. Major breakdowns in the city are repaired by staff from the divisional offices concerned and the records are maintained manually. On an average five complaints are reported in the city and all are attended the same day¹⁹. The operation and maintenance expenditure is categorized under the following heads;

¹⁹ As per discussions with PHE officials

- Establishment Expenditure : Salary to staff engaged for operation and maintenance of Treatment Plant and Distribution system
- Expenditure on Consumables: Cost of chemicals and other consumables
- Power charges

8.1.2 Water Supply Future Demand

The clear water demand has been calculated on the basis of per capita water supply demand (135 lpcd) and average water supply losses. As indicated in the Table below, the water supply losses are assumed to decrease from 35% in 2013 to 20% in 2041. Accordingly the average per capita water supply has been determined as 180 lpcd and the same has been taken into consideration for water demand projections.

Table 46: Water Demand estimation

Indicator /year	2013	2021	2031	2041
Per capita Water Supply Demand	135	135	135	135
Water losses (%)	35%	30%	25%	20%
Per capita Water Demand (lpcd+ losses)	182	176	169	162

Source: CRIS analysis

Based on the per capita water supply demand, clear water demand has been forecasted on basis of the population projections finalized in the demography section. Accordingly, the city would require around 17.55 MLD of clear water by 2021, 22.14 MLD by 2031 and 28.15 MLD by 2041. The detailed gap analysis has been discussed under the sector plans. The water supply demand projection for the design year has been presented in the Table below.

Table 47: Water supply demand projections

Year	Projected Population	Water supply demand in MLD
2021	1,00,012	17.55
2031	1,31,201	22.14
2041	1,73,756	28.15

Source: CRIS analysis

As per the DPR for water supply for Panaji and surrounding areas prepared by PHED, the total population projection is estimated to 1,28,302 for the horizon year 2041. Considering 24x7 water supply at the rate of 150 lpcd, the total water demand for the Panaji and its adjoining areas is estimated to 75 MLD. Out of this, Panaji city will require 58.0 MLD while the adjoining areas will require 16.7 MLD of water supply by 2041.

8.1.3 Water Supply System Post 1st Generation CDP - Status Review

Pre and Post 1st Generation CDP Scenario

Parameters	Description
Source	Surface water, Khandepar River
Total supply	21.4 MLD

Parameters	Description
Rate of supply	235 lpcd
Storage capacity w.r.t supply	58%
Coverage of water supply network	-
1. Road length covered w.r.t total city roads	63%
2. Geographical area covered w.r.t. city area	95%
3. Population covered w.r.t total population	95%

Source: CDP 2006

The CDP highlighted upon the following issues

- The water supply is contaminated with sewage
- The unaccounted water losses (UFW) were alarming accounting to 35%
- The non-revenue water was high accounting to 47%
- The existing scheme has been designed for intermittent supply and simple adoption of existing distribution system for 24x7 may not ensure the desired terminal pressures.
- Lack of proper maintenance of the existing meters causing NRW.
- Lack of re-cycling and re-use of the storm water

The Strategies proposed) are as listed below.

- Redesign of the distribution network to ensure adequate terminal pressure
- GIS Inventory Mapping & Data Base Management System
- Efficient NRW reduction mechanism
- Sustainable tariff structure
- Efficiency in Operation and Maintenance
- Water Resource Management
- Capacity building of staff

Proposed Projects and its components

The proposed projects and its components under CDP 2006 are as depicted in Table below. A total cost estimate of Rs. 74.80 crores was proposed for the projects proposed for improvement of water supply system in the city.

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
1	Treatment Plants &Accessories <ul style="list-style-type: none"> ■ Rehabilitation of WTPs ■ Installation of pre chlorination equipment ■ Installation of safety equipments ■ Installation of generators and flow meters ■ Replacement of Raw water pumps and back wash pumps ■ Distribution system management 	i. Rehabilitation of Treatment Plants and accessories (4 nos.); <i>estimated cost: 1100.0 lakhs</i> ii. Installation of pre chlorination equipment (4 nos.); <i>estimated cost: 15.0 lakhs</i> iii. Installation of safety equipments (4 nos.); <i>estimated cost: 10.0 lakhs</i> iv. Installation of generators and flow meters (4 nos.); <i>estimated cost: 128.0 lakhs</i> v. Replacement of Raw water pumps and back wash pumps (4nos.) <i>estimated cost: 16.0 lakhs</i>
2	Improvement of Distribution system network	vi. Laying of new pipelines (37 kms) <i>estimated cost: 4440 lakhs</i>

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
	<ul style="list-style-type: none"> ■ 900 mm dia DI transmission pipe ■ Rehabilitation of old/ damaged lines ■ Re design of distribution lines to meet out 24x7 supply ■ Rehabilitation of storage reservoirs 	<ul style="list-style-type: none"> vii. Rehabilitation of old pipelines (50 kms); <i>estimated cost: 100 lakhs</i> viii. Redesign of distribution lines (50 kms) <i>estimated cost: 1000 lakhs</i> ix. Rehabilitation of Storage reservoirs (14 nos.); <i>estimated cost: 56 lakhs</i> x. Installation of bulk meters (10 nos.); <i>estimated cost: 15.0 lakhs</i> xi. NRW reduction programme; <i>estimated cost: 200.0 lakhs</i> xii. Water harvesting structures; <i>estimated cost: 400.0 lakhs</i>

Source: CDP 2006

Status of Projects

The Detail Project Report for the improvement works of water supply system has been prepared by Public Health & Engineering Department (PHED), Goa under JNNURM and was sent to State Commission for approval. It got its approval in 2012 and a total cost of 71.22 crores was sanctioned for the same. Out of the total sanctioned amount, Rs 56.98 crores will be through central funding.

Current Status

The PHED, Goa department has received the initial installment of Rs 14.24 crores for the implementation of the project and under implementation by the PHED department.

8.1.4 Proposed Projects

The PHED department has prepared a detail project report for the improvement of the present water supply system in the city and its surrounding areas with a total estimate of 174 crores. (Refer Annexure 2). The DPR for improvement for water supply system in the city and its surrounding areas was approved by the state level steering committee (SLSC) and MoUD at an estimated cost of Rs 71.22 crores under JnNURM-1 funding. The DPR components comprises of construction of a separate intake on river Khandepar, a raw water pumping station, a 27 MLD water treatment plant at Curti and laying of 87 km of distribution network across the town and other ancillary works. It also has provision to replace 15,252 house service connections. The PHED department has received sanction of central funding of Rs 56.98 for the entire project out of which first installment of 14.24 crores has been released till now. The works under the same are under implementation.

8.1.5 Institutional Framework for Water Supply System

The CCP has no role in the provision and maintenance of the water supply system in the city. The water supply system is operated and maintained by the Public Health Engineering Department. Apart from this, all the water supply projects are designed, developed and implemented by PHED. The engineering department of PHED is headed by a Superintending Engineer, who is assisted by an Executive Engineer and a Deputy and Assistant Engineer in project execution and operation and maintenance of the assets. There is no private sector involvement in the existing water supply system. Technical assistance is sought through consultants for various tasks like preparation of detail project

reports, tender documents and construction supervision. A private agency is involved by PHED for collection of bills.

8.1.6 Service Adequacy and Key Issues

It is observed that the present supply to the city is adequate and has 100% coverage of metered connections. However, the percentage of NRW is considerably high which indicates water losses due to leakages and through transmission and presence of unauthorized connections within the city. The present coverage of household connections w.r.t the number of household is only 79%. The service adequacy for water supply system in the city has been determined in the Table below w.r.t to various parameters in comparison with the service level benchmarks (SLB).

Table 48: Service Level Benchmarks for water supply

Water Supply	Unit	Value (2011-12)	SLB	GAP
Coverage w.r.t existing roads	%	100.00	100	**
lpcd	lpcd	198.00	135	-
Metering	%	100.00	100	-
NRW	%	35.00	20	-
Hours of Supply	hours	6.00	24	18.00
Quality	%	100	100	100.00
Complaints redressal	%	100	80	80.00
Cost recovery	%	N.A.	100	100.00
Collection Efficiency	%	N.A.	90	90.00
Coverage of water supply connections in slums	%	N.A.	100	100.00

Source: PHED, Goa

Note: The parameters of cost recovery, collection efficiency supplied is not available as the city Panaji area is covered under a regional water supply scheme called as Opa Scheme. All the information related to these parameters is maintained at a regional level. The city has no registered slums in the city hence the assessment wr.t the slum pockets have not been included. However, the urban poor chapter highlights the need for proper sanitation in all the urban poor pockets located within the city.

The major issues in the present water supply system in the city are as listed below.

- The gross water supply considering the population of CCP and its surrounding areas as per Census 2011 and daily supply of 24.2 MLD the supply rate works out to be 198 lpcd which is considered as substantially high when compared with the service level benchmark of 135 lpcd as prescribed by the CPHEEO.
- Some of the distribution mains are very old and there are heavy leakages from these old mains leading to water loses under NRW. The existing distribution system in the city is old and damaged. It still consists of asbestos cement pipes which are prone to leakage during other utility works in the vicinity. Also the pipe joints of the AC pipes are vulnerable to leakage resulting to loss of water. There is urgent need to replace the present water supply network with new pipelines.
- Since the water is supplied only through the means of gravitational force, the supply is widely varying in terms of pressure and duration.

- As per Census 2011, there are 10,158 households in the city. However of these households, 8,829 are covered with individual water supply connection depicting coverage of 79% as against the benchmark of 100% as prescribed by the Ministry of Urban Development (MoUD) in the service level benchmark toolkit. Most of the service connections in Panaji are of galvanized iron (GI) and are corroded and leaking which are highly prone for water contamination. All the old and non functional connections in the city need to be replaced to avoid water losses.
- The PHED should focus towards reduction of the losses in the system due to old and dilapidated pipelines as the non-revenue water is as high as 35%.
- Lack of proper water supply zoning resulting in poor monitoring of the water supplied and the losses incurred. Proper monitoring system for assessing the losses due to transmission and distribution needs to be proposed.
- There is a need to implement E-Governance in the operation and maintenance functions of PHED. Presently most of the things are maintained manually which results in poor database as well as consumes more time and manpower.
- At present the PHED staff is performing most of their functions manually. There is need for capacity building programmes and training for the staff which will upgrade them to use the new system and technology which will be available after the implementation of E-Governance system in the department.
- IEC programmes and camps for creating awareness among the citizens related to the optimization of water use, maintenance of hygiene, water borne health issues etc.

8.2 Sewerage and Sanitation

Panaji is bounded by River Mandovi in the North, hill and its region in the South and crisscross creeks in the East and West. The altitude of the city is only seven m from the Mean Sea Level (MSL) and at same plain level of River Mandovi. The topography of the city varies from hilly, rolling terrain and plain on plateau region. The varying topography is a result of the erosive interaction of ocean hydrodynamics with a folded metamorphic geology capped with laterite. It allows natural flow of storm water into nearest drains, nullahs, lakes and River basin. The soil found in the city is of three types viz. lateritic, alluvial and marshy. The laterite soil and alluvial soil are well drained and acidic in nature while marshy soil is subject to flooding and have high water table. The ground water table in the city varies from 1 to 20 m.

8.2.1 Existing Sewerage and Sanitation System

The sewerage system for Panaji was first commenced in 1967 during the Portuguese period and was the first of its kind in the state. The existing sewerage system in Panaji covers only the core city area and does not cater to the outer areas of Ribandar, Taleigaon, Dona Paula, Caranzalem etc. as well as the adjoining Out Growths (OG). Some of the wards in the outer areas of the city are partially covered while the remaining is totally devoid of sewerage system. The uncovered areas depend upon the system of individual soakpits/ septic tanks, direct discharge into the major drains and also open defecation to some extent.

The accessibility to sanitation facility in the city as well as the adjoining seven OGs has been analysed to understand the present coverage of sewerage facilities. There are 16,244 numbers of households combined in CCP and surrounding seven OGs as per the Census 2011 data. Out of these, 14,179 numbers (87%) of households have individual toilets, 1,149 households (7%) use public/ community toilets while 6% resort to open defecation. The households which have access to individual toilets are either connected to the existing sewerage system (42%) or have individual soak

pits/ septic tanks (58%). The Table below lists the sanitation facilities in city and its adjoining 7 seven OGs.

Table 49: Sanitation facilities in the city region

S. No.	Type of sanitation	Numbers of households	Percentage (%)
1	Individual toilets	14,179	87
a	Sewer connections	5,978	42
b	Soak pits/ septic tanks	7,330	52
c	Low cost sanitation units	409	2.88
d	VIP latrines with slab	365	2.57
e	H/hs with unimproved toilets with slab	46	0.32
f	H/hs directly connected to the open drains	19	0.13
g	Night soil serviced by animals	32	0.23
2	Public/ Community toilets	1,149	7
3	Open defecation	916	6

Source: Census 2011

In CCP the sewerage network is limited to the core city area. It is divided into 12 sewage drainage blocks and serviced by eight numbers of pumping stations. The Table below shows the various sewerage zones within the city and the area covered under each.

Table 50: Sewerage Zones in Panaji CCP

S. No	Zone No	Area Covered
1	I	Neugi Nagar, Portaise, Nine infantal near Bhandari Hospital
2	II	Mala, Mala Hillock, Bhandari Hospital
3	III	Marry immaculate school, Anita Tea house, People's High school, upper
4	IV	Bharat Lodge, Post office, Old Bus stand part of Mala
5	V	Panaji core city area
6	VI	Campal, Dr.Jack Siquira House
7	VII	St.Inez, Caulo Colony, Govt quarters
8	VIII	Part of Altinho, Military camp, Mental Hospital
9	IX	Adarshana Colony Miramar to Solmar Hotel
10	X	Batulemand some parts of Altino Govt quarters
11	XI	La campala and lake view colony
12	XII	Municipal Quarters, Tonca

Source: CDP 2006, Panaji and PHED, Panaji

The total length of the sewerage network in the Panaji CCP is about 45 km out of which 40 km covers the core city area while 3 km covers the EDC patto area. The present coverage of sewerage network w.r.t the existing road length in the city is only 56%. There are 2,760 sewer connections²⁰ in the city which includes connections to residential as well as non residential properties.

The sewage from the sewerage network is collected in three outfall drains which carry the sewage to the STP located at Tonca area for treatment. The three outfall drains are located at following areas.

- Near Panaji Tourist Home (Northern part of Panaji)
- St. Inez
- Miramar (near Goa International Hotel)

Sewage Treatment

The first sewage treatment plant (STP) for Panaji was installed in 1967. It was designed to cater for a population of 40,000 with a capacity of 5.68 MLD and was having trickling filter treatment process. The old plant was abandoned and demolished later. A new STP using sequencing batch reactor (SBR) technology was commissioned in 2005 at Tonca. It was constructed with design capacity of 12.5 MLD with peak factor of 2.25. The existing treatment plant is not equipped with sludge digesters to take care of the sludge generated out of the plant. PHED has out sourced the maintenance of the sewage treatment plant (STP) to a private agency.

In addition this, a small decentralized STP with a treatment capacity of 0.57 MLD has also been implemented for Patto Plaza area (EDC area) mainly for catering institutions. It receives 0.10 MLD sewage daily. This STP network has about 3 km length of sewer line with 300 sewer connections. The PHED department is at present implementing a 2.0 MLD STP at Patto which is funded under the state government.

Table 51: Details of STPs in Panaji CCP

S. No	Details of Sewage Treatment Plant	Location	Installed capacity	Waste Water treated	Utilized capacity
			MLD	MLD	%
1	STP 1	Tonca	12.5	8.0	64
2	STP 2	EDC Patto	0.57	0.10	17
3	Proposed STP 3	EDC Patto	2.0	-	-

Source: DPR for water supply under JNNURM, 2010

Quality of effluent in STP

As per the laboratory reports of PHED department the characteristics of raw sewerage reveals presence of 300 mg/L of Biochemical Oxygen Demand (BOD) level and 400 g/L of suspended solid levels. The Tonca STP is working with 95% treatment efficiency with effluent character of BOD less than 20 mg/l.

At present PHED is supplying 24.2 MLD of water to Panaji CCP with the gross supply rate of 198 lpcd. However, only 8.0 MLD of sewerage is being collected and treated in the existing STP of 12.5 MLD. This is mainly due to inadequate coverage of existing sewerage system in the city.

²⁰ As discussed with the PHED officials one sewer connection caters to multiple connections

8.2.1.1 Sewerage Charges

The sewerage charges for domestic and non-domestic connections are based on the percentage of water charges. The sewerage charges for domestic connections are levied as 25% of the water charges per month while for non-domestic connections as 35% of the water charges per month. The sewage connection charges are listed below in the table below.

Table 52: Sewerage connection charges for domestic and non-domestic connections

S. No.	Type of Connection	Up to 150 mm	Above 150 mm
1	Domestic	Rs. 200	Rs 350
2	Non Domestic	Rs. 1000	Rs 2000

Source: PHED, Panaji

8.2.1.2 Sanitation

Public Toilets: In the city there are presently 29 numbers of public convenience systems with a total capacity of 171 seats located in various parts of the city. The public toilets are operated and maintained by Sulabh Sauchalaya. Out of these, 25 numbers of public toilets are connected to the UGD network while four numbers of public toilets are still connected to the septic tanks. However, with the increasing tourist influx in the city every year there is a need to provide adequate number of public toilets at major tourist destinations within the city as well as in the core city area. Apart from this, the existing public toilets needs to improved with good standard facilities considering the tourist potential of the city.

Table 53: Public toilets in Panaji CCP

Sanitation Details	Number
	Nos.
Public Toilets	29
Total number of seats	171

Source: Panaji CCP

8.2.2 Future Sewage Generation

The future generation for the sewerage is calculated taking into account the projected population of 1.63 lakhs and future water supply demand projections till 2041. The future sewerage generation has been projected taking into account that 80% of the supplied water supply will be treated. As per the future projections for sewerage generation about 13.33 MLD, 17.59 MLD and 23.43 MLD will be generated in the years of 2021, 2031 and 2041 respectively. The Table below shows the future sewerage generation for 2041.

Table 54: Future Sewerage Generation for Panaji

Projection Year	Total Water Supply Demand	Total Sewerage Generation
2021	17.55	14.04
2031	22.14	17.71
2041	28.15	22.52

Source: Analysis

8.2.3 Sanitation Sector Post 1st Generation CDP - Status Review

Pre and Post 1st Generation CDP Scenario

Parameters	Description
Sewage Treatment Plant (STP) Capacity	STP 1: 12.5 MLD and STP 2: 0.57 MLD
Total Sewage generated	12 MLD
Total Sewage Treated	8.0 MLD
Length of Sewer line	43.0 kms
Coverage of sewerage system	-
Coverage w.r.t city roads	60%
Coverage w.r.t total population	70%
% of Population with site sanitation	25%
% of Population without sanitation	5%
% Population discharging untreated water	5%
Locations receiving untreated sewage	St. Inez Nullah and Mandovi River
Public toilets	18 nos. with 110 seats

Source: CDP 2006

The CDP highlighted upon the following issues

- Carrying capacities of existing sewers is less than required
- Substantial proportion of the households still practice/ opt for on-site sanitation system with septic tank / soak pit as final disposal.
- High ground water table & high ground water saturation contaminate ground water.
- Lack of public toilets
- Lack of sanitation system in ward No. 14; St. Ines Bandh, ward no. 12, Aivao Caranzalem, ward 1.
- Lack of O&M
- The contaminated water is discharged in to sea / rivers /nallahs.

The Strategies proposed are as listed below.

- 100% coverage to be ensured not only for Panaji but also for the surrounding areas.
- Redesign of the existing sewer
- System network to ensure safe disposal.
- GIS Inventory Mapping & Data Base Management System
- Efficient maintenance mechanism
- Establishing O&M system
- Ensure 100% treatment of sewer discharge

Proposed Projects and its components

The proposed projects and its components under CDP 2006 are as depicted in Table below. A total cost estimate of Rs. 14.07 crores was proposed for the projects proposed for improvement of sewerage system in the city.

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
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S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
1	Rehabilitation work of old damaged sewers and extension of sewage network	43 kms; <i>Estimated cost: 107.5 lakhs</i>
2	Sewer cleaning equipments	CCTV, Sewer Jetting Machine, High Pressure Water Tanker & Sludge Vacuum tanker; <i>Estimated cost: 100 lakhs</i>
3	Development of new sewerage system for the uncovered area	5 km; <i>Estimated cost: 500 lakhs</i>
4	Renovation of public toilets (Nirmal toilets)	18 nos.; <i>Estimated cost: 500 lakhs</i>
5	Development of new sewerage treatment plant	5 nos.; <i>Estimated cost: 500 lakhs</i>
6	Rehabilitation of pumping station	10 nos. <i>Estimated cost: 500 lakhs</i>
7	GIS Inventory Mapping and development of storm water drain system	-
8	Information Management.	-

Source: CDP 2006

Status of Projects

The Detail Project Report for the improvement works of sewerage system had been prepared by Public Health & Engineering Department (PHED), Goa under JNNURM with estimated cost of 14.07 crores and was sent to State Commission for approval. However, it was not approved by MoUD.

Current Status

The DPR report for sewerage system was not approved by the MoUD.

8.2.4 Proposed Projects

The PHED department is implementing the project for provision of sewerage network to the uncovered areas of Dona Paula, Taleigaon and Caranzalem within the CCP area. This project is being funded by the state government and the work is in progress. Apart from this, the department is also constructing a 2 MLD capacity STP at Patto which is also funded by the state government.

8.2.5 Service Adequacy and Key Issues

The service adequacy for sewerage system in the city has been determined in the table below w.r.t to various parameters in comparison with the service level benchmarks (SLB). It is observed that the present sewerage coverage in the city region is highly inadequate with only 42% coverage w.r.t the of the households having sewage connections.

Table 55: Service Level Benchmarks for sewerage

Sewerage	Unit	Value (2011-12)	SLB	GAP
Coverage of Toilets	%	87	100.00	100.00
Sewage network w.r.t households	%	42	100.00	
Collection efficiency	%	67.00	100.00	100.00

Sewerage	Unit	Value (2011-12)	SLB	GAP
(Sewage)				
Treatment capacity	%	108.90	100.00	
Quality of treatment	%	95	100.00	100.00
Reuse and recycling	%	0.	20.00	20.00
Complaints redressal	%	100	80.00	27.00
Cost recovery	%	N.A.	100.00	100.00
Collection Efficiency (sewage charges)	%	N.A.	90.00	90.00
Coverage of Toilets in Slums	%	N.A.	100.00	100.00

Source: PHED, Goa

Note: The PHED department is in charge of the sewerage system in the city and data is maintained at a regional level due to which has not been assessed.

The city has no registered slums in the city hence the assessment wr.t the slum pockets have not been included. However, the urban poor chapter highlights the need for proper sanitation in all the urban poor pockets located within the city.

The major issues in the present sewerage system are as listed below.

- The existing sewerage network in the city is only limited to the core city area with 56% coverage w.r.t the existing roads in the CCP area. The remaining areas of CCP as well as the outgrowth areas are devoid of sewerage system.
- The existing sewerage network is very old and dilapidated. It needs to be redesigned to ensure optimal collection and treatment of sewerage. This will include provision of new durable pipelines, manholes and pumping stations.
- In the uncovered areas 58% of the households depend upon individual soak pits and 7% of the households opt for public toilets for sanitation facilities. About 6% of the households still do not have any access to sanitation which results in practice of open defecation. Hence the present sewage coverage in the city is highly inadequate. The sewerage network needs to be expanded for 100% coverage within the CCP area and its outgrowth areas.
- The present STP is under utilised with only 67% of sewage collected per day.
- There are no measures for recycling and reuse of treated water. As of now the waste water after treatment at the STP is drained into the river Mandovi. However, a project is required wherein the treated water can be recycled and used for non-potable uses within the CCP area i.e. for gardening, fire fighting purposes etc.
- The major drains which carry the sewage from the STP to the River are prone to direct disposal of sewage from the uncovered areas as well as solid waste. This results in blocking of waste water in the drains leading to unhygienic conditions within the city.

8.3 Solid Waste Management

The municipal solid waste generated within the city is managed by CCP. This section details out the existing waste management practices within CCP and highlights the deficiencies in the present system.

8.3.1 Existing SWM System

The Corporation of City of Panaji is managing the collection, transportation, treatment and disposal of Municipal Solid Waste (MSW) generated in Panaji city. The activities associated with the management of solid wastes from the point of generation to final disposal are divided into following functional elements:

Figure 28: Activities involved in Solid waste Management system in Panaji CCP

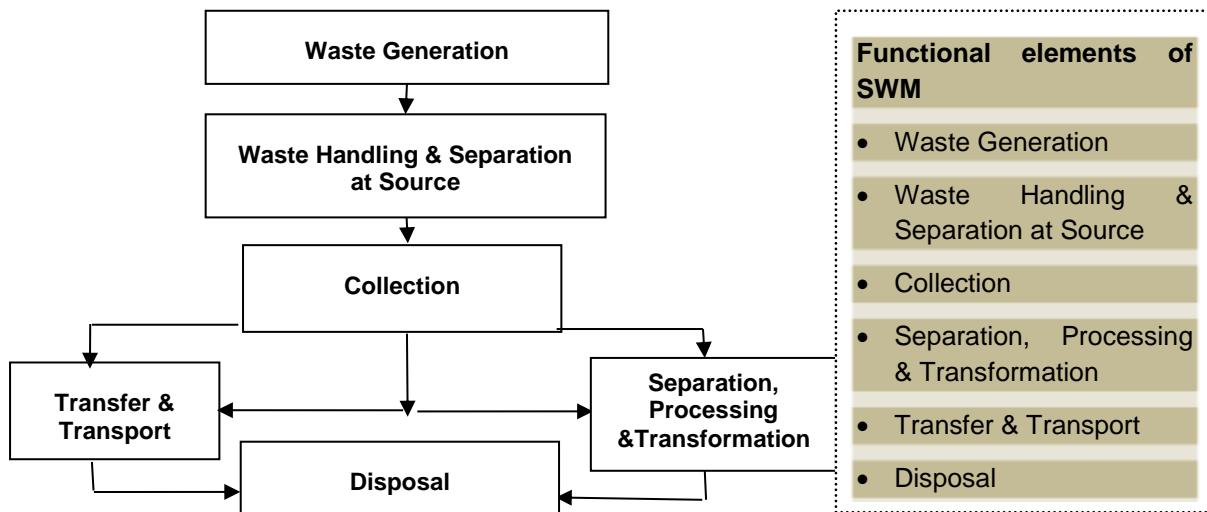
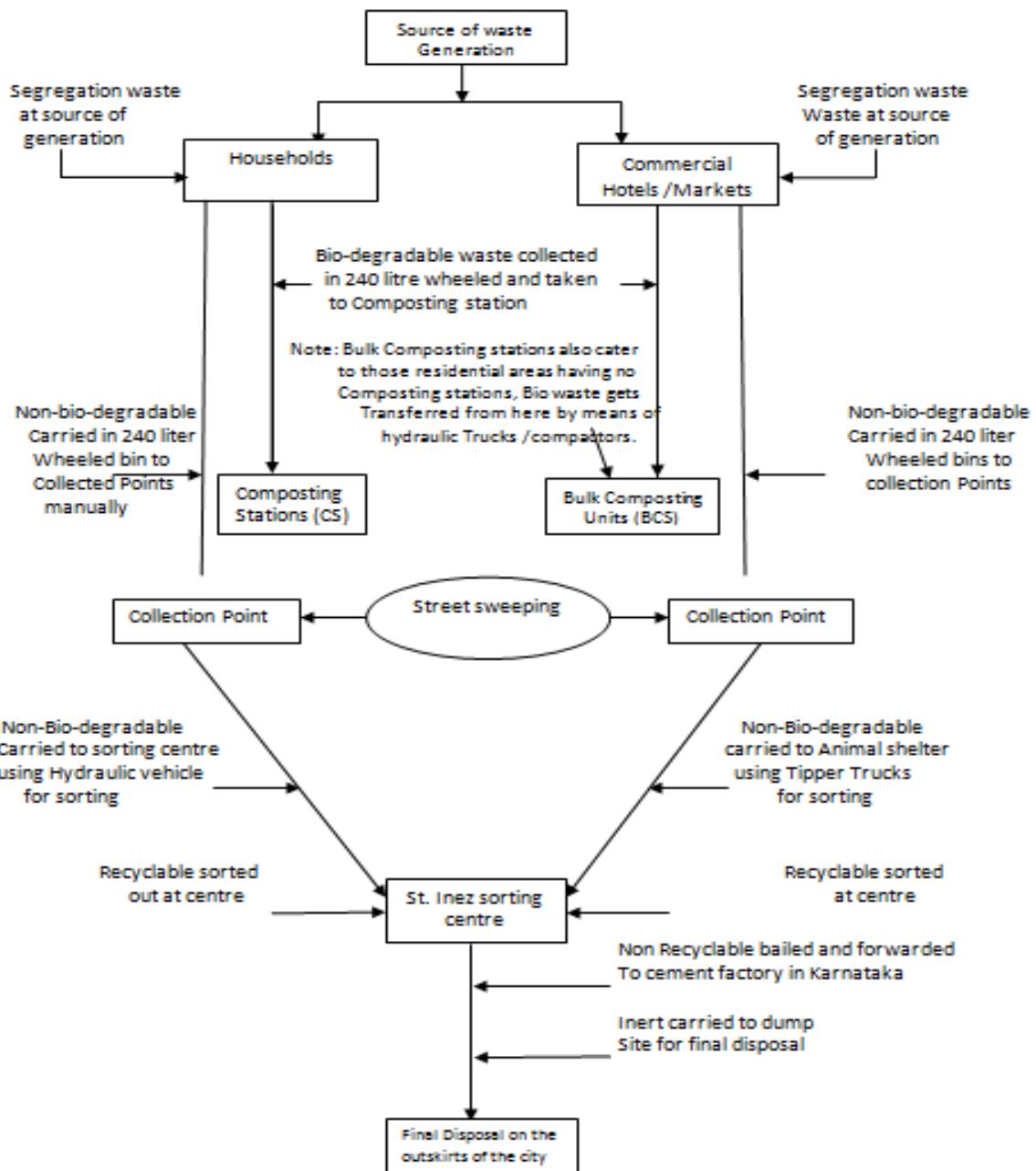


Figure 29: Existing Solid waste management system in Panaji city.

Source: CCP Panaji

8.3.1.1 Solid Waste Generation

The CCP area on an average generates 47.0 tons of solid waste per day. The primary source of waste generation in Panaji city are the local households, markets and commercial establishments such as hotels, restaurants, shops etc. construction activity is also significant. Out of the 47.0tons waste collected per day 39.0 tons is received at the dumping yard while only 33.0 tons is actually received and treated at the treatment plant. The per capita waste generation is 619 gm which is quite high which may be due to the high percentage of floating population in the city which contributes to the total waste generated in the city. The total waste of 47.0 tons generated, is collected through door

to door and from the community bins per day. Apart from this, an average construction waste of 25.0 tons is deposited as debris from various construction sites.

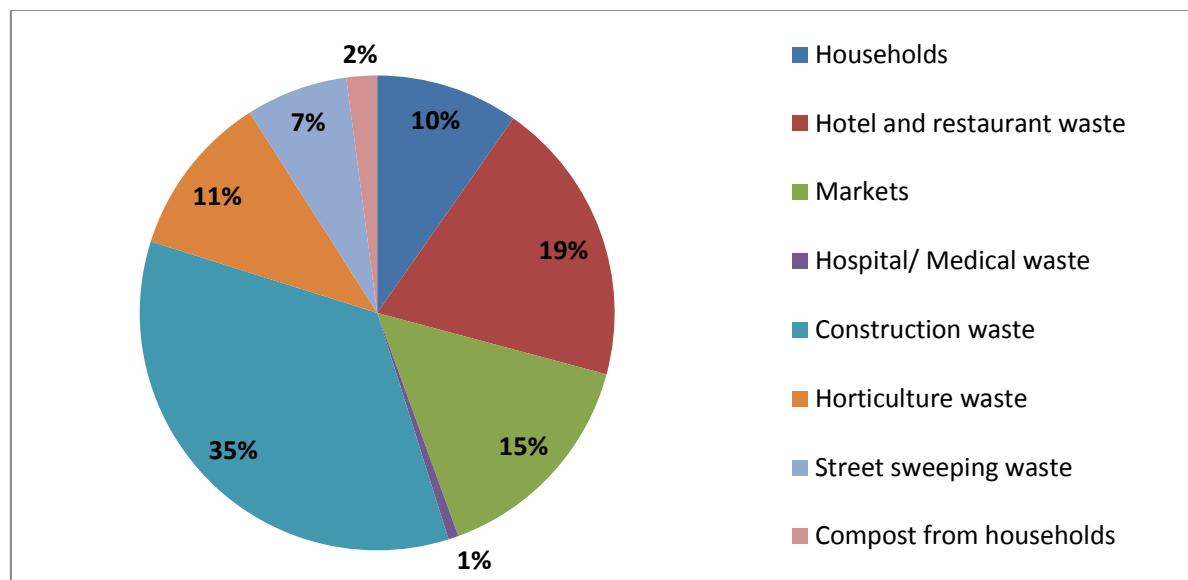
The total domestic waste generated in the CCP area is about 7.0 tons per day constituting 10% of the total waste generated. The commercial waste includes the waste from hotels and eating establishments, from shops, trading units, small time street vendors etc. The commercial waste generated is estimated to be 25.0 tons per day constituting 34% of the total waste generated. The construction waste comprises of 25.0 tons per day which constitutes of 35%. The Table below illustrates the various sources of municipal solid waste generated in the city.

Table 56: Source of Municipal Solid Waste generated

S. No	Type of Waste Generator	Total quantity of waste generated/ day (tons)
1	Households	7.00
2	Hotel and restaurant waste	14.00
3	Markets	11.00
4	Hospital/ Medical waste	0.50
5	Construction waste	25.00
6	Horticulture waste	8.00
7	Street sweeping waste	5.00
8	Compost from households	1.50
	TOTAL	72.00

Source: CCP, Panaji

Figure 30: Sources of waste generation



Source: CCP, Panaji

8.3.1.2 Composition of Solid Waste

The composition of solid waste generated in the city consists of 42% of wet organic waste, 11 % of dry organic waste, 8% of recyclable waste and 39% of inert waste. The detail of composition of solid waste generated is given in the table below.

Table 57: Composition of waste generated

Type of waste	Quantity of waste	Percent
	Tones per day	%
Wet Organic Waste	27	42
Dry Organic Waste	7	11
Recyclables	5	8
Inert	25	39
Sub total	64	100
Hazardous/ Hospital waste	0.5	-
Horticulture waste	8	-
Total	72	-

Source: CCP, Panaji

8.3.1.3 Waste Collection

The solid waste collection system involves primary collection, secondary collection, transportation, processing and disposal of solid waste generated in the city. There are 12 numbers of Municipal Solid Waste Management Zones within the city. **Primary collection** - Municipal solid waste is stored in a segregated form at the generator level viz. houses, hotels, restaurants, commercial area. The residential units and all the commercial establishments in the city other than hotels and restaurants store their waste in a two way bin system i.e. bio-degradable waste (wet waste) and non-biodegradable waste (dry waste). All the hotels and restaurants are covered under four ways dry waste segregation. The dry waste is stored in four fractions (paper/card boards, glass, metal plastic) in low density polyethylene (LDPE) bins. While collecting the waste each fraction is stored in a specific color LDPE bags specified by the Corporation. 60% of the residential complexes are also covered under four-way segregation of dry waste. The dry waste from these residential complexes is stored in 240 liter trolley bins provided by Corporation. The four dry waste fractions are paper, plastics, metal / glass and others (multi layered material, foils, thermo Cole, textile etc.)

The waste is stored by the households and other generators in two separate bins, one for bio-degradable and one for non-biodegradable Green plastic or metal containers with lid are used for the storage of bio-degradable waste and a similar size bin of black color is used for storage of non-biodegradable waste. Out of the total properties of 23,342 in the city at present about 13,342 properties are provided with these primary storage bins. Thus, it has 57% w.r.t the collections bins coverage at present.

The segregated waste is collected through door-to-door collection by CCP workers by visiting individual units in the area allotted to each sanitary worker. The waste collection from the houses starts at 2.00 pm and it continues till 6.00 pm. The wet (biodegradable) waste is collected on daily basis while from hotels and restaurants twice in a day. The dry (non-biodegradable) waste is collected twice a week from house hold units (Mondays and Thursdays) while from the hotels and restaurants once in a day. The dry waste/ non-biodegradable waste from residential establishments and

commercial areas is collected and segregated under four ways segregation on daily basis in 240 liter bins with separate colour coding. All the main roads are swept on daily basis. The sweepers use wheeled trolleys to collect and deposit swept waste.

8.3.1.4 SWM Charges

CCP has levied Rs.1 per day per household and Rs.100/- to Rs.7500/- per month to commercial establishment for collection of MSW from their premises.

8.3.1.5 Secondary waste collection

Panaji was made bin-free in 2003 and the requirement of the bins/ secondary storage was gradually nullified through systematic implementation of segregation of waste at source initiative. As such, there are no secondary storage points in Panaji. CCP has also placed street corner litter bins of 15 liter capacity at various locations around Panaji city. 240 litre bins are used for transportation of waste from households to composting stations or from establishment to collection points as the case may be.

8.3.1.6 Transportation of Waste

The solid waste collected per day in Panaji is 47.0 tons which is also transported daily from the source or the secondary collection points to the dump yard. All the collected dry waste (7 tones)is segregated before transporting it to the dump yard. There are 38 numbers of vehicles used for the present Municipal Solid Waste Management. Each vehicle makes three trips per day to collect and transport MSW for disposing off at the facilities in the city. It takes about an hour or two to make one trip depending on the distance to be covered, traffic conditions prevailing at that time, and location of site where the waste is to be unloaded.

8.3.1.7 Solid Waste processing and Disposal system

Bio-degradable waste is processed through aerobic composting methods at the de-centralized composting stations spread over various areas of Panaji. It is transferred manually to the nearest composting station for processing by using of 240 liter capacity trolley bins or to the nearest collection point to transport the waste to the bulk composting facility. At present there are 68 decentralized composting stations. The location of composting stations in various zones of Panaji is given in table below.

Table 58:Zone-wise location of various composting stations in Panaji city

Zone No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
No. of Composting Stations	19	0	1	0	12	10	1	2	7	5	9	2	68

Source: DPR, Solid waste Management Plan for Panaji

The process of composting followed by CCP involves inspection of organic waste, and removal of any material that is a contaminant / non-biodegradable. This is followed by layering of the waste into the cell, spreading the waste evenly, applying of odor control cultures such as effective microbe solution, Bokashi or cow manure over this waste and finally covering the waste layer with an equal amount of leaf litter. A few days later, aeration is done by means of poking air holes through this waste, turning the waste in layers. After 20-25 days of this operation, the waste has reduced its volume, and turned into pre-compost with little or no odor. This is then transported to the bulk composting facility at Patto, where compost is allowed to mature, dry before sieving the compost for sale. At the bulk composting facilities, organic waste convertor machines (OWC-500) with curing systems are installed at market

and at Patto sites. Primarily organic waste generated from municipal market of which 50% is sent for composting at market premises itself. The remaining 50% is taken to the bulk composting facility at Patto, Panaji. The capacity of each machine is 3MT/day. A total of 6 nos. of OWC-500 machines have been installed in Panaji city. The compost is sold by CCP at Rs. 10/- per kg and Rs. 3/- per kg on bulk purchases of 100 kg and above.

The dry waste/ Non-biodegradable waste is transported from the 240 litre bins collection points in each zone by means of trucks available with CCP to the sorting centre at St. Inez. After sorting the waste it is ultimately sold to scrap dealers (kabadiwallahs). Non-recyclable waste material is bailed and sent to cement companies in Karnataka as per the MOU by the cement companies with the State Government.

8.3.1.8 Disposal (Non-Biodegradables and Inert)

At present there is no designated dumping site and sanitary land filling area to dispose the waste collected from the Corporation of the city of Panaji. Inert/residual waste is dumped at one temporary site located in Panaji.

The proposed site for integrated Solid Waste Management Facility is located at Baiguinim village at a distance of about 8 km from the city. The total area of the proposed land fill site is around 17 hectares. The land has been acquired by CCP. The proposed integrated municipal solid waste management facility to be set up at Baiguinim would include material recovery facility, bio-methanation system, in vessel composting and engineered sanitary landfill facility. The facility would recover recyclables, compost and electricity from the different waste processing streams. The CCP is in the process of submitting information sought by the JNNURM directorate.²¹

8.3.2 Future Solid Waste Generation

The CCP has prepared a Detail Project Report for Solid Waste Management system in the city under the JNNURM programme. The same was approved by State government and MoUD under JnNURM-I. However, the implementation works has not been taken up till date. The DPR for SWM has been proposed for the horizon year of 2040 and includes all the future requirements for improvement of SWM system in the city region. The projection for solid waste generation for 2040 as per the DPR for SWM is 100.0 TPD for projected population of 1, 61,436.

The proposed waste management plan and infrastructure/equipment for primary & secondary waste collection and transportation system for Panaji city have been framed based on the following:

- Past population estimates based on Census surveys.
- Projected populations for the design period
- Spread of Panaji city
- Current MSW quantities as per survey data
- Projected MSW quantities are based on the present waste generation data
- SWM standards

²¹<http://indianewprojects.wordpress.com/2014/01/11/corporation-of-the-city-of-panaji-is-planning-to-construct-an-integrated-municipal-solid-waste-management-facility-goa/>

Table 59: Future Solid Waste Generation

Year	Projected population A	Per capita Waste generation (in grams) B	Average per day waste generation (in tons) A*B	Annual SW generation (in tons) A*B*365
2021	100012	699	69.86	25,984
2031	131201	843	110.63	41,025
2041	173756	994	172.73	64,055

Source: CRIS Analysis

8.3.3 SWM post- 1st Generation CDP – Status Review

Parameters	Description
No of Solid waste Zones City divided in 12 solid waste zones	12
Waste generated per day is 55.31 tons	55.31 Tonnes per day (TPD)
Inorganic waste: and organic waste	59% and 41%
Composting units:61 nos.	61 nos.
Treatment Facility	Treatment of wet waste at Patto EDC site while recycling of dry waste at Altinho and St Inez
Availability of Land fill site	No land fill site approved
SWM Transportationfacilities	Trucks: 4 nos. , 1 nos. composting van & 3 nos. open and tippers
SWM staff	No of semi skilled staff is 190 nos. while skilled staff is 90 nos. working on rotation

Source: CDP 2006

The CDP highlighted upon the following issues

- Lack of appropriate dumping site
- Existing decentralized composting yards treats only 1/3rd of the wet waste
- Improper segregation of waste at source
- No separate biomedical waste management system
- Vehicles are old and outlived, high O&M cost

The Strategies proposed to achieve the vision are as listed below.

- Government intervention to have a common treatment facility within the district may also be explored. The cost of the land and infrastructure may be borne by the higher order administrative towns / city.
- Explore the possibility of public private participation
- Carry out survey to optimize route.

Establishing O&M system

Proposed Projects and its components

The proposed projects and its components under CDP 2006 are as depicted in Table below. A total cost estimate of Rs. 19.07 crores was proposed for the projects proposed for improvement of SWM system in the city.

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
1	Provision of litter bins(to be provided at streetsand lane)	200 nos; <i>Estimated cost: 107.5 lakhs</i>
2	Provision of household bins (green bin)	20,000 nos; <i>Estimated cost: 500 lakhs</i>
3	Replacement of collection vehicle	<i>Estimated cost: 1000 lakhs</i>
4	Setting up of composite plant	<i>Estimated cost: 300 lakhs</i>

Source: CDP 2006

Status of Projects

The Detail Project Report for the improvement works of solid waste management system has been prepared by CCP with estimated cost of 34.54 crores and sent to State Commission for approval initially. After approval from the state commission it has been sent to MoUD for approval in 2013.

Current Status

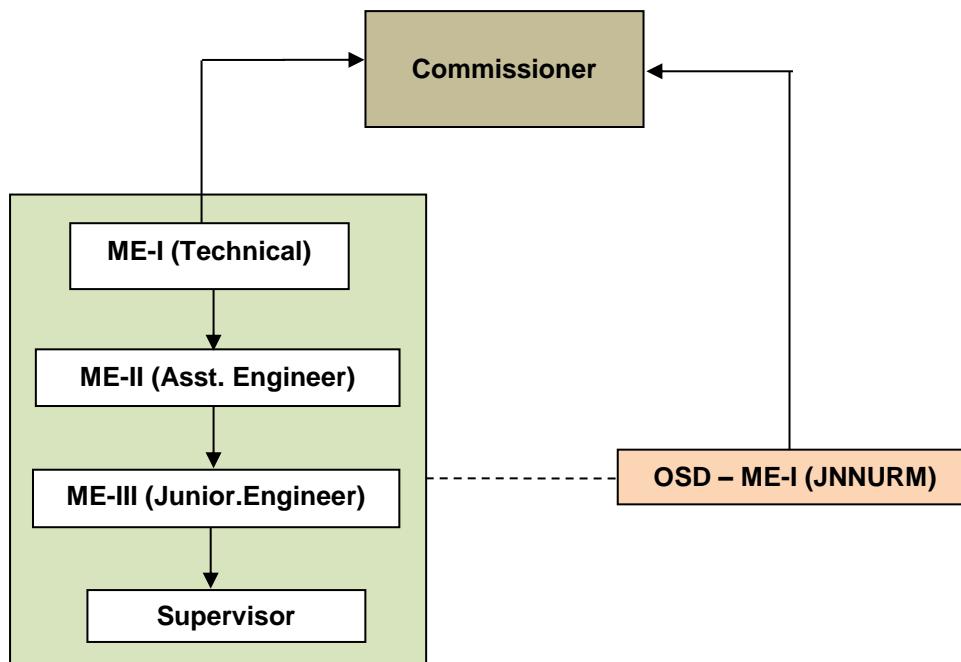
The DPR was approved by MoUD in 2014. However, the DPR for SWM was delayed than expected and hence now it needs to be resubmitted to the MoUD for approval under the JnNURM -2 scheme.

8.3.3.1 Proposed Projects for Solid Waste Management system

The CCP has prepared a detailed project report (DPR) for Integrated Municipal Solid Waste Management system (IMSWMS) proposed for the design year 2040, for a total capacity of 100 TPD with a total estimated cost of Rs 96.67 crores. The DPR was approved by MoUD and state government in 2013 but no funds had been allocated by the centre under the JnNURM 1 scheme. Subsequently the project needs to be updated and resubmitted to the ministry for approval under the JnNURM 2 scheme. Hence, the project proposal for SWM as per the DPR prepared by the CCP has been included in the CDP proposal for Panaji.

8.3.4 Institutional Framework for SWM

The CCP is responsible for urban governance and civic management is the Corporation of the City of Panaji (CCP).The Commissioner is the highest administrative officer of CCP. SWM department is responsible for management of solid waste in the city. The city of Panaji is divided into 12 SWM zones for proper operations and management of its services. There are 12 nos. of supervisors in charge for each zone in the city. There are 15 additional supervisor deployed at various facilities. Apart from this, the other SWM staff includes 499 sanitary workers appointed for various MSWM activities. Each sanitary staff has a designated area for daily cleaning. There is separate staff appointed for waste transportation (drivers and helpers) responsible for lifting solid waste and dumping it on the outskirts of the city. It has 24 nos. of drivers for the same. The administrative structure of SWM cell in CCP is shown in Figure below:



Source: DPR for SWM, Panaji, 2012

8.3.5 Service Adequacy and Key Issues

The service adequacy for solid waste management system in the city has been determined in the Table below w.r.t to various parameters in comparison with the service level benchmarks (SLB). It is observed that the present solid waste coverage in the city is adequate and has 100% coverage w.r.t the household coverage, collection efficiency and extent of segregation. However, the O & M of SWM has been a major issue for the CCP with only 17.20% of collection efficiency from SWM taxes and - 49% of cost recovery from private operators. The CCP has 22% of waste recovered from biodegradable and non-biodegradable waste at present.

Table 60: Service Level Benchmarks for solid waste management

Solid Waste Management	Unit	Value (2011-12)	SLB	GAP
Household level coverage	%	100.00	100.00	
Efficiency of collection (MSW)	%	100.00	100.00	
Extent of segregation (MSW)	%	100.00	100.00	
Extent of recovery (MSW)	%	22.00	80.00	58.00
Scientific disposal (MSW)	%	-	100.00	100.00
Complaints Redressal	%	-	80.00	80.00
Extent of cost recovery	%	(49.00)	100.00	149.00
Efficiency in collection (SWM charges)	%	17.20	90.00	90.00
Household level coverage of solid waste management services in Slums	%	N.A.	100.00	N.A.

Source: CCP

Note: The city has no registered slums in the city hence the assessment wr.t the slum pockets have not been included. However, the urban poor chapter highlights the need for proper sanitation in all the urban poor pockets located within the city.

The major issues in the present SWM system are as listed below.

- Sanitary workers involved in door-to-door collection, transferring of waste to the pick-up points and in the composting operation have not been provided with appropriate Personal Protective Equipment (PPE)s
- The existing numbers of composting units are insufficient in numbers to process the biodegradable component of waste generated and collected at present and beyond.
- Finding areas in Panaji city for setting up of new de-centralized compost units is a difficult proposition due to the fact that in Panaji city, land is scarce and not available for setting up the required MSW facilities.
- Location of the composting units within the city limits causes issues related to bad odour which is presently not been addressed effectively.
- De-centralized composting units are becoming difficult to manage and monitor considering the total number of units setup in the city.
- Present sorting centre for non-biodegradable waste (dry waste) is not sufficient enough for the quantum of non bio-degradable waste received at the centre and not efficient because of being completely manual in operation.
- Most of the vehicles involved in the waste transportation have surpassed their economic life.
- Present workshop located at CCP is lacking in space for parking the vehicles and also in equipments for undertaking major repair works.
- Crude dumping of inert waste is happening at various locations in the outskirts of the city due to the absence of a centralised engineered MSW treatment facility.
- Un-scientific management of slaughter house waste with no proper arrangements for its safe disposal.

8.4 Storm Water Drains

The storm water drains within the CCP are mainly of two types viz. major drains/ nallahs and roadside drains. The major drains are maintained by the Water Resource Department. The roadside drains are proposed and laid by the PWD department while CCP maintains the roadside drains located within its jurisdiction.

8.4.1 Existing Drainage System

Panaji is located along the bank of River Mandovi where it is merging with the Arabian Sea. The terrain of the city is generally sloping from East to West direction along the course of River Mandovi. Saline soil in the region occurs in the flood plains of River Mandovi where the soil is deep, poorly drained and less permeable. It is saline, high in pH and contains humus and organic matter. The average annual rainfall received in the city is 3124.06 mm.

Based on the natural topography and the slope of the city all the storm water drains are laid flowing towards the Western area of the city. All the road side drains surface runoff water is let into major drains which is further discharged into River Mandovi. The present storm water drains are closed without any lining and are desilted every three months. The altitude of the city is only 7 m from the Mean Sea Level (MSL) and at same plain level of River Mandovi. The city of Panaji consists of majority of the area which has been reclaimed on low lying areas. These are highly prone to flood

water from three sides i.e. Zuari river on the South, Mandovi river on the North and Arabian Sea in the West.

As the general level of the city is lower than the high tide level, when the level of Mandovi river rises, reverse flow takes place which was absorbed by the creeks/ nullahs/ marshy land/ ponds, etc in the initial period. The system of surface storm water drains were constructed during the period of Portuguese rule along most of the roads and streets. The city's major SWD network still comprises majorly this old system of SWD. The storm water from here is channelized towards the River through major drains. However, with the scale of urbanization and silting of the major drains the existing system of SWD has been inadequate and insufficient to address the issues of the city which faces flooding every monsoon due to the natural process of the high tide in the River Mandovi. This has been a major challenge for the city which needs to be addressed in a systematic and effective manner.

8.4.1.1 Roadside drains

The present storm water drainage network for Panaji city was planned and implemented in the year 1938 by the Portuguese. All the major roads are provided with roadside storm water drains further connected to the outfall drains which finally leads to Northern side of the city for ultimate discharge into Mandovi River at various locations. The present storm water drainage system can be divided into four major zones as listed below.

- Run off from the Altinho hillock flowing into the Mala & Faintainos area of the city further discharging into Mala Lake. From here it flows into Ourem Creek and finally to River Mandovi
- Run off from the core city area (Northern part) flowing into Mandovi River through surface drains and gutters.
- Run off from St. Inez areas flowing into the St. Inez Nullah and then to the River Mandovi.
- Run off from the Southern parts of the city flowing into the Arabian Sea

The total length of roadside drains in the city is 77 kms (one sided) which covers the existing road network within the city. Presently the details w.r.t the existing storm water drains is not available and hence the various aspects of coverage, condition of the storm water drains and areas covered under present network could not be assessed. It is very important for the CCP to map the existing storm water drains to assess the present state of the drainage network and further propose improvement projects for efficient storm water discharge in the city. The increasing urbanization and increase in number of properties in the city which depends upon an old drainage system implies high vulnerability of the existing storm water drainage network of the city. This is one of the major reasons in the clogging and flooding of the drains.

8.4.2 Storm Water Drainage post 1st Generation CDP – Status Review

Parameters	Description
Present storm water drains lay out just reward this appropriately	Storm water drains laid as per the site topography during Portuguese reign
Coverage within CCP area	100%
Total Length and condition of storm water drains	No proper data pertaining to the length and condition of the storm water drains
Present O & M Agency	CCP only attends to the repair works of the existing drains

The CDP highlighted upon the following issues

- Closure of existing drains
- Silting of Mandovi River
- Silting of natural drains
- Encroachment along with Saint-Inez Nallah
- Encroachment and reclamation of lakes.

The Strategies proposed to achieve the vision are as listed below.

- Redesign of the existing drain system network to ensure safe against the flash flood.
- GIS Inventory Mapping & data base managementsystem
- Efficient Maintenance Mechanism

Proposed Projects and its components

The proposed projects and its components under CDP 2006 are as depicted in Table below. A total cost estimate of Rs. 4.50 crores was proposed for the projects proposed for improvement of storm water drainage system in the city.

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
1	Cleaning of all the stormwater drains	100 km; <i>Estimated cost: 250 lakhs</i>
2	Beautification of Saint-Inez nallah	(3000x20x3); <i>Estimated cost: 200 lakhs</i>
3	GIS Inventory Mappingand Development of StromWater Drain ManagementSystem	-

Source: CDP 2006

8.4.2.1 Proposed Projects

The CCP has prepared a DPR on St. Nallah/ creek at Panaji which estimated a total cost of Rs 19.56 crores. The proposal is presently reworked by GSIDC and the project cost estimate with new components is approximately Rs 72.0 crores. It has been taken up as one of the project component under improvement of storm water drains in the Revised CDP for Panaji.

8.4.3 Service Adequacies and Key Issues

The service level benchmarks as shown in the Table below shows 100% coverage of SWD w.r.t the existing road network within the CCP area. The city SWD network was laid during Portuguese period and still functional. However, there is a persistent problem of flooding during monsoon due to high water levels in River Mandovi and shortcomings of the present SWD system to mitigate such incidences. The present state of outfall drains is bad with dumping of SWM and lacks proper maintenance. The city needs a proper storm water drainage management plan which should be based on in depth study of the existing SWD system, its carrying capacity, its surface condition and need for replacement and improvement. The roadside drains should be aligned as per the topography and integrated to the network of major outfall drains forming a proper drainage system within the city.

Table 61: Service Level Benchmarks for storm water drains

Storm Water Drainage	Unit	Value (2012-13)	SLB	GAP
Coverage of storm water drainage network	%	100.00	100.00	
Incidence of water logging / Flooding	Number	N.A.	-	

The major issues in the present storm water drains are as listed below.

- The present system of storm water drains discharge is planned on the basis of gravity formed by the topography of the place. However given the same levels of River and land form and encroachment of natural barriers along the River this system is not applicable during high tide or monsoons. It occurs in flooding of the city area which has been a persistent problem every year during the monsoons. A new mechanism for efficient storm water discharge needs to be evolved to address this issue immediately.
- The high urbanization rate of the city has affected the natural drainage pattern of the city. The new development upcoming in the city has been ignoring this factor adding to the complexity of the problem.
- The Panaji city consisted of lakes / marshy lands earlier which used to act a buffer against the flooding of River Mandovi during monsoons. One of these the Mala Lake located at foothill of Altinho acted as a catchment area to accommodate the excess run off flowing from Altinho. But due to encroachment along the lakeside its area reduced from 70,000 m² to 15,000 m² and is still prone to encroachments. This reduction in the catchment area of the lake has resulted in run off entering the city areas from Altinho. The Mala lake development and conservation will help in mitigating this issue to quite an extent. The River Mandovi flowing through the state meets the Arabian Sea near Panaji. This perennial source naturally silts in the area where it merges the sea. Panaji located adjacent to this conjuncture of the River also discharges its storm water runoff and sewage into the River. Over the years the siltation in the River has been increasing causing free flow of water and increase in river bed level. During peak storms, invert levels of outfall drains are lower than water level of River / Tides and thereby affecting the safe discharge.
- The present storm water drain network is old and poorly maintained. This reduces the carrying capacity of the drains resulting in overflowing of storm water drains and stagnation of water on the city roads.
- The natural drains such as Saint-Inez Nallah which carry major part of storm water to River Mandovi are affected due to silting due to indiscriminate dumping of solid waste, discharge of untreated sewage from the household not connected to UGD network and encroachments along the drains. This has reduced the present carrying capacity of the natural drains along with reduction in the velocity of the flow. Presently there is no proper mapping of the existing storm water drains and information on its present condition. The CCP conducts only the repair works of the existing storm water drains when required.

Panaji city being surrounded by water bodies has high ground water table with water being available around 1 to 1.5 m from the surface. Moreover, the soil is deep, poorly drained and less permeable. Hence, high ground level saturation is also affecting the percolation surface run-off.

9. TRAFFIC AND TRANSPORTATION

9.1 Existing Transportation Infrastructure

9.1.1 Regional Roadways

Goa has a total length of 269 kms under National Highways. The road network in Goa is well developed in the coastal plains providing accessibility to the beaches and various tourist spots. However accessibility to hilly and dense forested terrain of Western Ghats is poorly developed. Goa has two National Highways passing through it. The NH-17 runs along west coast and links Goa to Mumbai in the North and Managalore to the South while NH-4A runs across the state connecting the city of Panaji the state capital to Belgaum (Karnataka) in East. Apart from the above mentioned National Highways, Goa has 8 State Highways of which the major ones are:

- SH 1 connecting Mapusa to Valpoi via Bicholim
- SH 5 connecting Ponda to Margao
- SH 6 which takes off from SH-5, south of Ponda, passing through towns of Sanvordem and Sanguem and leading to Karnataka.

The city of Panaji is connected by the hierarchy of road network which includes National Highway (NH), State Highways (SH), Public Work Department as well as the CCP roads. The State Highways, Major District Roads (MDR) and the city roads are maintained by the state government under Public Works Department (PWD). The CCP presently is not involved in the O & M and laying of roads within the city.

The regional road network within the city shows two major roads passing through Panaji CCP viz. NH-17 and NH-4A. The NH-17 passes through the city and further connects it with Mumbai in Maharashtra via Mapusa and Pernem in the state and Mangalore in Karnataka via Margao in the state. The NH-4A connects the city to Bangalore in Karnataka via Ponda in the state. The NH-7 intersects the NH-4A in the city. These regional roads also form the major spine of the city road network. The Fig below shows the regional road connectivity within the state and Panaji.

Figure 31: Regional Connectivity in the state



Source:

9.1.2 Railways

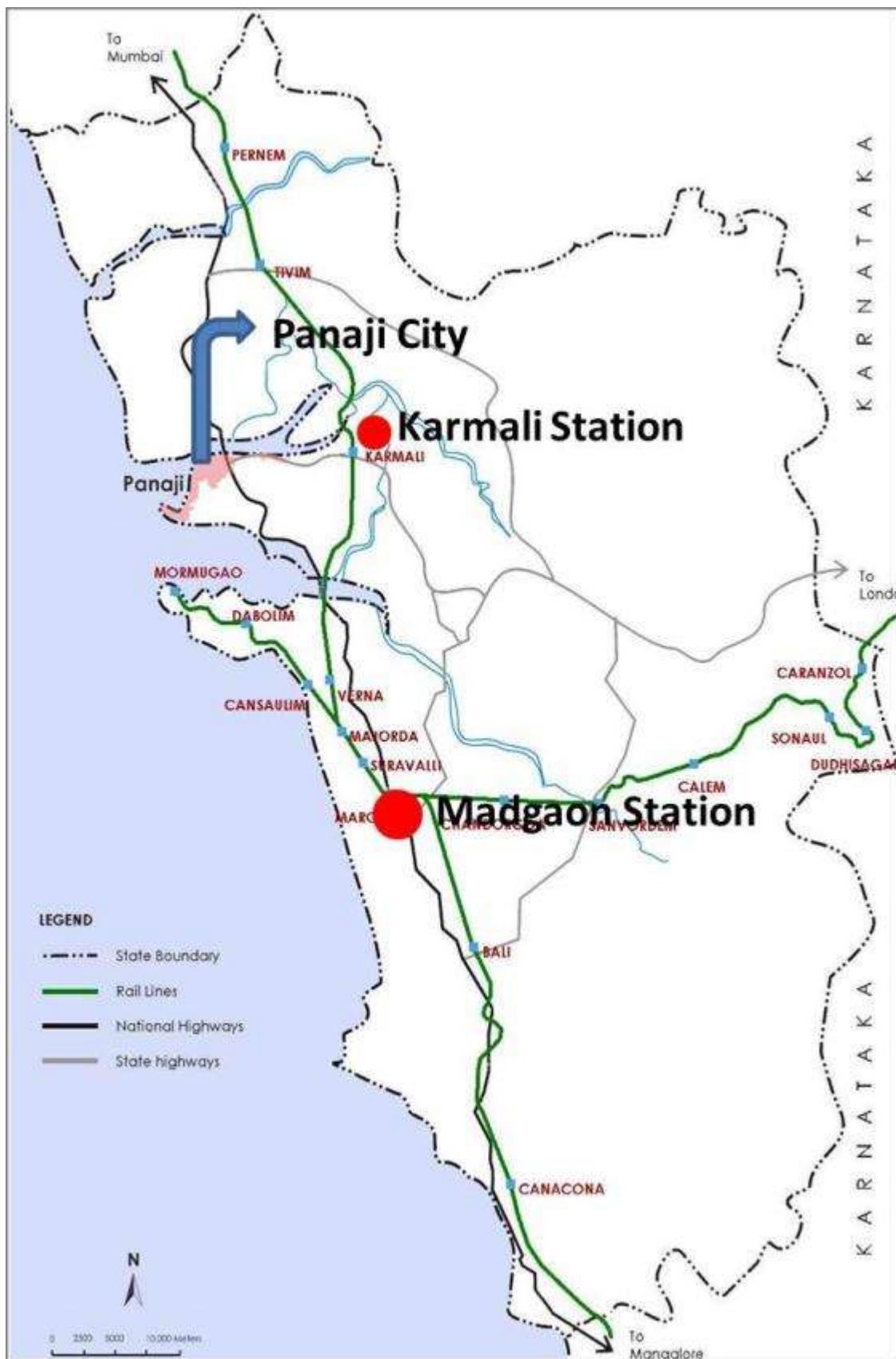
Goa has well developed railway linkages with the rest of the country. There are two single broad gauge track routes for the movement of goods and people. These are as follows:

- a) The Panvel-Mangalore North-South link by Konkan Rail Corporation
- b) The Londa- Mormugao East- West link by South Western Railway.

The state has two major railway stations – Margao and Vasco da Gama. Both these stations are located in the Southern part of the state. The South Central Railway terminus is at Vasco-da.Gama and the Konkan railway terminus is at Margao. The Margao station is the biggest and most prominent railway station being a railway junction positioned at the intersection of the Konkan railway and South Western railway. It is well connected to major cities in the country viz. Mumbai, Mangalore, Bangalore, Cochin, Chennai, Ahmedabad, Delhi, Jaipur, Kolkatta etc. Apart from this there are smaller stations along the rail route passing through the state which connects to the various locations along its route.

The city of Panaji does not have direct rail connectivity. At present the Margao station only serves as the major rail link to the city. It is located at a distance of 40 kms from the city and further connected by private buses/ KTC buses, private taxis/ two wheelers etc. The nearest railway station to the city is located at Karmali at a distance of 14 km from the city. However, this station is small and presently not equipped with good infrastructure to cater high volumes of passenger traffic. Moreover, there is lack of proper public transport system between Karmali and Panaji which can facilitate good accessibility to reach Panaji.

Figure 32: Schematic Map - Rail Connectivity and stations in the state



9.1.3 Waterways

Goa is endowed with 253 km of navigable inland waterways. Currently the Mandovi and Zuari rivers are used for transportation of around 15 million tonnes of iron ore from mines in the Bicholim, Sattari and Sanguem talukas to the Marmugao Port. The Cumbarjua Canal, which links rivers Mandovi and Zuari, is also used for iron ore transportation in the monsoon months, since the mouth of the River Mandovi is not navigable during the monsoon, due to the formation of sand-bars during this period. However due to limited draft of the canal, only smaller size barges can navigate at high tide through the canal.

Besides iron ore, imported coal is also transported from the Port to a coking plant at Amona. The transportation of passengers is limited to the government owned public ferry services used at river crossings, mainly at places where road bridges are not available. There are 21 numbers of ferry routes within the state. Out of these, 12 routes have been privatised for toll fees since 2002. In addition to meeting the needs for transportation of goods and passengers, the inland waterways have a tremendous scope for tourist leisure transportation, in the form of boat cruises and sightseeing.

Ferry transport is a significant transport mode in the Panaji city. A substantial number of people use the ferry system operated by River Navigation Department as it is affordable and less time consuming to go across the River Mandovi. There are three numbers of jetties from which ferries transport people and vehicles across the River Mandovi. They operate from Panaji to Betim, Ribander to Chorao and Divar jetty to St. Pedro. The Table below gives the details of the existing ferry routes operated in Panaji.

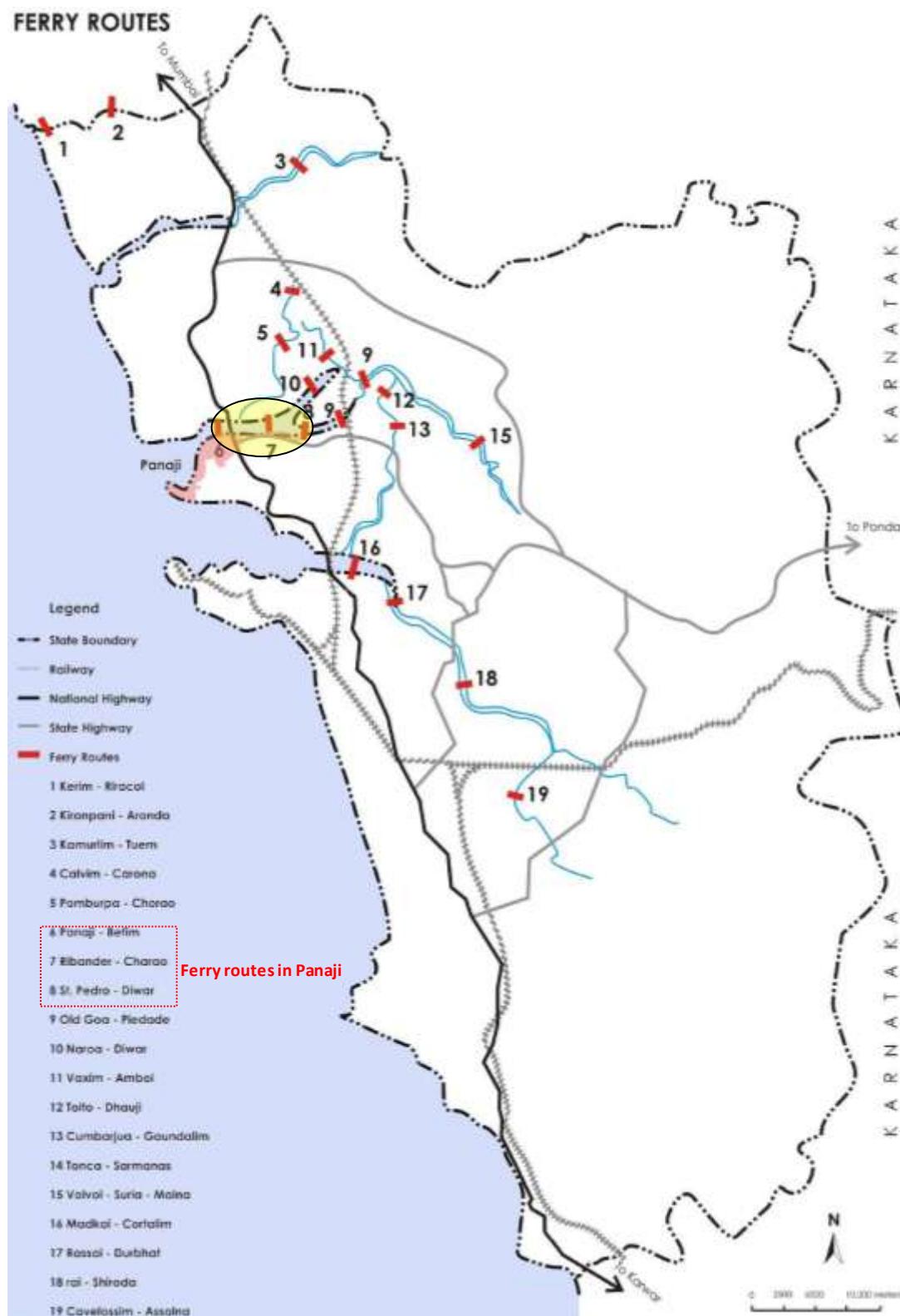
Table 62: Ferry Routes in Panaji

S. No	Origin	Destination
1	Panaji	Betim
2	Ribander (Chorao Jetty)	Chorao
3	Divar Jetty	St. Pedro

Source: DPR for Comprehensive Mobility Plan for the City of Panaji under JNNURM, 2010

It has been projected in the draft regional plan that by 2021, 20 lakh people could generate 30 lakh trips per day (at 1.5 trips per person per day). Considering this projected demand and convenience of inter city transportation through the water ways the city needs to give high prominence to this mode of transport in future. The city road network has no scope for expansion given its geographical settings while the city will experience major thrust of traffic movement with the rapid urbanization. The city's water front and locational advantage along the coastline of the state (centrally located) can be used for developing the passenger ferry system to commute to major urban centres in the state viz. Vasco, Mormagaon, Madgaon etc. Apart from this, the waterways also need to be developed to improve the connectivity of the adjoining areas which are navigable to the city. Other than the existing ferry routes operational in the city, there is further scope in developing passenger services like Dona Paula-Vasco city, Panaji – Chorao-Divar-Old Goa- Amona-Pilgao, Panaji – Pomburpa-Aldona-Siridao, Banastarium – Old Goa – Panjim etc²². The Figure below shows the major ferry routes within the state including the city of Panaji.

²² Goa Vision 2035, Goa Chamber of Commerce and Industry

Figure 33: Existing Ferry routes in the state

Source: DPR for Comprehensive Mobility Plan for the City of Panaji under JNNURM, 2010

9.1.4 Airways

The airport facility for the city is located at Dabolim which is about 35 km away from Panaji. Apart from this, a greenfielded airport is also proposed at Mopa in Pernem taluka which is located at a distance of 30 kms from Panaji.

Figure 34: Airports in the state



The Dabolim Airport in Goa (only airport for the state) ranks 8th out of all the airports in India, in terms of the volume of traffic held. It is estimated by the Airports Authority of India authorities, that the runway can handle up to 25 million people per year, however, the support and infrastructure facilities are so poor, that the airport is struggling to cope with a mere 2.2 million passengers, less than a tenth of its integral capacity.

Infrastructure constraints include a terminal that can only support a meagre 350 passengers on the domestic side and 300 passengers on the international section, a facility for parking that can accommodate just a mere 100 cars and no buses/ coaches, a minuscule apron, that has no more than six bays, no cargo facilities to speak of and a very poor approach highway. The present situation is far from ideal²³ and the airport is under severe strain, stretched to the point of collapse.

Even conservative projections by AAI point out to an estimated traffic of 54 lakh passengers by 2015, with over 49,000 aircraft movements. The next two years alone will receive approximately 30000 annual aircrafts and 35 lakh passengers transit this airport, and Airport Authority of India (AAI) is well aware that they are at crisis point.

The key constraint, for efficient functioning of the Dabolim airport, is the lack of sufficient land. At present the airport covers an area of 36.40 acres. The state government as well as the Navy has transferred 9.87 acres and 6.25 acres of additional land respectively summing to 52.51 acres.

²³ Present airport requirements includes a terminal building that can support 2000 domestic and 1500 international passengers, car parking areas for 1000 cars and 50 coaches, no less than 12 aerobridge bays and 6 non standard bays for VIP and private aircraft, along with integrated handling facilities to managed 5000 MT tons of perishable and non perishable cargo.

However, due to disagreements among the concerned departments, the development works for the enhancing the present airport facilities has not been yet commenced.

On the other hand a proposal for Modern International Airport at Mopa in Pernem taluka is declared and under consideration. It is located at a distance of 30 kms from Panaji. The land already acquired, land under notification of acquisition and land proposed to be acquired adds up to about 1100 hectares. The 13th Finance Commission has given a special Goa specific grant of Rs 100 crore for Mopa Greenfield Airport. The Goa Government has now officially given an “in principle” approval to the civil aviation ministry to two airports in the state. However, the Government commissioned the International Civil Aviation Organisation (ICAO) to carry out a study of the situation concerning the existing airport at Dabolim and the proposed new airport at Mopa in order to explore the feasibility of operating two airports in the state. The high powered committee has since submitted its final recommendations for a new airport at Mopa to the centre. City Road HierarchyRoad Network

The city spreads over a total area of 8.30 km²as per the ODP for Panaji. Out of this, the area underroads is 0.30 km² which constitutes only 5.45 % of the city area. The total length of the roads in the city is 77.0 km. Out of this 71.7 km of road network is located within the CCP area. Thus, the city roads comprising of sub arterial, collector and streets constitute about 93% of the total roads in the city. Following table provide the length and width of the various roads in the city. The arterial roads comprising of the regional NH/ SH constitute remaining 7% of the total length of the road network which is interconnected to the sub arterial roads of the city.

Table 63: Distribution of road network in Panaji city

Road category	Length (km)	Width of the roads (m)	% to total
Arterial Roads (National Highway, State Highways)	5.3	30- 50	7
City Roads (Arterial, Collector and streets)	71.7	2 to 15	93
Total length of the Roads	77.0		100%

Source: PWD and NHAI Department

9.1.4.1 City Roads

Panaji, similar to many other Indian cities that have had a colonial past has a mix of organic, radial and grid iron road networks. Organic road networks are seen in Fountainhas, Portais and Boca Da Vaca areas which were the first to be inhabited on account of the creek and the presence of fresh water springs. Radial networks developed in the Altinho areas due to the topographical conditions of the Altinho hill. Grid iron networks exist in the Central Panaji areas as this forms reclaimed and engineered land that was laid by Eng. Luis Maravilhas in 1923. Patto complex area also has a grid iron pattern as it was designed and executed after 1985.

The Ribander causeway built in 1632 formed the main link between Ribander and Central Panaji as well as the construction of the Patto Bridge in 1633. Both these are today heritage structures. The main arterial road of the city today is the D B Road which runs along the Mandovi River edge and connects the Kadamba bus stand area down till the NIO junction²⁴. Also adding to the road network of the city are 7 road bridges and 1 foot bridge. Of this the new Patto and the old Patto bridges act as

²⁴ DPR for Comprehensive Mobility Plan for the City of Panaji under JNNURM, 2010

major entry and exit points to the city. The road network in Panaji is also characterised by a large proportion of one ways.

Figure 35: Road Hierarchy in Panaji city



Source: DPR on Public Share Bicycle for Panaji, 2014Carriageway

The width of roads ranges between 4 to 14 meters in the city. As indicated in the Table below, about 77% of the road network has either two or four lanes (width 8-14m) and around 12% of the road network has two lane carriage widths. The remaining 11% of the road network has single lane. Majority of these single lane roads are collector roads further connecting to the arterial roads. The major regional roads have four lanes and all the major roads within the city have two lanes. The Table below shows the details of carriage widths for the existing roads in the city.

Table 64: Carriage way details

Carriage way (Meters)	No. of lanes	%
Up to 3 meter	Single lane	11%
4 to 7 meter	Two lane	12%
8 to 14 meter	Two lane/ Four Lane	77%
Total		100%

Source: DPR for Comprehensive Mobility Plan for the City of Panaji under JNNURM, 2010

9.1.4.2 Road Condition

The city roads within the CCP are 100% surfaced with Bituminous topped (BT) roads. All the roads are maintained on regular basis by the PWD department. The major issue which is faced by the city administration is regular resurfacing of the roads which are subjected to frequent wear and tear due to high vehicular traffic movement. The road surface is also damaged during the period of monsoons due to heavy rain and flooding in some parts of the city. The roads are resurfaced with layering of BT every time without scrapping the old road surface. This issue needs to be addressed on priority basis.



City roads in core area

9.1.5 Important Junctions

There are in all 26 major traffic junctions in the city. Out of these the major junctions that are prone to heavy traffic congestion in the city are as listed below.

- Kadamba Circle near Heera Petrol Pump
- Panjim Church Square Junction
- Army Headquarter Junction
- Kala Academy Junction
- Vivanta Hotel Junction



Traffic junctions in the city

These traffic junctions need to be improved on priority for proper traffic movement and facilitate ease of pedestrian movement as well as ensure safety measures. The same has been considered under the junction improvement proposal for the city.

9.1.6 Bridges, Flyovers and Interchanges

There are seven road bridges and one foot bridge within the city. The new Patto bridge and the old Patto bridge over Rua de Ourem act as the major entry and exit points to Panaji. The details of the bridges in the city have been listed below.

- Old Patto Bridge (Heritage) over Rua De Ourem
- Patto Bridge (1992) over Rua De Ourem
- The New Patto Bridge (extension of the Patto Bridge) (2004) over Rua De Ourem
- 4 bridges over St. Inez Nalla (2 near Campal, 1 near mall and 1 near Tonca)
- Foot Bridge (1990) over Rua De Ourem

9.1.7 Non Motorised Transport Facilities

The prominent pedestrian movement patternis concentrated in the central core city area of Panaji which occupies an area of about 2 km². The core city areaconsists ofprominent natural and built heritage, carnival/ festival areas,commercial areas andaccommodation areas along with the existence of administrative, institutional and other departmental offices. This central zone forms the zone of maximum concentration of pedestrian and vehicular movement due to the high intensity economic activities bustling in it. Several buildings in thecentral area of Panaji are arcaded and hence provide shaded pathways for the movement ofpedestrians.

The majority of the pedestrian movement is observed on all the main roads in the central area which includes Dada Vaidya Road, A B Road, 18th June Road and M G Road. Other roads like the junction around Panjim Church Square and roads leading to Kadamba bus stand via Rua De Ourem and Foot Bridge are also popularly frequented. Stepped pedestrian pathways also form a network to access areas of high slopes like the Altinho Hill amd Cortini which used to be very popular earlier until road accessibility reduced their importance. Examples of these include the way of the cross stepped pathway as well as the high court steps.Apart from this, the D B Road which is the major city level road passing along the waterfront of the city from is also a much frequented road by both pedestrian and vehicular traffic as it is a scenic route along the Mandovi River edge that leads not only to the Western tip of Dona Paula which is a tourist spot but also to Ribander and further to Old Goa. It is the widest road in Panaji and is designed as a promenade. The Fig below shows the major pedestrian ways within the city area.

Figure 36: Existing Pedestrain ways in the city

The CBD area of Panaji is ideal for pedestrian movement as the concentration of commercial activities stretch 600 m East-West and 400 m North-South which makes it ideal as a walkable core. It enjoys a mixed land-use, dominated with commercial activities, also lending to institutional, residential and recreational use. The CBD also acts as a key pedestrian link amongst heritage areas with contrasting urban character, public spaces and historic buildings.

Inspite of all the built and natural features which supports pedestrian movement in the core city, it has been highly affected by chaotic traffic pattern due to movement of vehicles all over, inadequate safety measures, noise and pollution due to vehicles etc all leading to unfriendly pedestrian environment. There is urgent need to formulate policies and plans towards the restriction of vehicular traffic within the core city area, promote non motorized modes of transport, improvement of the pedestrian pathways and demarcate pedestrian zones linked to the public transport system.

9.2 Issues and Key Challenges

- The city has good regional connectivity by road network. Apart from that it is accessible by road to the major railway station at Madgaon and Dambolim airport.
- The city lacks direct rail linkage. The nearest railway station is Karmali which is a small station located at a distance of 14 kms from Panaji. There is lack of proper public transport system from the railway station to the city which if developed can facilitate easier approach for the people to opt Karmali station on the Madgoan and Vasco station which are located 40 kms away from the city and reduce the travel time. The city has access to water ways which

transports people and goods across the River Mandovi in lesser time. However, it is very minimal at present in the city. Other passenger ferry routes need to be explored taking into account the restrictions of the road expansion in the city especially for intercity connectivity.

- The city lacks direct air connectivity. The existing airport of Dambolim is 35 kms away while the proposed airport at Mopa is 30 kms away from the city. At present the Dambolim airport lacks adequate facilities for the present as well as future demand.
- The roads within the core city area are laid in grid iron pattern but due to the dense commercial land use and non availability of land, the roads cannot be taken up for expansion.
- All the roads within the city are 100% surfaced but have low carriageway. The average carriageway in the city is 11 m. The highest carriageway in the city is 15.5 m while lowest is 2.0 m.
- The city roads are prone to high level of wear and tear due to traffic movement and flooding during the monsoons. This results in frequent resurfacing of the roads. Provision of CC roads in the city will increase its longevity and reduce the need for frequent repairs.
- Easy and comfortable pedestrian movement difficult due to congestion within the core city area. Lack of policy measures to restrict the vehicular movement and use of non motorized modes of transport within the core city. This results in increasing use of motorized vehicles adding to the congestion on the roads as well as unpleasant environment for the pedestrians.
- All the pedestrian pathways within the city are not at one level, comfortable, shaded and properly designed with street lights, sitting benches, paving and landscaping for pedestrian movement.
- There is lack of proper infrastructure for crossing roads like foot over bridges, traffic signals, zebra crossings along the major junctions and roads.
- There is a need for formulating a Non motorized Transport policy for the city which promotes and develops various non motorized options of commuting within the city like pedestrian pathways, public bicycle sharing system, restriction of vehicular movement in the core city area, etc

9.3 Existing Traffic and Transportation System

9.3.1 Traffic Volume

9.3.1.1 Entry and exit points

The Panaji city has two major entry and exit points viz. the Old Patto Bridge and the New Patto Bridge. The Old Patto Bridge was built during the period of Portugal rule and is a heritage structure. Most of the traffic uses these two major bridges for commuting to and fro to the city. As shown in Table below, 74% of the total traffic enters from New Patto Bridge and remaining 26% of traffic enters from Old Patto Bridge in the city. On an average total 1,06,014 vehicles enter in the city through these two bridges. This shows high level of traffic movement on these bridges which becomes a bottleneck during peak traffic hours. The Table below shows the traffic count on both the bridges and % of usage.

Table 65: Traffic Count at Old Patto Bridge and New Patto Bridge, 2012

Day Wise Total Vehicles Entering Panaji City	Old Patto Bridge		New Patto Bridge		Grand total
	Vehicles Entering Panaji	% Usage of Bridge	Vehicles Entering Panaji	% Usage of Bridge	
6/11/2012	13723	25.5	40031	74.5	53754
7/12/2012	14054	26.9	38206	73.1	52260
Daily Average	13889	26.2	39119	73.8	106014
Percentage	26	-	74	-	100

Source: *Traffic Police cell, Panaji*

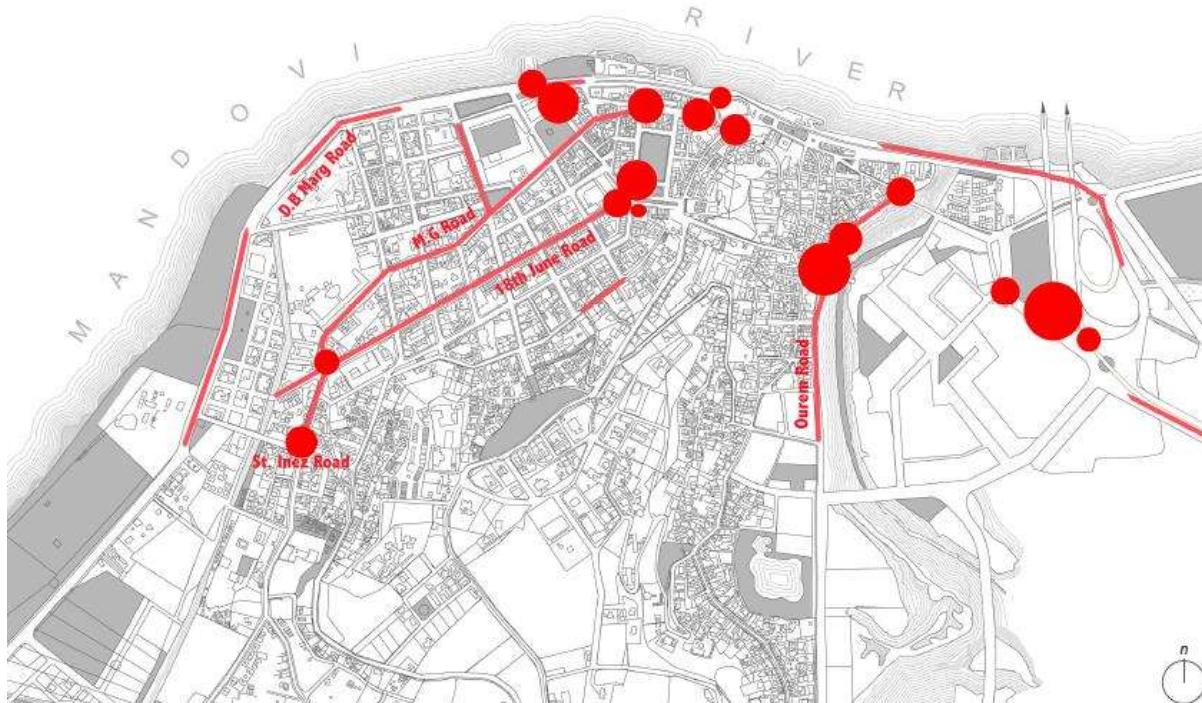
9.3.1.2 Traffic Characteristics

The unique location and characteristic of the city allows for the usage of various modes of transport such as road, rail, port, ferry, air and most importantly bicycle and walk. The central area of Panaji has grid-iron pattern planned during the Portuguese regime. This road network system in the city at present are too congested and face high traffic blockage throughout the year.

The predominant land use along the existing road network in core city is commercial drawing huge volume of vehicles and pedestrian volume. With the increase in the tourist activities in the city the commercial development also has been rapidly growing in the core city. Apart from this, the increase in vehicular ownership, increasing floating population and development pressure in the main commercial area has been adding to the conflicts between the vehicular traffic volume as well as the pedestrian movement.

Since the Central Business District of Panaji was planned during the late 19th century, the road carriage width is narrow to carry the present vehicular volume of traffic causing traffic jams and blockages in the peak hours. The junctions prove to be narrow for free vehicular movement. During peak hours, roads like 18th June Rd, Mahatma Gandhi Rd and A.B. Road, all being the core of the CBD area, suffer severe congestion, making the lives of its inhabitants unhealthy and miserable. D.B. Marg Rd also suffers unmanageable traffic volumes during peak hours affecting all the key institutions and public spaces along the road in Panaji. The junction as we enter the city, outside the Kadamba bus stand, is also affected by increased number of vehicles in addition to the inter-state and city buses which ply around every hour.

The problem is further amplified by the parking of vehicles along the roadside. The parking along the roads is not regularized and presently no parking charges are levied by the CCP which has caused parking inadequacy and traffic blockages due to increased rate of parking along the roads. Presently there is no pay parking facilities within the city..

Figure 37: Congested roads and junctions in the core city area

Source: Proposed Decongestion Model for City Centre of Panaji by Charles Chorrea Foundation

9.3.1.3 Traffic Volume at Junctions

As per the survey analysis in the Comprehensive Mobility Plan for the City of Panaji under JNNURM, 2010, ten city road junctions were surveyed to estimate the traffic volume during peak hours. A maximum traffic volume of 5810 PCUs is observed on Iffl Junction (viz the junction to Ribandar causeway and has 4 major roads meeting it). The other junctions where high influx of traffic volume was observed were secretariat junction and Betim Ferry Junction. There is low intensity traffic volume at foot bridge junction and Caculo Island junction. The summary of traffic volumes of peak hour on all the major sections of the roads is provided in the table below.

Table 66: Traffic Volume at Major Junctions

S. No	Name of the Junction	2 wheeler	3 wheeler	4 wheeler	Truck/ bus	Total	PCU's
1	Miramar	1189	72	1108	289	2658	2642
2	Kala Academy	1800	62	1079	212	3153	2677
3	St. Inez.	2844	106	1390	105	4445	3233
4	Caculo Island	1135	61	824	89	2109	1720
5	Betim Ferry Junction	3236	64	1327	479	5106	4446
6	Dominos Pizza Junction	2858	320	1635	79	4892	3621
7	Secretariat Junction	1903	141	2377	395	4816	4655

S. No	Name of the Junction	2 wheeler	3 wheeler	4 wheeler	Truck/ bus	Total	PCU's
8	Foot Bridge Junction	1747	83	699	114	2643	1998
9	Junction to Ribandar causeway	2856	115	1816	817	5604	5810
10	Kadamba Bus Stand	3294	120	1208	119	4741	3332

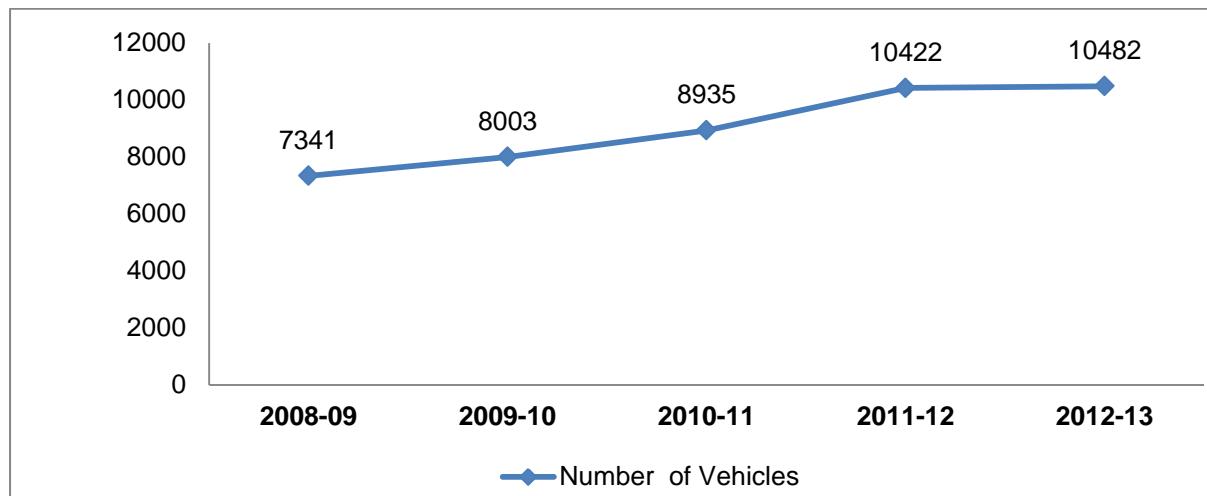
Source: Comprehensive Mobility Plan for the City of Panaji under JNNURM, 2010

9.3.1.4 Vehicular Growth and Composition of Vehicles

Goa ranks first among all the states in terms of households owning two wheelers and / or a car with around 81.5% compared to the national average of 25.7% as per Census 2011. Evidently, the number of vehicles in the city has also been increasing every year. At present the most preferred mode of transport within the city is two wheelers and four wheelers followed by auto rickshaws and taxis by the locals and tourists to nearby places. Apart from this KTC operated city public transport is also used for movement within the city.

Analysing the vehicular growth in the city it has been observed that city has experienced about 9.3% growth in vehicular population in last four years. The maximum increase is observed in rickshaws, taxis, goods vehicles and two wheelers. A decline in public transport buses has been observed in last four years indicating a decline in its usage. The figure and table below depicts the modal split of the vehicles registered in the city from 2008-09 to 2012-13.

Figure 38: Growth of vehicles in the city (2008-2013)



Source: Regional Transport Office (RTO), Panaji

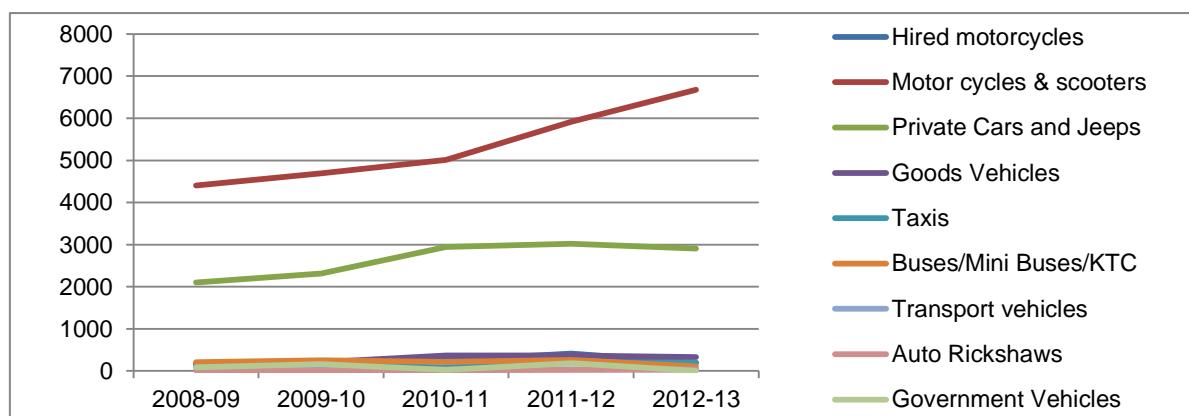
Table 67: Number of Vehicles Registered at RTO, Panaji

S. No.	Type of Vehicles	2008-09	2009-10	2010-11	2011-12	2012-13	Growth %
1	Motor Cycles on Hire	159	167	244	413	195	5.23
2	Motor Cycles and	4400	4692	5013	5918	6673	10.97

S. No.	Type of Vehicles	2008-09	2009-10	2010-11	2011-12	2012-13	Growth %
	Scooters						
3	Private Cars and Jeeps	2102	2313	2941	3016	2904	8.42
4	Goods Vehicles	186	207	365	368	332	15.59
5	Taxis	109	143	82	198	199	16.24
6	Buses and Mini Buses/KTC	207	249	212	262	110	-14.62
7	Transport vehicles	86	68	35	41	33	-21.29
8	Auto Rickshaws	7	4	17	24	31	45.07
9	Government Vehicles	85	160	26	182	5	-50.75
10	Total	7341	8003	8935	10422	10482	9.31

Source: RTO, Panaji

Figure 39: Growth of vehicles in various categories (2008-2013)



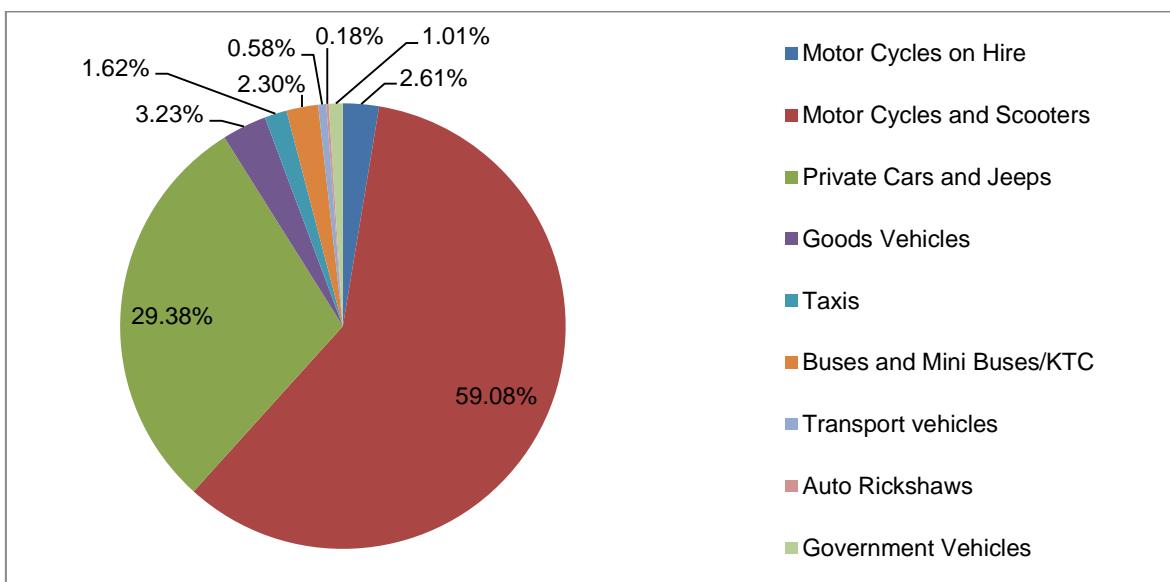
Source: RTO, Panaji

9.3.2 Modes of Transport

9.3.2.1 Modal split

This unique location and characteristic of the city allows for the usage of various modes of transport such as road, rail, port, ferry, air and most importantly bicycle and walk. Apart from the various motorized and non motorized on road modes of transport in the city, there are ferries which carry people and vehicles between Panaji and smaller satellite towns located across the Mandovi River at present. A unique mode of intermediate transport by way of motorcycles on hire having a combination of motorcycle pilot and passenger behind are also present.

As per the average of the number of vehicles registered in the last five years (2008 -2013) it is evident that among all modes of transport, private two wheelers and four wheelers remain the most preferred in the city with vehicular population of 88.46%. The other modes of passenger movement within the city includes hired motor cycles (2.61%), taxis (1.62%), KTC/ private buses (2.30%) and autorickshaws (0.18%). About 3.23% of the vehicles are goods vehicles while 1.01% is government vehicles. The Fig below shows the modal split of vehicles operating within the city.

Figure 40: Modal Split of vehicles in the city

9.3.2.2 Public Transportation

The public transport system in Goa predominantly includes bus transport system. KTC operates services within Goa state as well as outside Goa. Apart from this, private bus operators also operate to a large extent. It is estimated that about two-third of the buses operators are in the private sector and the state owned Kadamba Transport buses operate parallel to the private sector. Apart from this motor cabs, autorickshaws and pilots (motorcycles) also serve the purpose of passenger transport in the state which form the major mode of transportation in Goa. Among these, the pilot motorcycles are very popular among the locals as well as the tourists for movement due to easy accessibility even in the remote areas, low fare and faster mobility. There is also some percentage of passenger ferry routes which ply in the state.

Goa boasts of one vehicle for every 2.8 people residing in the state; this the highest index in the country. Over the last five years, there has been an average annualised growth of 9 to 10% in the number of vehicles, coming to Goa's roads.²⁵ It is observed that ratio of the number of public transport vehicles to the number of private vehicles has sharply declined over the years. This extremely high rate of growth of private vehicles, especially two wheelers and private cars not only congests the roads but also causes high levels of pollution and wastage of fuel, which is primarily imported.

Besides the growing affluence, the primary reason, for the high spurt in private vehicles, is the poor availability of an alternate public transportation system. The public transport system mainly comprises of bus services. The Kadamba Transport Corporation (KTC) runs its service, analogous to the private sector and has to hence compete with them, on all the routes, except the three major trunk routes intercity routes between Panjim, Margao and Vasco, which have been nationalised by the Government. At present the KTC has a fleet of 433 vehicles comprising 36 luxury buses, 250 semi luxury buses and 147 mini buses operating on 215 routes covering over 104000 kms per day and catering to around 75000 passengers per day²⁶. However, in the recent years, the losses of KTC have risen because of non replacement of old buses, low fleet utilisation and over staffing.

²⁵ Goa Vision 2035, Goa Chamber of Commerce and Industry

²⁶ Goa Vision 2035, Goa Chamber of Commerce and Industry

9.3.2.3 City Level Bus Service

The public bus transport system in the Panaji CCP is also operated and maintained by Kadamba Transport Corporation (KTC). It was established in the year 1981. Likewise the state, the public transport system in the city is also struggling to compete with private modes such as cars, two wheelers and other intermediary modes, as they are unable to respond to the demand. In Panaji the current modal split have low percentage of mass transport which is around mere 2.3%.

The core city is restricted for public transport operations due to high density and inadequate carriage widths of the roads for bus operations. Hence, the existing routes within the city are limited and often the frequencies are inadequate. The most frequented route is from KTC to Miramar beach and then down to Dona Paula via Tonca. The Fig below shows the existing bus route within the city.

Figure 41: Map showing existing bus routes within the city



Source: DPR for Comprehensive Mobility Plan for the City of Panaji under JNNURM, 2010

9.3.2.4 Intercity transport

The Kadamba Transport Corporation is the major agency which runs the intercity transportation in the city. The major routes/ towns connected include entire North Goa and South Goa talukas as well as the neighbouring states of Karnataka, Maharashtra and Andhra Pradesh. Apart from KTC, bus services operated by the private sector also operate in the city which caters to the intercity need of the people. Apart from transportation between the major urban centres, the bus transport also connects the city to the major transport nodes viz. airport, railway stations etc. However, there is no dedicated bus service connecting these transport nodes which receives the maximum thrust of domestic as well as foreign tourists visiting the state.

A total of 54 routes are operated by private and Kadamba Transport Corporation. About 2619 numbers of trips are generated from the neighboring towns to the city of Panaji by private buses as well as KTC operated buses. Each bus operates around 8 trips per day covering approximately 200

km mileage per day. The buses that access various other towns in the region are predominantly towards Old Goa (private buses) and then towards Mapusa (public buses).

9.3.2.5 KTC Bus stand Infrastructure

The Kadamba bus terminal which is located at the entrance to the city serves as the major hub and interchange for intercity and intra city buses. This is also the point where intermediate modes of transport like taxis and pilots can be also procured on entering Panaji city. This interchange transport hub is not only located at the entrance to the city but is also located along the NH 17 and has large traffic volumes and intermingling of both inter and intra city traffic.

The present bus stand is spread on an area of 40000 sq. m. There are 40 numbers of platforms with 40,000 numbers of average passengers travelling per day. The condition of the bus stand is not satisfactory and needs improvements. An additional area of 17490 sq. m adjacent to the existing bus stand and EDC Patto Plaza has been proposed for Transport Bhavan. The PWD, Goa has taken up following works for improvements of bus stand. This includes the following:

- a) Asphalting (hot mix) of road surface within bus stand area
- b) Fixing of pavers at arrival and exit point
- c) Kotah stone flooring at Panaji bus stand (in main building)
- d) Painting of the main bus terminus
- e) Electrical repair/ illumination work
- f) P/F PVC sheet roofing over the main bus terminus
- g) Construction of storm water drainage

9.3.3 Existing Transportation Infrastructure

The existing transportation infrastructure of the city includes the KTC bus terminal and the Ferry transport node. The Kadamba Transport Corporation (KTC) and private bus operators run buses within Panaji and Goa State. There are total 433 numbers of buses in the state with 800 trips performed by the city services (private vehicles) and 2619 trips are generated from the neighboring towns to the city of Panaji by private buses as well as KTC operated buses. Apart from this, there is water transport facility transporting people and goods from Panaji across to other bank of River Mandovi. There are 3 jetties from which ferries transport people and vehicles across the river Mandovi. There is no direct railway link or airport facility within or surrounding the city limits. Parking Facilities

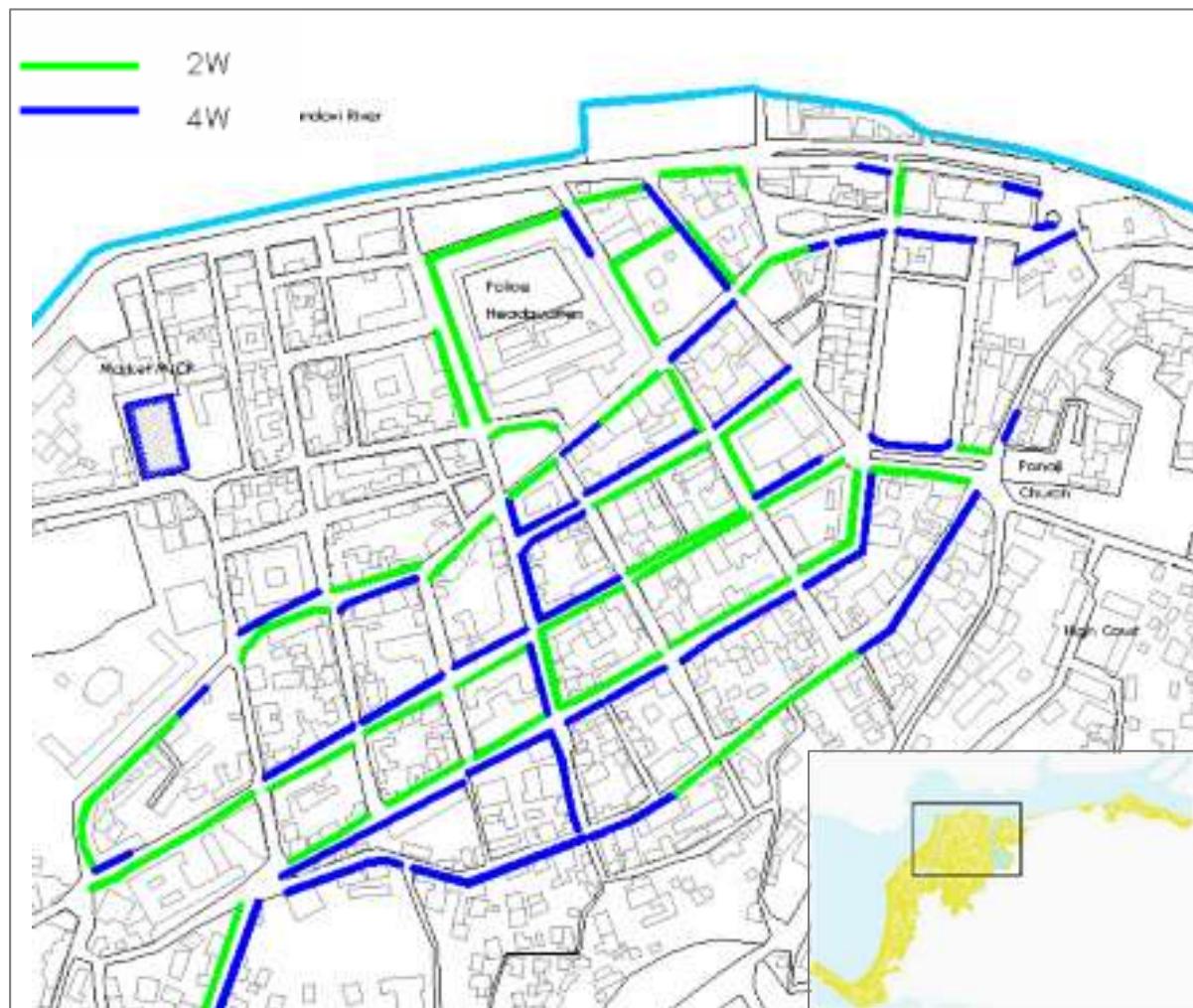
9.3.3.1 Para Transit Parking

Parking is allowed free of cost in all areas of Panaji especially in the central commercial areas. Areas demarcated for parking of two and four wheelers and no parking zones are indicated as per information that was provided by the traffic police department and CCP. The central business district area of Panaji attracts a large volume of traffic, especially during the peak hours and the demand for parking spaces is the highest in the city. Most of the roads within CBD have been made into one-way and has parking on both sides of the road thus compromising on the right



of way for the movement of traffic. At present the city has the parking for 2,201 four wheelers and 5,516 two wheelers at a time²⁷.

Figure 42: Allocated parking areas in Core City Area of Panaji



Allocated Parking areas in Core City Area²⁸

The demand for parking area within the city increases with the increase in the number of vehicles. In order to accommodate this growing demand the valuable and limited city space and city roads are compromised for the benefit of private vehicle owners. The demand for parking is the highest in the core city area where the right of way of the existing roads is inadequate even for two way movement of vehicles. Majority of the roads inspite of having provision of onstreet parking on both the sides experiences double parking and haphazard parking which effects the vehicular movement in the core city.

Comparing the parking numbers during the peak time and parking numbers during the night time it is observed that most of the parking spaces in the city are occupied by the working population than the residents of the city. Despite the efforts of the Traffic Department to declare no-parking areas, they have not been followed because of the lack of strict implementation and due fines to discourage the

²⁷As per data collected from Traffic Cell, Panaji, 2013

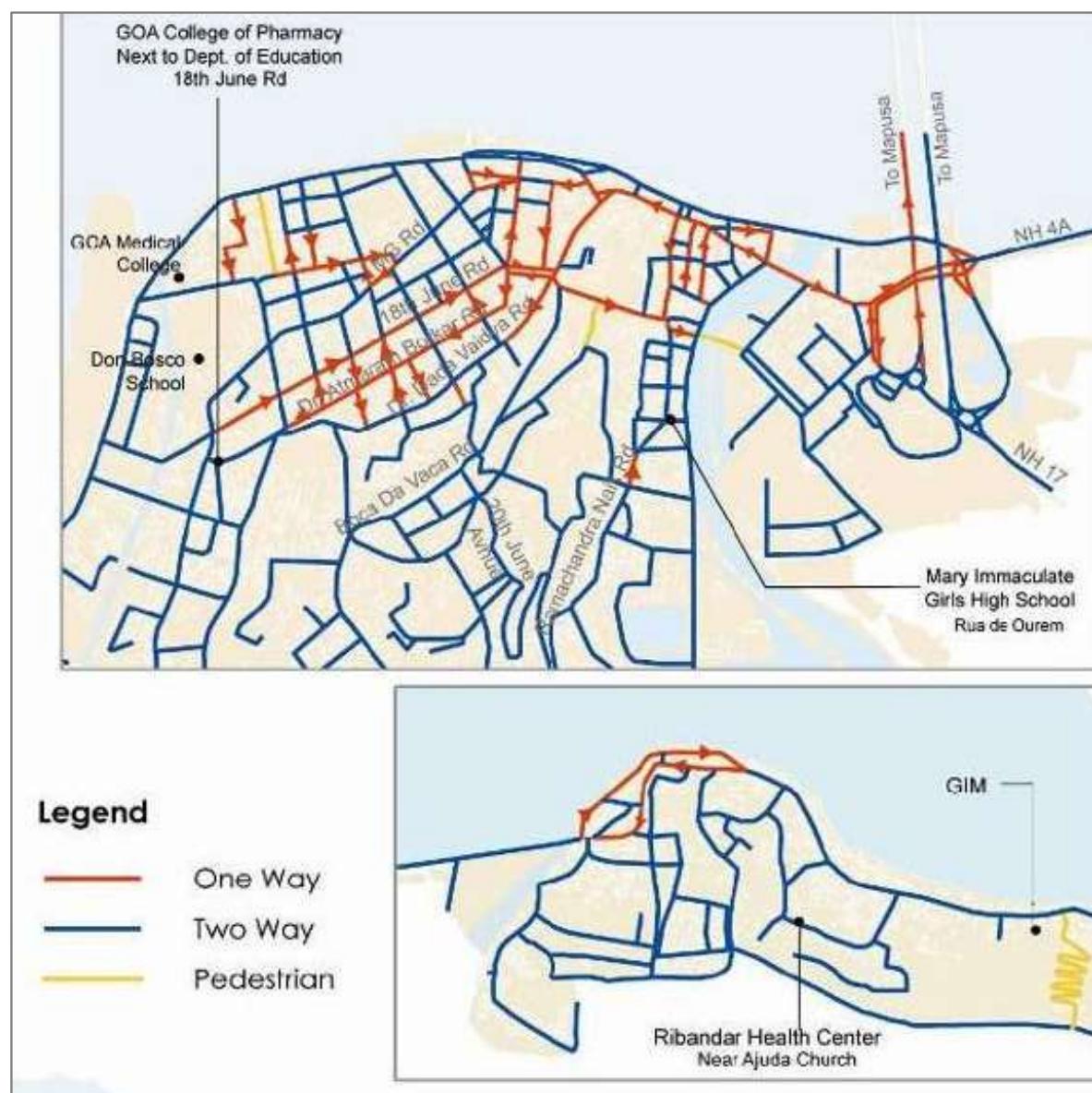
²⁸Source: DPR for Comprehensive Mobility Plan for the City of Panaji under JNNURM, 2010

same. There is a urgent need to solve the parking issues in the city with proper parking policy, provision of multilevel parking in the core city and strict enforcement of parking policy.

9.3.4 Safety and Traffic Management Measures

As the central commercial areas of Panaji city have the highest influx of tourists it also has the maximum parking spaces in the city as well as high traffic volumes. The designation of one and two ways and signage has been carried out in this area so as to regulate the traffic flow. Ribandar area also has a system of one and two ways that have been designated. This is due to the fact that the roads here are narrow and themain road which functions is the NH 4A which is the main route to old Goa from Panaji city although it is only 6m wide. The Fig below shows the traffic movement pattern within the city.

Figure 43: Traffic movement in the city (one way, two way and pedestrian)



Source: DPR for Comprehensive Mobility Plan for the City of Panaji under JNNURM, 2010

9.3.5 Traffic Calming Measures

Urban transport in the city is dealt by multiple organisations viz. Traffic cell, RTO, PWD department, CCP, KTC etc. Each individual department functions separately under the respective roles and responsibilities under respective departments. At present there is no measures or steps towards a common approach towards for the traffic management within the city. Junction Improvement Programmes

Presently no projects are taken up for junction improvement within the city. However, the Comprehensive Mobility Plan for the City of Panaji have proposed junction improvement projects as listed below. The same has been taken into consideration in the project proposals under Traffic and Transportation in the Revised CDP for Panaji.

- Kadamba Bus stand Junction
- Domino pizza Junction
- Foot bridge Junction (Patto)
- IFFI Junction (footpaths)
- NIO Junction (ROW, Cul de sac & Turning radius)
- Caculo Junction, St Inez Junction, Adil Shah Junction
- Miramar Junction and Betim Ferry Junction

9.3.6 Issues and Key Challenges

- Total road coverage in the city is only 5.45% of the total city area which is highly inadequate in comparison to the URDPFI guidelines of 14-15%.
- Being most preferred mode of transport, the increasing number of private two wheelers and four wheelers in the city over the years has elevated the traffic congestion and parking issues.
- The average road width in the core city of Panaji is planned during the Portuguese period which does not allow the overtaking of vehicles and restricts the speed considerably.
- The traffic movement in the core city area, junction at the entry/ exitpoints viz Old and new Patto bridges and the area near the KTC bus stand is highly congested causing traffic blockage.
- The predominant use of private vehicle in Panaji has led to significant and haphazard on-street parking in the city inspite of provision of parking on both sides of the roads. This has reduced the effective width of roads in the city, resulting in increased congestion.
- The large number of one-way roads has also lead to an increase in trip lengths for many private vehicle users, in turn increasing the overall vehicle kilometres travelled. Finally, the intermingling of intra-city and inter-city traffic has further exacerbated problems of congestion.
- Parking areas in the city are not regularized and presently not charged with any parking fees. Lack of strict enforcement on parking in no parking zones.
- Lack of multilevel parking facilities in the core city area which can be best option considering the land scarcity and demand for parking.
- One of the biggest issues in Panaji is the inadequacy of the public transport system. Public transport only accounts for 15% of the total trips in the city. Public transport routes are not comprehensive and do not cover all areas of the city. The existing bus services in the city are insufficient and inadequate. While a few regions are well served, like Kadamba Transport Corporation to Miramar beach, other areas have little to no bus services. This is especially true of private buses which only ply on certain major routes in the city.
- There is lack of proper public transport system between the city and the major transport nodes like the Dambolim Airport and Karmali railway station. The city being the administrative capital and prime tourist hub in North Goa there is heavy influx of people commuting from

these transport nodes to the city. At present high reliance is on private taxis/ scooters by the tourists to commute to the city. Lack of traffic control measures & signage at major junctions causes chaos and traffic jams.

- The bus stand lacks good passenger facilities like adequate public toilets, separate entry and exit gates, rest rooms, and facilities for disabled people, adequate garbage bins and proper paving for pedestrian circulation area. Project Proposals.

9.3.7 Proposed Projects

The various studies which have been commenced towards the improvement of the traffic and transportation system within the city which includes the following.

1. Comprehensive Mobility Plan for Panaji.
2. Traffic Decongestion Model for Panaji city centre
3. Public Bicycle Sharing

The CDP proposal for Panaji has taken into consideration these studies and the project proposals under Traffic and Transportation has been formulated based on the components proposed in these study reports.

1. Comprehensive Mobility Plan (CMP) for Panaji city

The CCP has prepared a CMP for Panaji under JnNURM-1 with estimated cost of Rs.799.0 crores out of which Rs.414.82 crores is estimated for the development and improvements works within the CCP limit. The DPR finally was approved by SLSC at a cost of Rs 742.91 crores. It was submitted to MoUD for approval in 2013 and not yet approved.

The estimated project cost of the project is Rs. 742.91 crores. It is observed that the project covers the following project components for the design year 2031.

- | | |
|--|---|
| a) Road improvements | b) Public transport |
| <ul style="list-style-type: none"> ■ Road hierarchy delineation ■ Primary and secondary rings ■ Road improvements ■ Junction improvements | <ul style="list-style-type: none"> ■ Tram system ■ Bus system - Routes, Bus stops and new buses ■ Ferry system ■ Mono rail (pre feasibility) ■ KTC Stand re design ■ PWD garage re design |
| c) Pedestrian and NMV Plan | d) Interchange points |
| <ul style="list-style-type: none"> ■ Footpath upgradation ■ Arcaded walkways ■ Zebra crossings ■ Foot over bridges ■ Pedestrian precincts ■ Dedicated cycle lane | <ul style="list-style-type: none"> e) Freight traffic f) Parking g) Traffic management plan |
| | <ul style="list-style-type: none"> ■ One and two way systems ■ Signalisation ■ Road markings and signage |

Apart from these recommendations has been suggested for improvement of traffic and transportation in Panaji region as well as Panaji city.

Panaji region level

- a) NH and bye pass upgradation
- b) Ring road completion
- c) New bridge and ramps
- d) Jetty and parking facilities across Mandovi

Panaji City level

- a) Integrated land use proposals
- b) Institutional mechanisms

The CMP of Panaji envisioned maximizing investments in public transport to develop an efficient, comfortable, safe yet unobtrusive public transport system so as to facilitate movement of people and not vehicles and promote walking and cycling. The projects have been delineated on the basis of the analysis generated from primary and secondary surveys & data collection, information gathered from stakeholders and also on the basis of the issues and suggestions that have been received during the primary and secondary stakeholders' consultation process. The same has been considered in the Revised CDP for Panaji under Traffic and Transportation sector investments.

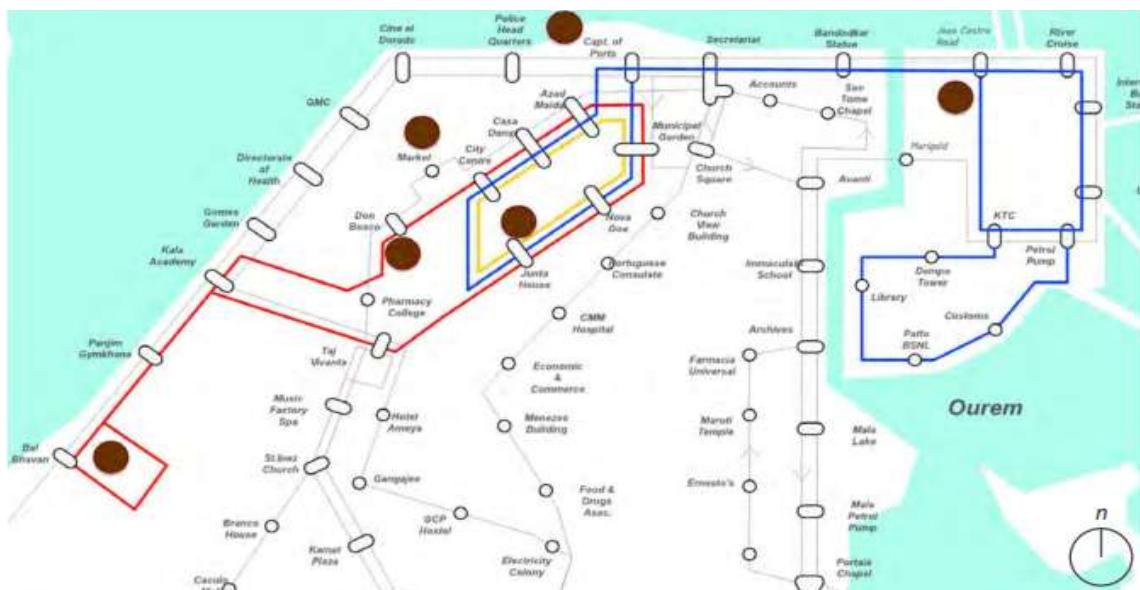
2. Decongestion Model for the city centre of Panaji

The decongestion model for Panaji predominantly addresses to three main issues, apart from the change in traffic directions:

- Bus Rapid Transit
- Parking strategies
- Pedestrain Environment

b) Hop on and Hop off system in the CBD – In order, to decrease the traffic volume entering the city during the daytime, the model proposes park and ride system wherein the commuters park their cars in the parking lots outside the CBD area and take the hop on and hop off bus service plying in the core city area. This will reduce the travel time caused due to congestion and inavailability of parking space. Having this in mind, three loops have been proposed for the people who want to communicate in the CBD area. They are Loop A: from the main bus stand to the CBD; Loop B: from Bal Bhavan to CBD and Loop C: around CBD area (Refer Fig below). The buses should be circulated in designated lanes which will open in a bay to facilitate the flow of traffic and the accesibility to the pedestrian areas. New bus stops designs to be adopted, in order to favour the quick identification of routes, disabled friendly and with low floor in level with the floor level of the bus stop.

Figure 44: Proposed bus route for Hop on and hon off system



Interval in mins	Loop	Distance (km)	Time per loop @ 15km/hr	Total Duration of stops (mins)	Total Time per loop	No. of buses on loop (total time/ interval)	Frequency at Central Loop / min (total buses/ interval)	Frequency at Central Loop
10	A	4.2	16.8	8	24.8	2.48	0.588	1bus/2min
10	B	3.5	14	8	22	2.2		
10	C	2	8	4	12	1.2		

b) Parking Strategies

Various parking sites have been identified to ensure proper working of the decongestion model. Appropriate parking policies, including parking hours and rates, have to be formulated for all residential areas around the city to discourage haphazard parking around the proposed parking sites. The proposed parking locations are mainly divided into three different categories:

Off site multi storey parking in the periphery – Multi storey parking facilities in the peripheral areas for the population which is commuting from the peripheral areas of Margao, Vasco, Porvorim, etc., to the North-East or from Miramar, Dona Paula to the South-West. To be located at inter change transit point eg: Kadamba Bus stand where the hop on hop off buses can be easily accessible.

On site parking in the CBD – Dilapidated government structures like P.W.D. garage and other government buildings with the possibility of providing enough parking spots, like Junta House and Municipal Market, have also been considered as on-site parking areas. Multi-level parking would be the best option to tap the fullest parking potential of these spots/ parking space in the CBD wherever possible.

On street parking in the CBD - All designated parking streets in the CBD will have on street parking along them, Typical road width have been proposed for four wheeler and two wheeler parking as shown in Figure below.

Figure 45: Proposed on site and on street parking facility in the core city



c) Pedestrian Environment

The area which is formed within the loop of the bus routes has been proposed as the pedestrian zone within the core city. The 18th June road will be the major spine of the pedestrian movement. As a person gets off a bus, they can access this pedestrian zone to their left all along the loop (fig 9.2). The pedestrian areas also prioritize high commercial purpose since it is a proven fact that pedestrianization increases people movement up to thrice of what already exists with busy traffic and also makes the streets extremely safe and secure for residents. This will be in favour of the businesses, especially restaurants, retail and other recreational activities.

Figure 46: Proposed pedestrian movement in the core city



3. Proposed Public Bicycle Share (PBS) system for Panaji

The proposed Public Bicycle Share (PBS) system for the city of Panaji includes the area under the jurisdiction of Corporation of the City of Panaji. The target user group of the system will be the residents of the city whose travel distances are less than 5 kms and tourists in the city. While the residents will become regular users of the system, using the bike share for either end to end

connectivity or for last mile connectivity, the tourists will become casual users of the system and be able to use the system to visit the various points of tourist attraction in the city, through multiple short trips in a day. The system proposed will have to be planned keeping this target audience in mind.

PBS Planning Considerations

- **Size of the system** - It is recommended that the Panaji PBS system provide 1 bicycle every 100 people in the city, for a total of 1040 cycles in the system. It is also recommended that the city provides 1.5 docks/ cycle, resulting in 1545 docks system wide.
- **Station Density** - It is recommended that the Panaji PBS system should plan the stations such that the average distance between stations is 250m. The density could be higher in the major commercial centres of the city
- **Coverage area** - The first phase should be launched in the densest regions of the city where there is high traffic . The subsequent 2 and 3 phases can be launched in other dense regions in the city which could benefit from a PBS but would not be able to sustain the programme all by itself.
- **Location of Stations** - The station density is higher in the Central Business District (Central Panaji), Panaji Market and St. Inez area than the rest of the city. On an average there is at least one station every 250m in the city. 66 Stations have been identified for Panaji. These stations are spread across the 8.12sqkm area of the city.
- **Placement of Stations** - It is recommended that Panaji installs all its stations in existing on-street car parking spaces, considering that on-street parking space is available in plenty at all locations identified for PBS stations. Care should be taken to replace car parking and not two-wheeler parking as far as possible so that fewer vehicles are displaced. At a few stations like the one proposed outside Kala academy, it is proposed that the station be placed on the footpath, as it is wide enough to accommodate a PBS station, without interrupting pedestrian flow.

The components proposed as per the DPR for Public bike share system proposed for the city has been taken into consideration in the Revised CDP for Panaji under the Traffic and Transportation sector investments.

Major Project components of Proposed PBS for Panaji

1. **Public Bicycle Sharing system** - It is recommended that Panaji adopt a fully automated PBS System. This will ensure that the system is efficient, reliable, has a better public image and does not experience high rates of theft and vandalism. It is, however, recommended that the city hire station attendants to man every station in the city for the first six months of operations.
2. **Bicycles** - It is recommended that the Panaji PBS system make use of custom built bicycles which follow the following design principles:
 - Easy to use, Adaptable to different users, Sturdy and Durable, At least 3 gears, Personal Storage space/ basket, Mechanical reliability, Unique Design for Branding & Prevention of theft, Design to ensure safety of user, Attractive and Space for Advertisement



3. **Bicycle Stations** - It is recommended that the Panaji PBS system make use of Modular Stations in the city. This will help the city at a later stage, when the location and size of the stations may have to be changed because of a change in travel demand in the city.



4. **Docking Unit/ Cycle parking Area** - It is recommended that the Panaji PBS system use Individual Docking units at all stations except for the large stations where Cycle Parking areas are recommended. It is also recommended that Panaji opt for a model where the docks themselves are designed to lock and unlock each cycle, rather than the terminal handling this function.



- 5. Terminal/ kiosk with Advertisement space** - A bicycle station will also have a terminal or kiosk along with the docking units/ parking areas. A station should also dedicate space for advertisement.



- 6. Bicycle Redistribution System** - Given the large number of stations in a city-wide PBS system, there is always a possibility of asymmetry of demand across stations. To ensure that the cycles are consistently available across all stations in the PBS system throughout the day, a robust system for the redistribution of cycles from stations where they are over-crowded to other stations where there is a shortage of cycles. This is usually accomplished through the use of custom-built redistribution vehicles.



- 7. Data Management System** - IT-enabled data management is the back bone of any PBS system. It provides for real time monitoring and transmission of system usage data making the management and operation of the system smooth. It consists of the central control room, the smart card infrastructure and the software for data transmission and management.
- 8. Payment Mechanism** - It is recommended that the operator and CCP in Panaji ensure that the payment system can handle not just card transactions but also cash transactions. It is recommended the city formed a network of existing retail outlets which can handle the cash transactions that the terminals at the stations cannot handle.



- 9. Maintenance Centre** - it is necessary to have a maintenance centre where trained staff repairs the cycle. These maintenance centres would also hold the extra cycles of the system, which will replace the damaged cycles when they are being repaired.

9.4 Street Lighting

The State of Goa does not have its own power generation. It is entirely dependent on the power allocated from the central sector controlled generating stations in the western and southern regions wheeled through neighboring state grids. The power is purchased from the Power Grid Corporation and the state electricity department is in charge of distribution and collection of electricity charges. There are 3 Substation catering to the city at Altinho, Patto and Donapaula. There are 21 feeders through which the supply is discharged to the city.



The state electricity department is responsible for the installation, replacement, repairs, operation and maintenance in the city. There are about 3,426 street lights in the city. About 64% of the fixtures are sodium vapour lamps, 17% are tube lights and 15% are metal halide lamps. Apart from this 3% are halogen lamps, 1% is mercury vapour lamps and 0.2% is high mast lamps. The Table below shows the break up of type of street lighting system within the city.

Table 68: Details of Street Lights

Description	Nos.
High Mast Lamps	7
Halogen lamps /CFL	101
Mercury Vapour lamps / T5 24Wx4	24
Sodium Vapour Lamps (150W / 250 W)	2,201
Tube lights	581
Metal Halide (70 W)	512
Total	3,426
Spacing between streetlights (Norm, < 35 meters)	35 m
Street lighting coverage (75-80%)	100%

Source: Panaji CCP

9.4.1 Service Adequacy and Issues

- The present street lighting facilities in the Panaji CCP area is adequate with 100% coverage and well maintained.
- However, the present street lighting system needs to be upgraded and latest technology of LED lighting system needs to be adopted for the city.
- Apart from this, there is need of underground cabling of the electrical wires which will support higher durability, minimal maintainence as well as make the city free of unwanted network of cables visible along the roads.



9.5 Traffic and Transportation Sector post- 1st Generation CDP– Status Review

Pre and Post 1st Generation CDP Scenario for Traffic and Transportation

Parameters	Description
Total road length	77 kms
Surfaced roads	100%
Road carriageway	3 to 14 m
Vehicle population	78.7% 2wheelers, 25.7% 4wheelers, 4.7% goods vehicles & 1.89% buses & others
Major traffic junctions	26 nos.
Traffic Flow	90.8% of traffic enters from old Patto bridge and 9.2% from new Patto bridge

Source: CDP 2006

The CDP highlighted upon the following issues

- Insufficient parking space, in areas of high intensity land- use overcrowding of roads.
- Bad road geometry/ alignment / badsignage / absence of regulation
- Lack of pedestrian walkways
- Mix traffic on roadcreate problems during peak hours
- Clash between the pedestrian and vehicular traffic
- Existing system of one way is very confusing for new comers/ tourists
- Lack of parking spaces for boats, and cruises etc.

The Strategies proposed to achieve the vision are as listed below.

- Identification of designated
- Parking areas to stop on street
- Parking to ensure smooth traffic flow
- Promoting safe pedestrian movement
- Develop traffic management system
- Options for involving private sector players
- Realignment of traffic geometry is required
- Developing parking space for boats and cruises
- Developing water transport system
- Efficient Public Transport system linking Panaji to other towns
- Connecting neighbouring settlements through waterways

Proposed Projects and its components

The proposed projects and its components under CDP 2006 are as depicted in Table below. A total cost estimate of Rs. 36.15 crores was proposed for the projects for improvement of Traffic and Transportation system in the city.

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
1	Developing Parking Lots in (on basis of PPP)	i. Core city (12000 sq. m.); Estimated cost: 120 lakhs ii. Developing parking lots at entry and exit points of city

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
		<p>(40000 sq. m.); Estimated cost: 400 lakhs</p> <p>iii. Parking space for boats and cruises (1 no); Estimated cost: 70 lakhs</p> <p>iv. Realignment of traffic on entry and exit points; Estimated cost: 10 lakhs</p> <p>v. Two bridges on Paulo creek (2 nos.); Estimated cost: 2000 lakhs</p> <p>vi. Developing water ways system between Panaji and Donapola (5 kms); Estimated cost: 500 lakhs</p>
2	Traffic management system	<p>vii. Identification of hierarchy of roads; Estimated cost: 5 lakhs</p> <p>viii. Comprehensive plan for one way traffic; Estimated cost: 10 lakhs</p> <p>ix. Road signage and road marking; Estimated cost: 150 lakhs</p> <p>x. 10 mini buses for subsidized public transport system for inter-city traffic (10 nos.); Estimated cost: 120 lakhs</p> <p>xi. Pedestrian walkways in core city (2 km); Estimated cost: 25 lakhs</p> <p>xii. Developing footpath/ cycle track along St. Inez nala (5 km); Estimated cost: 85 lakhs</p>
3	Junction Improvement (15 nos.)	Estimated cost: 120 lakhs

Source: CDP 2006

Status of Projects

The Comprehensive Mobility Plan for Panaji city with estimated cost of Rs. 742.91Crores and submitted to MoUD on 8/8/2013 for approval.

Current Status

The DPR is awaiting approval from MoUD hence yet not taken up for further implementation.

9.5.1 Street Lighting Sector post- 1st Generation CDP– Status Review

Parameters	Description
The state Electricity department is in charge of distribution and collection of electricity charges	Street lighting is presently under state department. No role of CCP
The CCP area is well lit up with street lights	100%

Source: CDP 2006

The CDP highlighted upon the following issues

- Open electricity cable
- Low Capacity Street light at major roads

The Strategies proposed to achieve the vision are as listed below.

- Under grounding of Electricity Cables
- Up gradation of Low capacity street light

Proposed Projects and its components

The proposed projects and its components under CDP 2006 are as depicted in Table below. A total cost estimate of Rs. 18.40 crores was proposed for the projects proposed for improvement of street lighting system in the city.

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
1	Underground ducting for the distribution system	77 km
2	Replace the existing fluorescent lamp to higher order one	5000 nos.

Source: CDP 2006

Status of Projects

The project proposed in the CDP has not been yet taken up for consideration. No further Detail project report prepared for the commencement of the proposals by the State Electricity Board.

Current Status

In absence of project initiation as per the proposed CDP there is no project proposal implemented or under implementation

10. HOUSING AND URBAN POVERTY

10.1 Overall Housing Scenario in the City

Housing is one of the important infrastructures within the city. The total number of households in Panaji city region is 17,807 out of which 10,158 households are located within CCP area as per 2011 Census. The average household size of the city is 4.0. The city is characterized by medium rise and high density housing in the core city and low rise moderately dense housing in the peripheral areas. The last decade has witnessed development of multi rise residential and commercial structures. Also, organised layouts are developing towards the outgrowth areas of the city.

10.1.1 Present Availability of Housing Stock

As per Census 2011, the district²⁹ has 1.07 lakh census houses in urban areas. The residential houses accounts for 98% of total houses in the city followed by residential cum other use houses accounting to mere 2%.

In order to find the growth in the number of houses in the North Goa district, the 2011 data has been compared with the Census 2001. As per this analysis, the number of houses has increased from 0.70 lakhs in 2001 to 1.07 lakhs in 2011 with a growth rate of 34%.

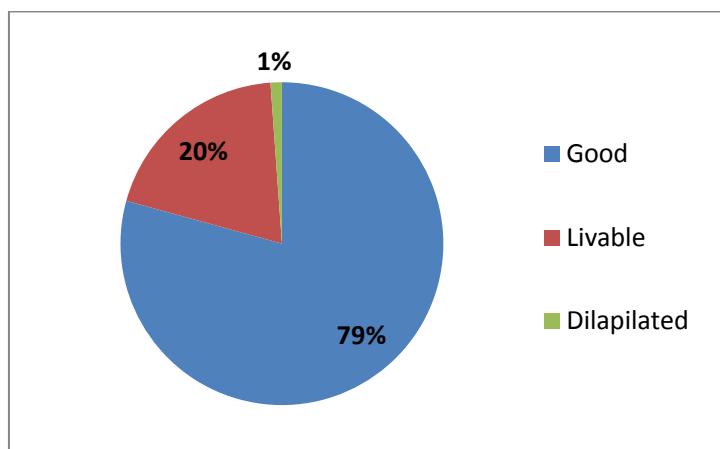
10.1.2 Quality of Housing Stock

Presently there are a total number of 1.07 lakh houses in the North Goa district as per 2001 Census which includes houses in good, livable and dilapidated categories depending upon the condition of the houses. Out of the total housing stock, 79% of the houses are in good condition while 20% of the houses are in livable condition. Only 1% of the houses are in dilapidated condition.

The houses in the city are made with laterite walls and concrete roofing. Most of the roofs are made with sloppy roof and Mangalore tiles covered over it to preserve its traditional look. The houses built are spacious having a large size of living and dining room. The blending of Indo-Portuguese culture has given unique architectural style to the old Goan houses which can be seen in the city and adjoining areas and urban centres³⁰.

²⁹, the housing scenario has been presented for the North Goa district as data for the city is not available in 2001 and 2011 census.

³⁰Goa Housing and Habitat Policy, 2003

Figure 47: Housing stock Condition

Source: *Housing Census 2001*

Comparing the 2001 and 2011 housing stock it is seen that there is increase of 43.2% houses under good quality housing and 18.9% increase under houses with livable conditions. There is a considerable decline in dilapidated houses showing a negative growth rate. Thus, it can be concluded that overall housing stock in the district and the city is of good quality. The Table below depicts the housing stock details for the district for 2001 and 2011.

Table 69: Quality of housing in the city

Housing type	2001 census	2011 census	Share (%)	Net increase in decade	Growth rate
Good	48,527	85,362	79	36,835	43.2
Liveable	17,099	21,092	20	3,993	18.9
Dilapidated	3,365	1,219	1	-2,146	-176.0
Total	68,991	1,07,673	100	38,682	

Source: *Housing Census 2001 and 2011*

10.1.3 Housing Requirement as per the Future Projected Population

In order to estimate the housing stock requirement for the next three decades, we have adopted the following assumptions. The assumptions are as follows

- Population projections as finalized in demography section above
- Household size is considered as 4 over the next three decades
- Residential and mix use would increase by 2% over the next three decades and 10% reduction in the dilapidated houses in the city.

Based on the above assumptions, the city will have a demand for only 0.38 lakhs houses by end of 2041. It indicates that the present housing stock in the city is adequate to cater the needs of the future population. Similarly the residential and mix use houses have been also estimated to only 0.34 lakhs houses by 2041. The percentage of dilapidated houses shows a declining trend with 0.82% of houses under this category by 2041. The total housing stock gap for the projected year of 2041 is very minimal for the city. Following table provide the assumptions and housing requirement in the city for the next three decades.

Table 70: Projected housing stock in the city

Year	2001	2011	2021	2031	2041
Population/Projected (in lakhs)	59066	70991	88892	115684	151367
Household size	4.3	4	4	4	4
Total houses (In lakhs)	1.28	0.18	0.22	0.29	0.38
Residential and mix use %	81.90%	83.90%	85.90%	87.90%	89.90%
Residential Housing stock (In lakhs)	1.05	0.15	0.19	0.25	0.34
Residential Housing (In lakhs) - Gap	-	-	-	-	-
Dilapidated Houses (%)	4.77%	1.13%	1.02%	0.92%	0.82%
Residential Housing -Dilapidated (nos.)		168	194	233	280
Residential Housing -Total (nos) - Gap		168	194	233	280

Source: Analysis

10.1.4 Housing Scenario across the City

Panaji is a small city located along the River Mandovi. The city has been evolving over the years under the thrust of various development aspects which is defining the urban spaces within the city. As discussed earlier, the city has 50.91% of area under residential land use. 15.45% of the area is under commercial land use which depicts it as a major commercial centre.

The core city is predominantly commercial while the Southern parts of the city is predominantly residential including areas like Altinho, Campal, Dona Paula, Miramar, St. Inez, Caranzelem having low to medium rise structures. The city falls under the coastal regulations hence there is restriction on high rise buildings. The city limits are already saturated with very high land prices (discussed in Chapter 4). As there is no land available for future expansion in the city, the adjoining areas of Dona Paula, Porvorim, Taleigaon, Ribandar and the outgrowth areas are under pressure due to the upcoming housing projects coming up in the future. These areas are located adjacent to the city limits and have access to good infrastructure facilities. Most of the housing projects developed by the private sector are targeted for medium income group (MIG) and high income group (HIG) housing considering the demand and high prices of land in the city. There is presently no initiative towards housing for the economical weaker section (EWS) and the low income group (LIG) residing in the city.

10.1.5 Overview of Housing Sector in the city

Investment in Goa's real estate by pensioners and wealthy individuals from neighboring metros have hiked the prices of homes by almost 100% in the last five years, according to industry experts. Real estate industry players confirm that the prices of flats, apartments and bungalows in the tourist belt and urban areas of Goa including Panaji have elevated in the last five years. Land prices are also being revalued every six months, inevitably escalating the cost further. For instance, the prices in localities like Dona Paula, near Panaji, which is overlooking the Arabian Sea have gone out of bound for middle or upper middle class families. The prices of the properties have boomed to double in the

last five years with approximately 35000 per ft² to 70000 ft². With no space left in the cities to convert, the builders now prefer the sub-urban locations, which are the next growth centres.

The Goa Housing Board is the only organization who takes care mostly to the needs of the EWS and middle income categories, whereas in private sector lot of construction is being done by private developers, individuals, private limited companies and cooperative housing societies. The construction activities are regulated by the Goa Municipalities Act for urban areas, Panchayati Act for rural areas and Town Planning Regulations.

The Goa Housing Board was set up by the Government to meet the housing need of the state under the Goa, Daman and Diu Housing Board Act 1968, functioning from 1969. The board has concentrated on the construction of LIG and MIG tenements in the new colonies set up in Porvorim, Margao, Ponda, Bicholim and Mapusa. However, due to increased cost of land over the years the Board has opted for construction of mass houses and plotted development schemes. The Housing Board has not implemented any projects within the city limits.

10.2 Urban Poverty and Slums

The slums of the urban areas are characterized by its multiple problems which includes social, economic and health problems. This chapter highlights the existing infrastructure facilities available in the slums and the services needed to make the habitat livable. The up gradation of slums should include:

- Upgrading the physical environment in poor settlements by providing basic services such as water, sanitation, waste collection, storm drainage, access roads and street lighting
- Regularizing security of land tenure and housing and
- Instituting a social support program focused on promoting sustainable livelihoods through the accumulation of natural, physical human, social, financial as well as institutional and knowledge/ information asset.

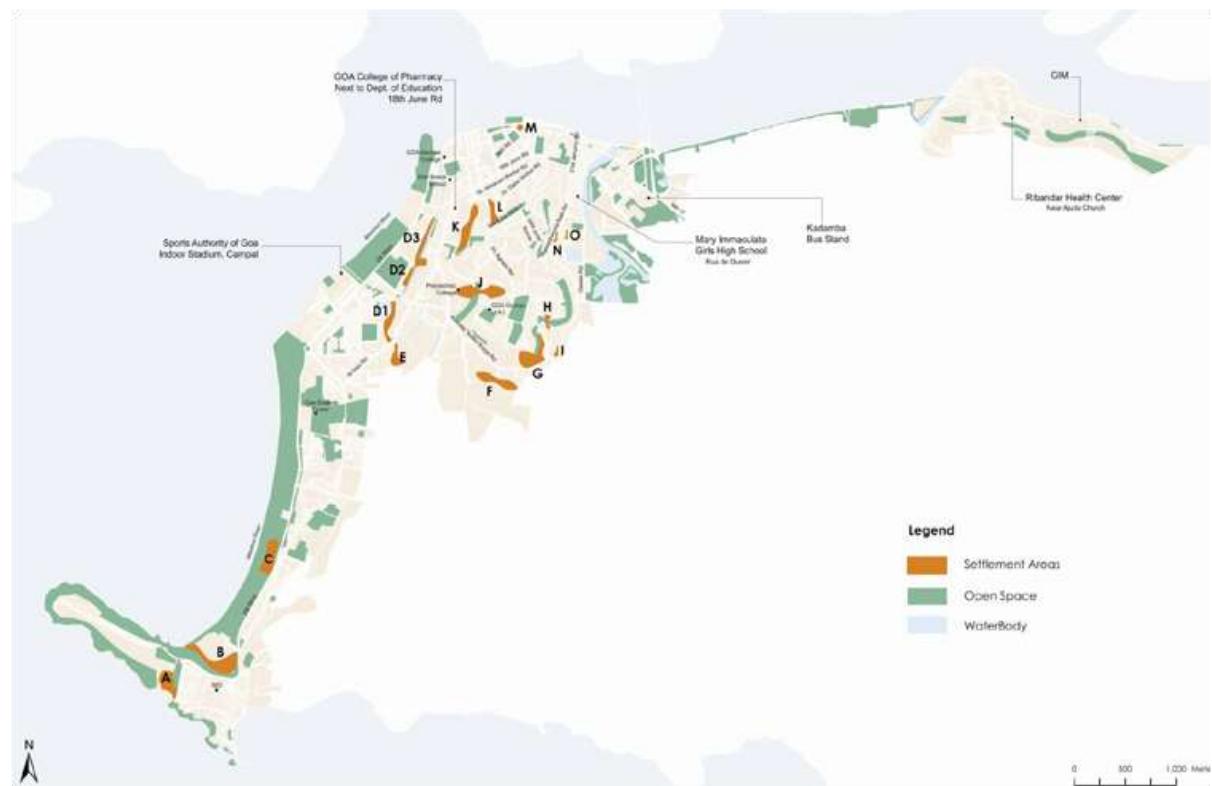
10.2.1 Number of Urban Poor pockets in Panaji

Panaji presently does not have major slum settlements within its jurisdiction. However, there is existence of urban poor pockets in few areas of the city which needs to be addressed in order to avoid its growth in future. These urban poor pockets are located in environmentally sensitive areas like unbuildable slopes of Altinho, edges of St. Inez Nallah and low lying areas of the city along the water bodies.

As per the survey conducted by CCP in the year 2003 there were 90 families identified as below poverty level (BPL)



families. The CDP prepared for Panaji under JnNURM have estimated 150 families in the BPL categories in 2007 as per the projection from 2003. According to the present estimate there are around 170 to 200 families in the BPL category. The Fig below shows the location of urban poor pockets within the city.

Figure 48: Location of slum like pockets within the Panaji

Source: DPR for Basic Services to Urban Poor for the City of Panaji under JNNURM

Table 71: Location of Slum like pockets in Panaji

S. No.	Settlement Area in Panaji	Areas included
1	A, B, C	Fishing villages – Aivado, Caranzalem, Marivel
2	D1, D2, D3	Located along the water bodies
3	E, F	Located on the boundary of CCP
4	G, H, I	Located along the Altinho hill slopes
5	J, K, L	Located along the Altinho hill slopes
6	M	Located in the city center
7	N, O	Located along Water bodies

Source: DPR for Basic Services to Urban Poor for the City of Panaji under JNNURM

10.2.2 Available Infrastructure for Urban poor Communities

The profile of the various urban poor pockets in the city has been listed below. The inferences have been derived are as per the study conducted by CCP for preparation of DPR for Urban poor for Panaji.

Table 72: Profile of the Urban Poor areas in the city

S. No.	Area	Tenure	Infrastructure facilities
1	Along St. Inez nallah Total number of households -140 Total Population – 674 Average monthly income per H/h - Rs. 4,710	Government land	Water supply - 39 individual metered water supply connections and 66 temporary bathing facilities. No handpumps or wells in the site surveyed. Electricity and street lights - 66 individual metered electricity connections and only 4 street lights. Sanitation and drainage facilities - 39 individual temporary toilets, one community toilet with 4 seats. Lack of sewage lines resulting in direct disposal into the nallah. No storm water drains causing water logging in monsoons. Solid waste is collected from 50 houses and the rest dispose waste directly into the nallah. Roads – Existence of only kuchha roads Social amenities – PHC – 3 kms, Bus stop – 1 km, Government Primary school – 1 km, Private primary school - > 1km, secondary school – 2to 5 kms, recreational facilities – Campal playground
2	Kamarabhat slum		Water supply - Public stand posts, community well and 86 temporary bathing facilities Roads – Pucca roads with one side drains. It is prone to flooding during the rainy season. Electricity – Street light facility with few houses having connections Sanitation facilities – Devoid of public toilets and individual toilets causing open defecation in low lying areas. Solid Waste management – No solid waste collection causing dumping in low lying areas Social amenities - PHC – 1 km, Bus stop – 1 km, government primary school, secondary school – 2 to 5 kms, 3 temples, one church but no recreational facilities.
3	Fishing villages including Aivao fishing community at Aivao-Dona Paula, Cabo fort- Marivel village fishing community at Marivel village and Ramponkar Fishing Community, CaranzalemPopulation -1350 No of houses - 650	Private land	Lack of adequate basic facilities in these areas which includes sanitation, solid waste management, water supply and drainage facility.
4	On the Boundary of CCP Ward No 5 -	Private and Government Land	Lack of most of the basic facilities like sanitation, solid waste collection, water supply system, storm water drains, roads and street lights.

S. No.	Area	Tenure	Infrastructure facilities
	Population – 200, 30 houses Ward No 17 – Population – 300, 35 houses		
5	Along Altinho slope Population – 300 No of houses - 55	Government land	Lack of sanitation facilities, solid waste collection and inadequate water supply
6	Along Altinho slopes / Old Dhobi settlement Population – 405 No of houses - 67	Private land	Lack of sanitation facilities, solid waste collection, drainage facilities and tenants do not pay taxes.
7	In the City centre Population – 15 No of houses - 3	Private land	Lack of all basic amenities in the area
8	Along the water bodies Population – 180 No of houses - 30	Private land	Old settlement and prone to flooding

Source: DPR for Basic Services to Urban Poor for the City of Panaji under JNNURM

10.2.3 Government Initiatives in Urban Poor Improvement

No slum improvement programmes have been undertaken within the city corporation limits of Panaji. In 1991-1992 as part of millennium development goals 150 slum dwellers (related to provision of housing for a economically weaker section) were targeted for improvement at the Goa statelevel and it has been fully achieved by the State. Urban Infrastructure governance scheme of Ministry of the Urban Development (MoUD) has not been undertaken in Panaji.

Table 73: List of Urban Poor/Slum Improvement Schemes

Component	Development envisaged	Competed work	Physical progress
CC Roads with Granular Shoulder (Square meter)			
Drain network (Meters)			
Water Supply (Distribution network in meter)			
Multi-utility Community Buildings			
CC Culverts (Meters)			

10.2.4 Urban Poor Sector post1st Generation CDP - Status Review

1st Generation CDP Report

Parameters	Description
Total number of BPL families	150 nos.
Urban Poor Locations	Three identified urban poor pockets - Ward No. 14, St. Ines Bandh in Ward No. 12, Aivao Caranzalem in Ward No. 1
Urban Poor Composition	It mainly comprises of number of pavementdwellers as well who mainly work as construction workers.
Land encroached	Encroachment on PHD water works and Forestland.
Major Issues	Lack of basic infrastructure facilities.

The CDP highlighted upon the following issues

- 90 BPL as per survey conducted by CCP- in year 2003
- Poor infrastructure facilities and Lack of adequate health infrastructure
- Limited knowledge regarding government schemes etc
- Increasing migrant labor/ construction workers/ pavement dwellers

The Strategies proposed to achieve the vision are as listed below.

- Upgrade existing areas/ marginalized sections of the society
- Provision of Basic Services to Urban Poor.
- Providing opportunities for Income Generation and Improvement in Housing condition
- Reduce the Urban Poor population within the Panaji area
- Stringent land control on public lands
- Locate and develop a vocational skill training institute so that regional population can be benefited

Proposed Projects and its components

The proposed projects and its components under CDP 2006 are as depicted in Table below. A total cost estimate of Rs. 10.00 crores was proposed for the projects proposed for urban poverty alleviation in the city.

Proposed Projects

The Detail Project Report for Urban Poor for the city of Panaji was prepared by CCP under JnNURM-1 to address this growing urban issue in the city. The report has detailed out the present state of the urban poor, issues pertaining to the urban poor areas, assessed the future infrastructure as well as socio -cultural improvement of the urban poor section and identified various projects for the improvement of the infrastructure facilities in the urban poor areas of the city. The DPR estimated a total cost of Rs 10.20crores and was approved by SLSC in 2010. The central fund of 1.15 crores was released for this project under JnNURM -1. However, the project has been cancelled and not taken up for further implementation³¹.

³¹ BSUP -State wise Report for latest Progress at Project & City Level, December 2014

10.3 Service Adequacies and Key issues

- There is no authentic database on slum population and also data base on urban poor is not adequate enough to get a comprehensive understanding of the current situation of the slums. Most of the population is migrant labor that have minimal or no proof of their identity. None of the slums or slum like settlements in Panaji is notified and hence in the absence of registration with the authorities, the slums are devoid of health, education and basic services.
- In the absence of affordable housing the landless especially laborers occupy and inhabit land owned by the government and lands reserved for public amenities such as maidans, stretches along roads, parks, water bodies, etc. The city in turn loses land meant for public provisions. Unoccupied private lands are also occupied by the poor (either by encroachment or on rental basis) and affect the city infrastructure indirectly.
- Easements of natural drains, steep unbuildable slopes and other environmentally sensitive areas, unsuitable for construction (and inhabitation) such as low lying areas, flood plains, creeks, areas with vegetation etc are often inhabited by the economically weaker section.
- In case of Panaji, St.Inez slum like area has come up along the St. Inez Nallah, Altinho slum is settled on the slopes of Altinhohill, slums N & O along Mala Lake and Kamarabhat slum partly on low lying areas. Regular disposal of solid waste in the drains leads to clogging and hence flooding during monsoons. Also due to erosion of top soil on the slopes and subsequent reduction in water retention capacity, areas on the foothills also get flooded during monsoons. The settlements located along the edge of the green areas have grown to cover some of the space. Some of these settlements (such as the one behind Boca da Vaca) are more than 30 years old.
- Due to lack of basic infrastructure like potable drinking water, toilets, solid waste management and health services, there are high risks of epidemics spreading in the city due to unsanitary conditions prevailing in the slums.
- Due to negligence of the development agencies towards the needs of the urban poor section in the city many slums resort to unauthorised access to infrastructure like water supply and electricity. This unaccounted usage in turn increases the shortfalls in the supplies of registered users in the city.
- Many slums are also affected with social ills that may increase concerns regarding law and order situation. Social-cultural conflicts can also be seen involving migrants from other states and the local population. However, these slums like areas provide necessary human resource to the city in the form of labourers, domestic help, auto/taxi drivers, workers in the informal sector, etc. contributing to the local economy. In the absence of this resource, the city may even come to a standstill. Hence, all planning interventions should take into account the contributions of the slums to the city and vice-versa.
- The problems with urban poor are manifold in a context of Panaji. There are issues regarding tenure of land, provision of infrastructure, education and awareness, health and sanitation, social problems of caste and religion. In this context providing services including stay and infrastructure is a complex process. The primary requirements in upgradation and resettlement schemes in urban poor areas are to list the beneficiaries which are in need of assistance.

Note: The data/ information pertaining to spatial Distribution of Slums (Ward-Wise Distribution), average slum size and housing stock (slums) is not relevant in case of Panaji due to non existence of authorized or unauthorized slums within the city. Hence, these are not included in the chapter.

11. BASELINE ENVIRONMENT: URBAN ENVIRONMENT AND DISASTER MANAGEMENT

11.1 Pollution Level in the City

Strategic urban environmental planning is an important tool to address urban environmental issues in a systematic and planned manner. Cities in developing countries face myriad urban environmental problems. Urban environmental problems are generally very complex in nature due to their multi-sectoral nature. Air pollution owes as much to use of unclean fuels (in houses and industries) as to vehicular pollution, only exacerbated by traffic congestion. Poor sanitation is a result not only of poor drainage systems but also of dumping of solid waste in drains. Further, especially in larger cities, urban environmental problems span across multiple jurisdictions, such as collection, transportation and disposal of solid waste or water pollution in rivers traversing through several adjacent cities and towns. There are other problems that hinder proper urban environmental management, which include lack of adequate knowledge (data and analyzed information) on urban environmental problems, poor institutional capacity for planning as well as managing urban environment.

The city of Panaji is a small city settled along the estuarine of River Mandovi. Its location along River and nearness to the coast makes it a highly sensitive environmental zone. The city has been evolving and developing due to the tourism activities which have gained importance in past two decades. This has been putting pressure on the city infrastructure over the years. The city infrastructure was planned considering a normal growth trend and the physiographic features of the city. However, the high influx of tourist population and the growing economy catering to this throughout the year has been major reason for affecting the present urban environment of the city. The urban infrastructure like sewerage, storm water drains and solid waste management if not properly maintained can contribute to the deterioration of the urban environment. Presently the Goa state pollution control board (GSPCB) has been the sole agency which has been monitoring the pollution levels in the city. It is an autonomous statutory organization constituted on 1st July, 1988 under the Water (Prevention & Control of Pollution) Act, 1974. It monitors the air pollution, water pollution and effluent disposed by the industries on regular basis.

The major infrastructure facilities which affect the city environs are solid waste management, sanitation, availability of open spaces and recreational spaces and urban forestry. The solid waste management is managed by the CCP Panaji and has 100% coverage. The waste is collected, treated and processed after segregating into dry and wet waste. Presently no scientific disposal method is practiced within CCP. This has helped to keep the city area clean up to good extent which is prone to littering especially by the tourist population. However, the major drains are prone to discharge of solid waste by the urban poor pockets along it and direct disposal of sewerage from the uncovered areas in the city. There are number of well-maintained public toilets within the city as well as tourist locations which caters to the public sanitation requirements of the city. The present water supply pipelines and the sewerage pipelines are old and damaged in some sections which need to be addressed in the priority to avoid the health hazards caused by the contamination of the drinking water as well as the ground water.

11.1.1 Ambient Air Quality

The major factor affecting the air pollution in the city is from the motorised vehicles. However, the city has number of green spaces and parks which help to keep the city environs safe from the effects of pollution. The present air quality in the city is well within the range as per the Central Pollution Control Board (CPCB) standards. Although, there is regular increase in the level of SPM over the period of last three decades. The Table below shows the average annual ambient air quality recorded for last three years.

Table 74:Ambient Air Quality in Panaji

CPCB/ SPCB Ambient Air quality	Annual Average value ($\mu\text{g}/\text{m}^3$)			
Monitoring station Panaji	2010	2011	2012	CPCB Standard
SPM	119.22	141.24	203.33	-
SO2	3.8	3.81	10	50 $\mu\text{g}/\text{m}^3$
NO2	15.78	16.84	15.25	40 $\mu\text{g}/\text{m}^3$

Source: GSPCB, Panaji

11.1.2 Noise Pollution

Noise pollution is the disturbing or excessive noise that may harm the activity or balance of human or animal life. The source of most outdoor noise worldwide is mainly caused by machines and transportation systems, motor vehicles, aircraft, trains etc. Indoor noise is caused by machines, building activities, music performances, and especially in some workplaces.

The city of Panaji is major commercial administrative and tourist centre which causes high concentration of people at a time at a given location. The old city of Panaji is always congested with high vehicular traffic and congestion contributing to the high noise levels throughout the day. Apart from this the tourist locations within the city, bus stands and major traffic junctions are other places where the levels of noise are quite higher than the audible standards. Presently there are no regulations for control of various tourist activities which causes noise levels beyond the standards. There are no major industries in the city hence any noise pollution caused by industrial activities.



11.1.3 Water Pollution

Water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans, aquifers and groundwater). Water pollution occurs when pollutants are directly or indirectly discharged into water bodies without adequate treatment to remove harmful compounds. Water pollution not only affects the drinking water and groundwater sources but also affects plants and organisms living in these waterbodies. In almost all cases the effect is damaging not only to individual species and populations, but also to the natural biological communities.

The present water supply and sewage system pipelines in the city are old and damaged which are prone to breakage leading to contamination of the drinking water supplied. Apart from this, substantial proportion of the households in the Panaji Corporation are still practicing/ opting for on-site sanitation system with septic tank / soak pit as final disposal. The city has a high ground water table and the soil condition does not support percolation of surface water which causes ground water retention. The ground water gets contaminated by the sullage discharged into soak pits/ septic tanks. This further flows into nearby water bodies. The GSPCB has three monitoring stations in the city to record the water quality on regular basis. The water quality data for last two years depicts that the various parameters for measuring the water pollution. The levels of pH and dissolved oxygen are more as per the CPCB standards. The level of biological oxygen demand (BOD) are also well within the limits. There is no monitoring system or mechanism to monitor the water quality of city level water bodies viz. Mala Lake, Campal lake, St. Inez creek nad Qurem creek on regular intervals which are prone to maximum pollution in the city. The Table below shows the water pollution levels measured at various locations along the River Mandovi for last two years within CCP Panaji.

Table 75: Water Pollution levels in Mandovi River

S. No	Parameters	Limit for SW II river as per CPCB classification based on designate best use of rivers	River Mandovi at IFFI Jetty 2013	River Mandovi near Hotel Mariott 2013	River Mandovi at Panaji 2013	River Mandovi at Panaji 2012
1	pH	6.5 – 8.5	7.75	7.39	7.56	6.31
2	Dissolved Oxygen (mg/l)	4 mg/l or more	7.3	6.56	6.26	5.83
3	BOD mg/l	3 mg/l or less	1.5	1.5	1.12	1.49
4	Total Coliform MPN/100 ml		12810	16330	7154	168.5

Source: GSPCB, Panaji

11.2 Water Bodies

The city of Panaji is highly ecologically sensitive zone. It lies in the estuarine zone where the River Mandovi merges with the Arabian Sea. The area beholds highly eco sensitive features like mangroves, marshy lands, aquatic life, river front, lakes as well as sea front.

11.2.1 Water Bodies in Panaji

The city of Panaji is an eco-sensitive area falling in Coastal Regulation Zone (CRZ) I, II and III. The major water bodies located in and around the city are the River Mandovi and the River Zuari flowing from Northern side towards the Arabian Sea in the South. The city has two natural water bodies viz. Mala lake which is catchment area for water from higher levels of the city located in the north eastern part while La Campala Lake in the towards the western part of the city. Apart from that other prominent water bodies which passes through the Northern part of the city is the St. Inez creek and Querem creek formed by the sea. These act as natural drains carrying the storm water from higher land of the city to the sea. Existing condition of water bodies



The River Mandovi and the Zuari rivers face problem of silting. The River Mandovi especially needs immediate attention since all the storm water drains are discharging storm water into the Mandovi River at present apart from the siltation of the River at the mouth of the Arabian sea,

It has been observed that the natural drain of Saint-Inez nallah which was carrying major part of storm water from the city to River Mandovi at present is affected due to silting and environmental degradation due to pollution. The major reason of this, since the drain is passing amidst the city area it is subjected to indiscriminate dumping of solid wastes, discharge untreated sewage well as encroachments in some of the places. As a result, the carrying capacity of the Nallah has been reduced greatly apart from affecting the velocity of the flows. At present this natural drain is completely silted, highly polluted and stagnant.

The city of Panaji city had abundant lakes / marshy lands acting as a buffer against the storm water floods in past years. However, these natural barriers are shrinking in number and area over the years due to rapid urbanisation and increasing demand for developable land. For instance the original capacity of Mala Lake has been reduced from original area of 70,000 sq.m. to 15,000 sq.m. As a result, with reduction in balancing capacity to retain water from the surplus flows of Altinho is causing floods in the Mala Lake area.



St Inez Nallah



Mala Lake

*Mandovi River Front**Sea Front along the city*

The Table below lists the water bodies in and around the city and its present condition.

Table 76: Water bodies in the city and its condition

S. No.	Name	Location	Condition	Remarks
1	Mala Lake	Ward 19 and 20	Poor	Receiving solid waste from clogged drains during backflow in monsoons.
2	Campal Lake	Ward 10	Poor	Receiving solid wastes from clogged St. Inez Creek.
3	Qurem Creek	Ward 27 and 28	Visibly clean	Apart from incidental black spots along the banks, the water body appears to be clean.
4	St. Inez. Creek	Ward 5, 7, 8, 10 and 13	Severely degraded	Receiving solid wastes from direct dumping clogged drains and sewage from hutments on the banks
5	River Mandovi	North and North West Boundary	Good	Apart from incidental black spots along the banks, the water body appears to be clean
6	Zuari Estuary	South	Good	-

Source: *City Sanitation Plan for Panaji (Situation Analysis)*

Presently CCP is not involved in the maintenance of the water bodies in the city. The Water resource department is in charge of natural drains and major drains in the city. There is an urgent need to address the issues pertaining to the degradation of the city's water bodies especially the St. Inez drain and the Mala lake.. The CCP has prepared a Draft DPR for St. Inez Nallah which details of the issues and measures for improvement of this natural drain with an estimated cost of Rs. 19.56 crores. It had been approved by the state committee. However, the same is being revised by GSIDC and not yet taken up for implementation.

11.3 Gardens, Open Spaces and Urban Forests

As per the existing land use, the city has about 0.80 km² under the green cover and accounts for 14.55% of total city area which is at present inadequate as per URDPFI guidelines. There are 17 parks in the city limits maintained by CCP and forest department. The city has no forest area within its limits.

Out of the total city area of 8.30 km² around 33% of the Panaji city constitutes of the area under natural features. The natural features mainly includes marshy lands and mangroves along the water front which act as barrier from the flooding caused during the monsoons. But with the increasing urbanisation in the city and non-availability of land for expansion of the city, reclamation of the marshy lands has been practiced hindering the natural setting of the place. This trend has already started affecting the city's environs blocking the natural drainage pattern. The city administration, state environmental department and the citizens are aware of the importance of these natural features and efforts are being made to restrict the same.

11.4 Identification of Environmentally Sensitive Areas

The city of Panaji as discussed earlier falls under CRZ zone and has environmental importance with rich fauna and flora. As per the study "Urban Vulnerability Assessment Report prepared by ICLEI the city level environmentally sensitive areas include the following features located in and around the city.

1. The Coast line and beach areas towards the West of the city.
2. The Khazan Lands are the plains running parallel to the coastline. These plains are flooded annually by brackish water from the Rivers and Creeks and hence, are fertile but saline. Most of these Khazan lands are used for cultivation of salt resistant species.
3. Riverine Systems: Mandovi River flows along the North of the city and meets the Arabian Sea, Zuari River flows towards the South of the City.
4. Creeks and Backwaters: These are brackish water areas and very rich ecosystems which exist along the Mandovi and Zuari Rivers and along St. Inez and Querem Creek.
5. Mangroves: These are ecologically rich ecosystems located along the river banks (Mandovi and Zuari Rivers) and along the Creeks (St. Inez and Querem Creek).
6. Sand dunes: The sand dunes along Miramar beach are on a decline and so is the sand dune vegetation.
7. Springs located in the Fountain area are believed to be fresh water sources which used to supply water to the entire city at one time.
8. Altinho hill and Western Ghats are other ecologically sensitive areas in and around the city.

The vulnerabilities of above identified environmentally sensitive areas in the city and its impact of climate change has been discussed further in the Chapter 11.

11.5 Bio Diversity of Panaji City

The city of Panaji under the Goa State Bio-Diversity Board has prepared a study on bio-diversity in CCP area. The study report is a baseline towards conservation initiatives by the state among cities, local and governance, and biodiversity. It examines the range of flora and fauna species associated with urban habitats within the jurisdictional confines of city of Panaji covering various terrestrial, aquatic and amphibious habitats, attempt understanding relationships between cities and biodiversity by looking at the major influences cities can have on biodiversity loss or on conservation within and outside the city boundaries, as well as the benefits of biodiversity conservation for cities, such as the

provision of ecosystem services. Based on the preliminary findings; it may transcend the scope to understand the main instruments and governance mechanisms that exist, allowing cities to effectively implement the directives of conservation of biodiversity.

11.5.1 Key Findings of the Bio-Diversity Report

- The total number of biodiversity species recorded during the period of study was 404: 46% of which comprised of Flora and 54% comprised of fauna. Among the flora the trees were predominant, while the birds and butterflies were the dominant vertebrate and invertebrate faunal elements.
- Out of the total species existing in Panaji, 14 species of fauna and 27 species of flora are accorded 'protected status' as per the Wildlife Protection Act, 1972 and other laws.
- The dominance ranking of 3rd place for Ichthyofauna diversity (fishes) is explained by the fact that, the city has numerous aquatic habitats including lentic and lotic fresh waters, back waters and marine waters. Much needs to be done to address gaps in the understanding of the fish diversity especially in the fresh waters as fresh water fish stocks are main source relied upon during monsoons.
- Herpetofaunal diversity is moderate as these groups are affected by changes in microhabitat and microclimate, barring a few areas the city.
- Among the floral species trend of dominance is trees, followed by shrubs and herbs. Good number of climbers have been enumerated and identified. The other groups are parasites, ferns, algae, xerophytes etc. Trees offer habitat to range of birds, reptiles and insects. Hence, there is a need to make the inventory more comprehensive and add other groups such as Bryophytes etc.

11.5.2 Conservation Measures

It is well accepted norm that the highest form of protection is protecting habitat rather than individual species. Many urban biodiversity habitats are the last reserve of species that have actually been displaced from their natural ranges. Urban landscapes and ecosystems thus have a huge habitat value, there is a great concern over the loss of biological diversity; saving individual species is not an effective method. Protecting the habitat of the species provides a good conservation measure. Habitat is all encompassing ecological entity that besides offering space and resources; allows population interaction, exchange of energy and material exchange. Thus the focus in conservation efforts has to be on preserving integrity of habitat.

On gross assessment the following interventions have been suggested in the existing diversity and increase the city's biodiversity.

- 1) Exotics despite the visual and aesthetic appeal in landscape planning, it occurs at the cost of native flora. The city has a large variety of exotic species. Though the existing exotic species may be allowed to grow, introducing and patronising new exotic species especially in construction sector for green belts and avenue plantation should be avoided as the exotic species affect the survival of the native plants.
- 2) Plantation of the native and local fruit and flower bearing species should be encouraged to increase the insect (butterfly) and bird life. Surveillance for identifying such areas for plantations be carried out and mapped followed up with requisite soil analysis etc. to ascertain compatibility. Moreover, there are some areas in the city specially Altinho hill side where plantation of native species can be undertaken.

- 3) The area around both the sides of St. Inez Creek can be utilised for avenue plantation (wherever possible) to enhance its eco-tourism value and habitat value.
- 4) The Ribandar area (Ribandar road) has rich mangrove presence and diversity. Mangrove plantation should be undertaken along the inter tidal fringe adjoining the road. The already existing mangrove patches should be monitored for growth and conserved; these can be protected by proper live/ biological fences that will help the faunal movement at the same time restrict anthropogenic activities. Stretch of mudflat should be retained along the Ribandar road, as it forms a integral part of feeding of ground for several waders (migratory and resident)
- 5) There is a potential to develop several interpretation zones e.g. Butterfly zone, herd and shrub zone, bird watching zone etc. Few gardens in the city can be utilised for this purpose.
- 6) The parade ground at Campal opposite Bal Bhawan can be enclosed by planting trees on all four sides which can attract bird life.
- 7) The Miramar beach stretch is diverse in terms of coastal species diversity. However, intensive beach tourism and easy access to this region is ruining the area of its richness and impacting the supralittoral stretch. The Miramar-Dona Paula bypass road along the beach side should be fenced and the area declared Plastic free zone, disallowing visitors from carrying plastics, soft drinks or alcoholic beverages and littering the place. Miramar beach also consist of excellent sand dunes which need immediate attention and conservation strategy.
- 8) It has been noticed that there are people who misuse the vegetated patches in isolated locations (Miramar and Altinho) for alcohol parties, and other illicit activities disturbing the ecosystem and its biological endowments. This should be regulated and stopped as the resilience of the ecosystem is at stake.
- 9) The construction sector is a significant pressure on natural habitats. Careful consideration be given by the concerned Regulatory Authorities in the state such as SEAC and SEIAA and Environmental Clearances granted only after careful scrutiny and assessment of impact of the proposal on the local ecology and biodiversity. Such statutory regulations establish a precedence of mitigational compliances and lessen the impact. This will not only help in maintaining the biodiversity, but also continue to be an example of for conserving the green cover of the city.
- 10) The city of Panaji has a mosaic of ecosystems with a rich diversity of biological endowments. The need of the hour is to demystify this information and display it at strategic points in the city. It would be ideal if information/ interpretation panels/ signage's are setup at several locations giving information of the flora and fauna throughout the city. This will help in creating awareness amongst both the residents as well as visitors and promote conservation of the flora and fauna in the city.

11.6 Goa State Coastal Zone Management Plan

In June 1996, The Ministry of Environment and Forest, GoI requested the National Institute of Oceanography (NIO), Goa, to delineate ecologically sensitive areas along the coastal stretches of Goa^{15,16}, based on which approval of plans was issued in September 1996. This is the prevailing law which governs developmental activities along the coasts, rivers and backwaters of Goa. The purpose of the notification was to control and minimize environmental damage to coastal ecosystems. The Goa State

Committee for Coastal Environment (GSCCE) was empowered to enforce the provisions of the notification. With respect to Panaji and its environs, the following categorization has been approved under the Goa State Coastal Zone Management Plan.

- a) Area along Ourem creek till confluence with Mandovi river is classified as CRZ-II.
- b) Area along Mandovi river bank (from confluence with Ourem creek) westwards till thebeginning of Children's Park of Campalis classified as CRZ-II.
- c) Area on land ward side of existing road till Rotunda of Gaspar Dias is classified asCRZ-II.
- d) Area west of Sports Authority of India complex up to Rotunda of Gaspar Dias isclassified as CRZ-II.
- e) Area from Rotunda of Gaspar Dias – Gaspar Dias beach to Caranzalem beach up toCabo Raj Niwas is classified as CRZ-III.
- f) Area from Cabo Raj Niwas to Dona Paula jetty is classified as CRZ-III.
- g) Area of Dona Paula cove/bay is classified as CRZ-III up to line of existing authorizeddevelopments.
- h) Area from Dona Paula cove/bay to Wainginim beach is classified as CRZ-III.
- i) The plateau top to the extent is classified as CRZ-II (falling within municipal limits).
- j) All areas outside municipal limits are classified as CRZ-III.
- k) Wainginim beach is classified as CRZ-III.
- l) From Wainginim beach to Siridao Beach and area up to Agassaim Bridge is classifiedas CRZ-III.

Refer Annexure 11 for detailed classification of CRZ zones defined as per the Coastal Regulation Zone Notification, Ministry Of Environment and Forests

11.7 Disaster Proneness Assessment of the City

11.7.1 Earthquakes

As per the District disaster management plan, the state of Goa falls under the moderate seismic zone in the country, viz. Zone IV in seismic zoning map of the country. Though the state has not directly witnessed any earthquake till date, it was affected by tremors from devastating earthquakes from neighboring state. The state and the region have experience two earthquakes till date both of magnitude of 5 whose epicenter was in Maharashtra. The Table below lists the occurrence of earthquakes and its effects till date.

Table 77: Earthquake data for North Goa district

Sl. No	Type of disaster	Year	Damage caused
1	The tremors of the devastating earthquakes with magnitude 5.0 or more that hit "Koyana" Maharashtra, that affected life of people in Goa	1967	Residential as well as public structures,infrastructures were damaged severely,although no casualties were taken place
2	the tremors of the devastating earthquakes with magnitude 5.0 or more	1993	Residential as well as public structures, infrastructures were damaged

Sl. No	Type of disaster	Year	Damage caused
	that "Latur" in Maharashtra, that affected life of people in Goa		severely, although no casualties were taken place

Source: *District Disaster management Plan, 2012-13, North Goa*

Although the vulnerability is low in the state, towns are more at risk than rural areas due to higher density of population. Another concern is the large numbers of building both private and public have constructed without proper earthquake resistance features. Goa being a tourist location has a number of heritage sites (No. of listed heritage buildings is 431 as per Town and Country Planning Department Notification) that need to be made earthquake resistant³². The city of Panaji and its surroundings is developing as major urban centre and has maximum number of heritage structures. Hence, the city needs to formulate revised building bye laws and the Development Control Regulations to mitigate the ill effects of earthquakes in future.

11.7.2 Cyclone

The occurrence of cyclones/ floods is restricted to the monsoons only. The impact of cyclonic winds is felt towards the onset of the monsoons in April end and May and again around September/October. The state of Goa has experienced only one major cyclone in the 2009 which affected its coastline apart from Maharashtra and Goa. There was damage to the crops and buildings along the coast line. The Table below gives the details of the cyclonic incidence in the state.

Table 78: Cyclone data for the state

Type of Disaster	Date of occurrence	Loss of Life	Damage Caused
Cyclone Phyan hit coast of Maharashtra , Goa and Gujarat.	November 9-12, 2009	7 persons dead and 44 missing	the cyclone 'Phyan' caused damage to crops and properties in Goa

Source: *District Disaster management Plan, 2012-13, North Goa*

Additionally, both the areas along coastline and interior regions can be affected by gusty winds which can cause damage to property, damage to crops, collapse of trees and in turn threatening lives of people including fishermen, livestock, ships and barges, boats, ships, fishing trawlers at ports. If cyclonic winds are accompanied by heavy rainfall then there is possibility of flooding in low lying areas, in Goa.³³ Panaji is also located adjacent to the coast line as well as River Mandovi. The city is quite vulnerable to major damage in case of cyclone at any point of time. Hence, the city corporation and residents of the city needs to be trained and made aware to take quick measures in case of such disasters.

³²*District Disaster management Plan, 2012-13, North Goa*

³³*District Disaster management Plan, 2012-13, North Goa*

Figure 49: Coastal CRZ villages in the state



11.7.3 Tsunami

As far as the North Goa District is concerned, the coastal belt was not recorded any Tsunami in the past. However, the Tsunami of 26th December, 2006 in the Bay of Bengal had caused after effects in the sea and rivers. No loss of lives or damages to the properties was reported, except some vessels in the sea were reported to have been damaged³⁴.

11.7.4 Floods

As far as North Goa district is concerned, there are 3 major rivers viz. Terekhol, Chapora and Mandovi, besides one minor River Baga. The River Mandovi has 10 tributaries viz. Madei, Surla, Kotrachi, Ragda, Khandepar, Kudnem, Valvanta, Bicholim, Assonora and Sinker. Of the annual rainfall, 75% is received during four months of monsoon (June – September) and as a result, almost all the rivers carry heavy discharge during this period. The flood hazard is compounded by the problems of sediment deposition, drainage congestion and synchronization of river floods with sea tides in the Coastal Plains.

The areas of Bicholim and Sattari talukas are mainly affected due to floods in River Valvonti, whereas the other talukas of Tiswadi, Bardez, Pernem and Ponda are flooded either due to low lying areas or due to temporary rise in water level of nearby rivulets.

This district has not experienced major floods in past few years, except in 2000 at Bicholim; 2005 at Mala, Panaji and Bicholim and in 2007 again in Bicholim due to overflowing of rivulet, causing no major casualties but causing heavy damages to the properties.

The city is located at same level as the River Mandovi causing flooding of the city area when the water levels in the River increases beyond the land surface level. This has been a persistent problem every year during the monsoons. Measures for proper drainage of the natural drains and efficient system of storm water drains in the city will assist in mitigating the floods caused frequently.

11.7.5 Manmade disasters in state and city

Industrial fire accidents and vehicular accidents are the major manmade disasters in the state. These are usually experienced in the Manufacturing and Formulation Installations and Storage Units in the State that have been classified as Major Accident Hazard (MAH) Units. In North Goa till date no Major Chemical Accident has been reported to the Inspectorate of Factories and Boilers from the MAH units.

The basic hazards posed by MAH units in North Goa are explosion and fire from storage and handling of LPG. These include facilities of Goa Glass Fibre Limited, HPCL LPG Bottling plant, and Rod Mill of Finolex Limited, Nestle, Filpack and others in North Goa. Hazardous material enters North Goa by road for local consumption in the state as well as transit to neighboring states. The main products transported to/from these units included liquid chlorine, petroleum products in tankers, liquified petroleum gases in bulk and in cylinders, ammonia and phosphoric acid and chemicals in loose and in bulk form³⁵. The main reasons cited for vehicles carrying Hazchem materials meeting with accidents are the negligence of the driver and the poor design of roads which are too narrow to enable smooth flow of traffic.

³⁴District Disaster management Plan, 2012-13, North Goa

³⁵District Disaster management Plan, 2012-13, North Goa

The city of Panaji is located at the tip of Arabian Sea along the Mandovi River. The transportation of hazardous material within the city limits is not possible as the state and national highways pass from the Northern Periphery of the city leading to other urban centres. However, the city is prone to fire accidents within the city which is taken care by the State Fire Department. The details of fire accidents have been detailed in Chapter 4.

11.8 Disaster Management Mitigation Measures

The Disaster mitigation at city level is a holistic management of the disasters (both manmade and natural). It involves management of events to minimize the damage during a disaster and development of preparedness to cope with the disasters to reduce the risk and losses.

As per the general disaster management structure in India, the district collector is the responsible agency for disaster management within the district. The district would play key role in disaster management and relief activities.

However, in view of the growing urbanization, decentralization of the disaster management plan is need of the hour. The disaster management plan is needed particularly in short-term recovery, decision-making, which can affect prospects for effective implementation of a mitigation strategy aimed at reducing the long-term risk to human life and property in the jurisdiction.

11.8.1 Current status of disaster management

The District Disaster Management Authority (DDMA) for North Goa District, has been formed under the Chairmanship of District Collector to evaluate the disaster preparedness for different types of calamities that may occur from time to time, with primary aim to take stock of the situation, monitors routine preparedness, suggest improvements in the response mechanism and to formulate a comprehensive District Disaster Management Plan for North Goa District. The DDMA is the apex planning body at the district level and will play a major role in disaster preparedness and mitigation. The DDMA has the primary responsibility of:

- Reviewing the threat of disasters.
- Vulnerability of the district to different disasters.
- Evacuation process to reduce risk and emergency response.
- Considering suggestions for improvement of the DDMP.
- To educate the public on different flood and cyclone hazards.
- To disseminate information about the protective steps, Dos & Don'ts.
- To make arrangements for emergency action.
- To effect evacuation from the affected areas if necessary.
- Search and Rescue Operations.
- Immediate mitigation and Relief Measures.
- Overall rehabilitation strategies and effort.
- Post disaster action and review.

As discussed above, the city is prone to natural disasters like earthquake, floods and manmade disasters like fire outbreaks and road accidents. Presently CCP is not involved in any relief measures during floods. Also, their role is limited to evacuation of people from flooded areas and distribution of malaria medicines.

In order to achieve disaster preparedness (pre disaster), dissemination of warnings (during disaster) and relief measures (post disaster), CCP need to formulate city level disaster mitigation plan on the lines of Disaster Management Plan proposed for the district.

11.8.1.1 Development of District Control Room

The state manual on development of municipal disaster management plan suggested the following institutional mechanism for the control unit/disaster management preparedness team at district level:

Table: Institutional mechanism for the control unit/disaster management preparedness team

S. No.	Members	Designation
1	Collector & District Magistrate (North)	Chairperson.
2	Chairperson of the Zilla Panchayat (North)	Co-Chairperson.
3	Additional Collector/ADM(North)	Chief Executive Officer/ Member
4	Superintendent of Police (North)	Member
5	Director of Health Services	Member
6	Principal Engineer, P.W.D.	Member
7	Director, Fire & Emergency Services	Member

Source: DMA, 2012

Any other official, technical expert or representative of the leading NGO or prominent citizen can be co-opted as Consulting Members after taking approval of the DDMA. The DDMA should also take review of changes in the indicators pertaining to the district like creation of additional infrastructure, development projects, changes in inventories, etc. and incorporate these changes while updating the DDMP. All the members are expected to substantiate/ assist the DDMA with all the updated information about their concerned areas of operation.

The District Control Room (DCR) has been proposed to be formed which will act as the nerve-centre of the disaster management and response machinery in North Goa district. All the activities pertaining to the tackling of any emergency scenario in the district right from the receipt of the early-warnings to the final rehabilitation measures, shall be guided, controlled, managed, implemented, monitored and reviewed from the DCR. The DCR aims for an effective and realistic response mechanism based on the DDMP with fail proof communication, accurate databases in order to make optimal utilization of Men, Material and Resources to prevent the loss to lives as well as minimize the loss of property.

- To implement, co-ordinate and ensure a speedy administrative response to any disaster situation the district.
- To ensure that the disaster response is as per the situation requirement and largely based on the DDMP.
- To effectively manage and utilize the available men, material and resources in the district. During disaster time, DCR will operate under the central authority of the District Collector, exercising powers to issue directives to all line-departments to provide emergency response service.
- DCR will be manned round the clock during disaster time to ensure rapid emergency responses. In any case, DCR shall function 24 hrs from 1st of May to 30th of September every year.
- DCR will co-ordinate with the State Disaster Management Authority (SDMA) and State

- Control Room (SCR) for appropriate support, guidance and smooth flow of information.
- DCR shall be operationalised by the Civil Administrative Branch (CAB) of the Collectorate, North Goa

This institutional mechanism will be applicable to entire district including the urban centres within the district. Panaji will also be covered under the District Disaster Management Authority.

11.8.1.2 Hazard/ Risk vulnerability analysis

The CCP need to set up a disaster management cell within to be actively involved in various monitoring and mitigation measures. The city's disaster preparedness team, under the direction of the Municipal Commissioner shall be responsible for preparation of annual contingency plans (Disaster management plans) and ensuring the effective implementation of disaster mitigation and relief measures in the city.

The CCP shall identify hazard proneness and develop ward level profile of each hazard in terms of high/ low/medium. Further, the frequency, magnitude, intensity and spatial extent of each hazard have to be mapped. This should be followed by development of hazard specific resource estimation.

11.9 Key Issues and Concerns

- The present water supply and sewage system pipelines are also old damaged which are prone to contamination of the drinking water supplied.
- Practice of on-site sanitation system with septic tank / soak pit is contaminating the ground water and water bodies as ground water table is high in the city area.
- Direct disposal of solid waste and discharge of sewage into the St. Inez drain has caused clogging of the drain and environmental degradation of the drain.
- City level water bodies like Mala Lake lack conservation efforts due to which it has been prone to encroachment and pollution over the years.
- The city has various environmentally sensitive areas which are prone to degradation due to the high urbanisation pattern in the city. These areas need to be taken special care so that it does not pose a major threat to the city in the coming future.
- The city is prone to high levels of noise as well as air pollution especially in the core area due high influx of vehicular movement, commercial activities and pedestrian movement.
- The city is prone to natural disasters like earthquake and monsoon induced floods. The floods are a major concern due to the city's topography and inadequate storm water drain system
- Panaji city being surrounded by water bodies has high ground water table with water being available around 1 to 1.5 m from the surface. Moreover, the soil is deep, poorly drained and less permeable. This affects the discharge of storm water and water is retained for a longer time which results in heavy flooding. The city faces high risk of fire accidents in the core city areas like core city and adjoining heritage areas. The congestion in these areas and narrow roads restricts the movement of fire-fighting services.
- The role of CCP has been limited in the disaster management planning for the city. There is at present no separate disaster management cell provided in CCP.

11.10 Urban Environment post1st Generation CDP - Status Review

Pre and Post 1st Generation CDP Scenario

Parameters	Description
Open spaces`	10% ; Adequate number of parks at various places within the city
population not covered by sanitation	5%
population discharging untreated sewage	5%
Major Issues	High urbanization affecting the city environs, natural drainage pattern, water bodiesand the ecologically sensitive areas around the city

Source: CDP 2006

The CDP highlighted upon the following issues

- Construction on low lying and environmentally fragile areas
- Unscientific constructions on hill slopes and the reclamation of land
- Water logging and flooding on roads etc. Stagnation of rain waters
- Silting of Mandovi River and Mala lake
- Contamination of piped water with sewerage
- Sea-water incursion and Maintenance of parks

The Strategies proposed to achieve the vision are as listed below.

- Protection of natural recharge areas.
- Identify and develop norms for ecologically fragile zones.
- Reclaim natural water bodies and Reduce pollution to the extent possible.
- Altinho is a water-shed and the topography needs to preserved
- Development and maintenance of parks and open spaces
- Tree cutting for the sake of festivities should be stopped

Proposed Projects and its components

The proposed projects and its components under CDP 2006 are as depicted in Table below. A total cost estimate of Rs. 70.40 crores was proposed for the projects for improvement of various aspects affecting the urban environment in the city.

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
1	De-silting of Mondovi River stretch	(4 kms); Estimated cost: 4000 lakhs
2	Rejuvenation of Mala Lake	30000 sq. m x 3 m depth; Estimated cost: 200 lakhs
3	Panaji Watershed Management System	9 sq. km; Estimated cost: 2700 lakhs
4	Beautification of existing garden and open spaces	13 nos. ; Estimated cost: 40 lakhs
5	Developing parks in each ward	30 nos. Estimated cost: 100 lakhs

Source: CDP 2006

12. CLIMATE CHANGE & SUSTAINABLE DEVELOPMENT

For centuries, human activities have released large amounts of carbon dioxide and other greenhouse gases into the atmosphere. The majority of greenhouse gases come from burning fossil fuels to produce energy, heating houses, and transportation purpose. Deforestation, industrial processes, and some agricultural practices also emit gases into the atmosphere. This has led to climate change which is referred to any significant change in the measures of climate lasting for an extended period of time. In other words, the climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer. Various evident impacts of the ongoing climate change at broad level are as follows;

- Rise in global average temperature near Earth's surface.
- Change in the monsoon pattern.
- Change in the pattern of wind.
- Increase in incidents of natural calamities such as floods, droughts, earthquake, severe heat waves, cyclones, etc.
- Affect on agriculture yields
- Melting of ice and rise in sea level, etc.

The impacts of the climate change are evident from the past incidents around the countries and presents challenges for the societies and environment. Thus, planning to mitigate the impact of climate change and reduce the emission of greenhouse gases is becoming more important for sustenance of our present societies and to save for future generation. This is possible by adopting sustainable and low carbon emission development measures.

12.1 Climate Change and Urban Cities

As per the International Panel for Climate Change (IPCC) 5th assessment report, the cities across the world, due to their rapid population growth and large-scale developmental and economic investments, are at high risk to the impacts of climate change. Most of the rapid growth will take place in the urban areas of Asia and Africa. In view of this, the cities should focus on developing adaptation capacity towards the climate variability.

India's cities are characterized by high density of population, housing stock, and poor infrastructure, which make them all the more vulnerable to climate change. Given that the most valued infrastructure is usually located in cities, the economic and social costs of climate change will be much higher in cities.

For example, cities house valuable communications infrastructure as they do physical infrastructure such as buildings, roads, bridges, and flyovers. Hence, any climate change impacts in the form of damage will be quite expensive. Climate change impacts the physical assets used within cities for economic production, the costs of raw materials and inputs to economic production, the subsequent costs to businesses, and thus output and competitiveness.

Infrastructure plays an important role in sustaining the development of a city. Infrastructure assets provide critical social and economic services not only to the city where they are located but also to the surrounding areas. The degree to which a city is vulnerable to climate hazards depends on the

frequency and intensity of climate related events as well as the local capacity to anticipate and respond to them. Quality, access, and efficiency of infrastructure services play an important role in determining this local capacity of the city as well as the magnitude of structural and economic loss that a city will have to bear in times of adversities.

12.2 Learning from the Past

Extreme climate events are expected to become more frequent as a result of climate change. The climate extremes can have devastating effects on human societies. The effects of climate change are expected to have substantial impacts on our human settlements and our development trajectory. Priority health research areas for different risk factors resulting from climate change are presented in the following table.

Table 79: Risk factors

Risk factors	Health effects	Priority focus areas
Temperature, humidity, precipitation	Vector borne diseases	Climate related diseases transmission dynamics, improved surveillance
Precipitation, water temperature	Water borne diseases	Climate and water related diseases
Local air pollution and stagnant air masses	Air pollution related health effects	Combined effects of climate factors and air pollution, weather related allergens
Extreme heat or cold	Temperature related illness	Improved prediction, warning and response

Source: *Climate change and human health, WHO*

Also, climate conditions affect the water availability and quality, the timings and intensity of rainfall can affect the transport of the disease causing organisms into the water supply, particularly in lower income areas and slum pockets.

12.3 Climate in Panaji

The climate in Panaji is hot in the summer and mild in the winter. During summers (from March to May) temperatures reach up to 32 °C and in winter (from December to February) it ranges from 20 °C to 28 °C. The monsoon period is from June to September with heavy rainfall and gusty winds. The annual average rainfall is 2932 mm (115.5 inches).

12.4 Climate Change Challenge in the state

As per the study on Urban Vulnerability Assessment under the ACCCRN project the following aspects were highlighted w.r.t climate change in the state.

- According to climate change projections made in the 4X4 assessment, there is a high probability of an increase in average annual rainfall (approx. 69 to 109 mm) and a high probability of a rise in average annual temperatures by 1.5 to 2.2°C in the Western Coastal Region by the year 2030

2. Salt water intrusion: Groundwater in Goa is available at 5-10m in the Tiswadi Taluka, but in Panaji City groundwater availability has been reported at 1 to 1.5m below ground level. Salt water intrusion has impacted the quality of available groundwater.
3. Formation of New beaches

12.5 Climate Change Challenges in Panaji

The city is an eco sensitive area given its geographical settings and topography. The vulnerability of coastal regions to climate change is an issue which has gained attention recently. Increase in the Sea- Level Rise (SLR), and the frequency and intensity of storms are two primary impacts of climate change faced by coastal communities. Panaji has been identified as one of the coastal cities vulnerable to flooding due to the predicted sea-level rise. The rapidly increasing urbanization and growing tourism pressure on city's infrastructure clubbed with future risks posed by climate change make the city highly vulnerable. Loss of green spaces due to illegal constructions, inefficient basic service provision, and growth of urban slums in an unplanned manner are some of the factors responsible.

The major impacts the city is prone to includes salt water intrusion, increase in sea level, high ground water table, rise in temperature, formation of beach, loss of mangroves, land reclamation, loss of sand dunes, siltation of storm water drains etc. The city requires a holistic approach towards these aspects which will not only safeguard the ecology and environment of the city but also the people residing in the city.

12.6 Urban Heat Island Analysis for Panaji

The urban heat island (UHI) is a phenomenon due to which the pattern of temperatures is higher in urban areas than in the surrounding areas. The major concern related to the UHI is air pollution. Higher temperatures increase ozone (O₃) pollution, because elevated temperatures can trigger the chemical reactions that form ozone.

As per the existing land cover analysis of CCP, 66% of land is under developed area and 34% of land is under undeveloped area (natural resource, conservation land and water bodies) in the city. Its location along the River Mandovi and Arabian Sea affects the climate of the city to a large extent. Apart from this, at present the city has good number of open spaces which affects the micro climate of the city. The city is facing acute deficit of developable land and hence the surrounding outgrowths of the city are experiencing increase in population growth and infrastructure facilities. Thus, there is high urbanisation occurring in the city region which may affect the city environs in the coming future.

Although a detailed study on micro temperatures has not been carried out, it can be broadly said that the central core city experiences relatively more temperature and pollution due to high dense developments and commercial activities attracting high vehicular and pedestrian movement. The city's residential areas and newly developed areas are less prone to high increase in temperatures.

12.7 Panaji's Climate Change Resilience

The physical resilience in the city has been analyzed in terms of connectivity of roads, access and availability of electricity, and water. Also the social resilience has been analyzed in terms of accessibility to health facilities. The social resilience depends on level of equitable access to basic services. The institutional resilience depends on preparedness of the ULB and other parastatal

agencies to cope with disasters. The economic resilience is analyzed on the basis of the employment pattern and affordability of the citizens. The ranking of these resilience parameters in the city and the rational is discussed in the Table below.

Table 80: Climate; parameters and ranking

Parameter	Raking	Description
Physical resilience	Medium	<ul style="list-style-type: none"> ■ The city has good regional connectivity to the major highways in the state. However, the Mandovi bridge acts as one single exit and entry point into the city which can be a bottle neck during time of emergency. ■ All the citizens have access to the electricity which is available for the most part of the day. However, break up for emergency services is not made. ■ Hygienic conditions provided to most of the citizens by good practices of SWM, provision of open spaces and 90% coverage of sewerage system and provision of good quality and adequate drinking water within the city. ■ The buildings within the city are mix of old heritage structures as well as new construction in the newly developed areas.
Social resilience	Medium	<ul style="list-style-type: none"> ■ The city has high literacy rate of 87% due to which general awareness among the people is high and assists in penetration of information & education campaigns. ■ The city at present does not have major concentration of slums. There are no declared/ undeclared slums within the city. However, few urban poor pockets are located along primary nallahs and low lying areas. ■ These areas are highly vulnerable to floods and water inundation.
Economic resilience	High	<ul style="list-style-type: none"> ■ Tourism is the major economy of the city which has a multiplier effect creating multiple job opportunities for the locals and the migrants. ■ The work participation rate in the city is 42.7%. The tertiary sector comprises of 98% of the total work force. This shows high rate of economic activities and access to service sector in the city. ■ 15.45% of the city area is under commercial land use is another indicator for high commercial activities within the city.
Institutional resilience	Low	<ul style="list-style-type: none"> ■ The disaster management cell is formed at state level and a state disaster management plan has been formulated. However, the policies are made at state and district level. There is no separate policy strategy for urban centres considering the complex structure of each city. ■ The Meteorological Department monitors and maintains regular information on the climate aspects of the city region which includes rainfall, temperature, humidity, wind direction etc. ■ The Goa Pollution Control Board monitors the water quality, noise pollution and air pollution within the city. ■ The Fire Services are available in the city to cater to fire accidents in the city and its surroundings.

Parameter	Raking	Description
		<ul style="list-style-type: none"> ■ CCP is dependent on external support in times of disaster for mitigating the impact post event. There is no budgetary allocation for mitigation of natural disasters and public awareness and training programme. ■ However, the city lacks contingency planning and implementation framework for mitigation against the natural disasters like flooding, cyclones and Tsunami which are most destructive among all.

12.8 Resilience Initiatives in Panaji

The Disaster Management Plan for North Goa district has been prepared. However, it addresses to the regional level threats including the urban centres within the city. There has been no major natural disaster occurrence in the city except flooding during the monsoon season. There is an urgent need for evolving a disaster management plan at city level after detail assessment of climate and the factors affecting it, considering the high concentration of population, heritage areas and city level assets.

At the city level there are various departments which are established to monitor and update the data on the climatic condition, pollution levels, heritage conservation and environmental preservation. However, a single database of all the information maintained by various departments is not maintained which will not give a complete picture of the climate change phenomenon in the city. The CCP's role is limited to ensuring safe and clean environment within the city. The city does not have a separate cell and budget allocation for assessment and monitoring of climate change and its impact in the city.

There are various city level studies carried out w.r.t the factors affecting the climate change and its threats and impacts on city level infrastructure facilities. The study report on "Planning Climate Resilient Coastal Cities: learnings from Panaji and Visakhapatnam, India" prepared by TERI under USAID funding. The aim of the study was to develop and test approaches that can increase resilience of infrastructure assets and the services they provide in the cities of Panaji and Vishakhapatnam.

Other than this, a study report on "Urban Vulnerability Assessment for Panaji" is also prepared by ICLEI in 2014. The overall aim of this project was to provide a solid understanding, policy and action recommendations to motivate and capacitate many more cities to start such urban vulnerability processes and to guide them in their first steps in a direction which will more easily allow the direct use of vulnerability assessments for subsequent adaptation and resilience planning. The issues and recommendations highlighted in these studies will be very useful for the city administration in planning the city infrastructure services and resilience planning against climate change effects.

The city is also taken up under the programme of 'Development of Solar City' by the Ministry of New and Renewable Energy (MNRE), GoI which is aimed to promote the use of Renewable Energy in urban areas. The target set for the cities under the scheme is to reduce the consumption of fossil fuel to the extent of 10% in the coming five years. This target would be achieved through a mix of various Renewable Energy and Energy Efficiency projects. The project details have been explained further in this Chapter.

12.9 Climate Change Assessment for Panaji

A detail study has been conducted by The Energy and Resources Institute (TERI) granted by USAID as part of their Climate Change Resilient Development (CCRD) project's climate adaptation small grants program. The goal of this study was to help the cities of Panaji to plan for and implement climate risk management strategies as an integral part of city development. The aim was to understand the kind of infrastructure that Panaji house and their vulnerability to climate change and sea-level rise, in particular. The study focused on the following thematic components:

- 1. Develop and demonstrate an urban infrastructure inventory and linkages along with other considerations to support climate resilient planning efforts
- 2. Develop and demonstrate a rapid climate vulnerability assessment approach for infrastructure services
- The vulnerability assessment of Panaji was carried out by TERI with following objectives:
 - 1. Understand the impact of sea-level rise and vulnerability of the city to climate change induced events like extreme precipitation
 - 2. Identify hotspots and critical infrastructural services infrastructure and services.
 - 3. Identify actions to address climate criticality and plan for climate resilience and
 - 4. Inform planning decisions at the level of the local government (city government) to achieve the same.

The purpose of the study was to inform and support the city decision-makers for planning the infrastructural services infrastructure and services of the city such that the climate threats are addressed appropriately at all levels—structural, planning, investment, and governance. This assessment has identified vulnerable hotspots and critical infrastructure on spatial scale and a Database Management System (DBMS) to support the city government to address the impacts of sea-level rise in its planning strategies. The study also gives broad sector-wise recommendations to the city as a starting point to initiate climate resilience planning and retrofitting of infrastructure assets and services.

The study particularly looks at Sea Level Rise (SLR) as a component of climate change and how it affects the infrastructure and services of the city. Sea-level rise coupled with extreme rainfall events lead to inundation, water logging, and floods in the city. Hence, exposure of the city to SLR as well as heavy rainfall in terms of frequency of extreme precipitation, increase in the precipitation level, if any, were assessed. The key points highlighted in this study are as follows:

- i. The precipitation trends for the last three decades for Panaji were studied. The analysis result shows a decreasing trend for total monsoonal rainfall for the period 1989-2009 as shown in Fig below. Panaji also shows a decrease in the highest 24 hourly rainfall annually and for monsoon months (Figure 20). The rainy days however, also show a slight decrease in the city.
- ii. The trend for Panaji (1875-2010) shows an increase in the sea-level based on the tide gauge data.
- iii. The trend of increase in sea level estimated from the dataset is 1.26mm/year. The Figure below shows the Annual MSL anomaly for Panaji (1875-2010)

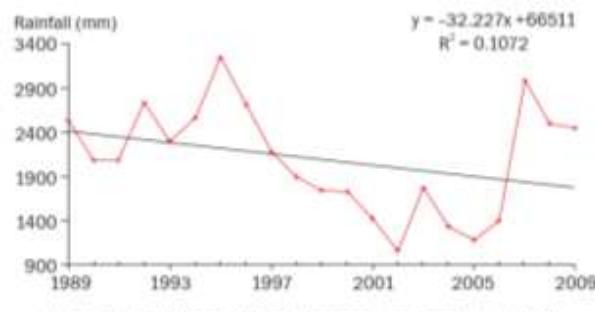


Figure 19: Total annual rainfall in monsoon months in Panaji, 1989–2009

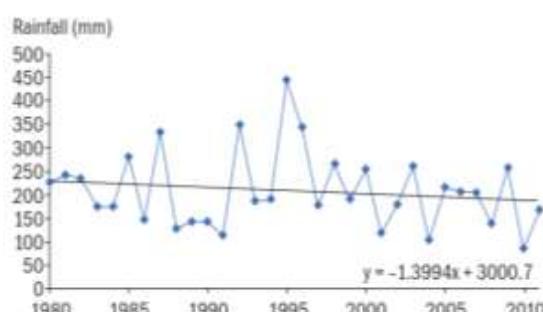
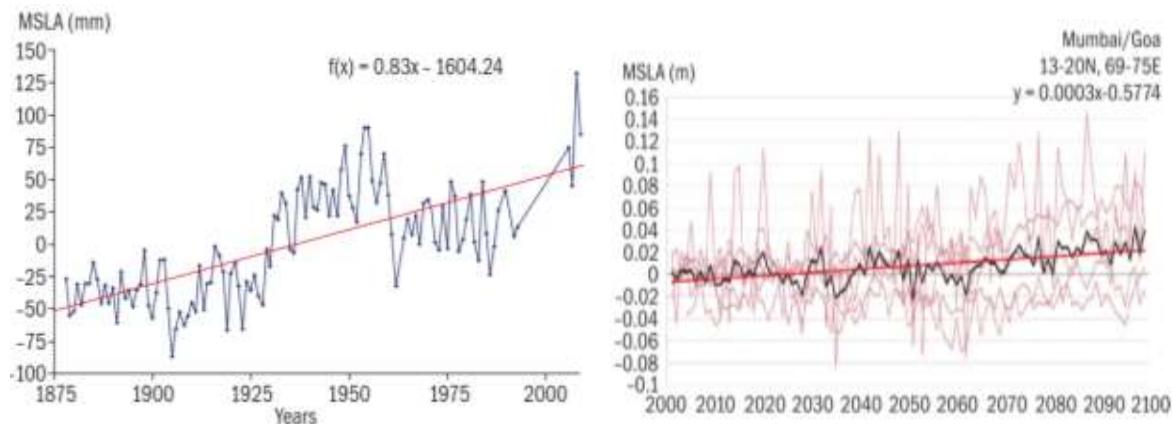


Figure 20: Annual highest 24hr rainfall, Panaji

iv. As per the future trend estimates of Mean Sea level for 2100, the Mumbai/ Goa coast shows a trend of ~0.3mm/yr. The figure below shows the projected sea level anomaly for Panaji till 2100.



Source: Climate Change Resilient Development (CCRD), TERI, 2014

12.9.1 Vulnerability Assessment

Exposure Profile - Exposure is the nature and extent of changes that a region's climate is subjected to with regard to variables such as temperature, precipitation, extreme weather events, sea level (Brenkert and Malone [2005]). The study particularly looks at the impact of SLR on infrastructure and services of Panaji. Sea-level rise coupled with extreme events like extreme rainfall will lead to inundation, water logging, and floods in the city.

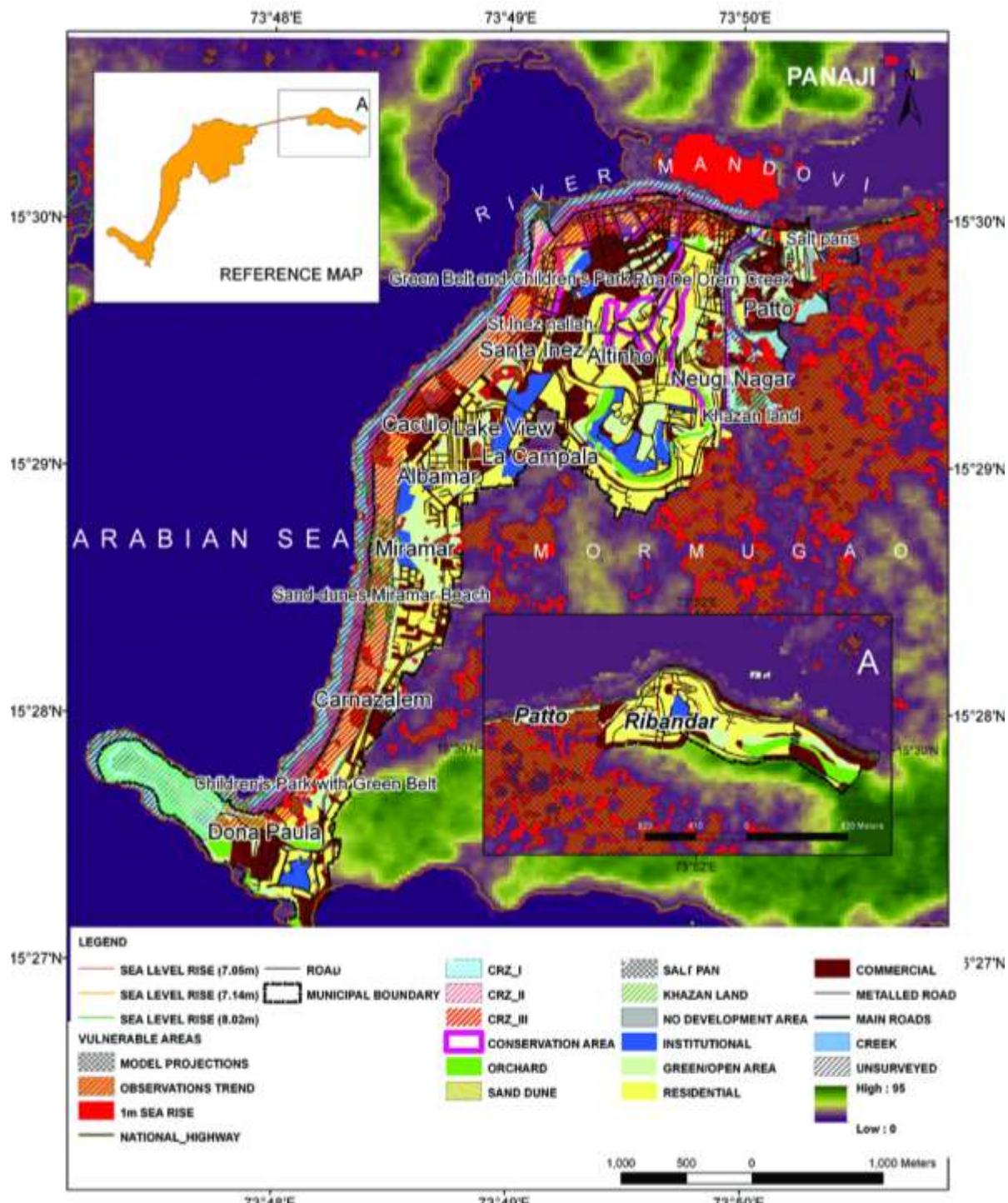
To understand the exact spatial extent of the impact of SLR and other extreme events on Panaji, the three SLR scenarios were overlaid on the Digital Elevation Model (DEM) of the city. This led to identification of hotspots, areas, and assets that are likely to be affected under different SLR scenarios, providing a concise spatial exposure profile for Panaji.

The Figure below highlights the areas and uses that are vulnerable in Panaji. Few areas, like Ribandar, Patto, Fontainhas, Nuegi Nagar, St Inez, La Campala, Miramar, Carnazalem, Dona Paula are found to be partially vulnerable. In terms of the uses/activities that are likely to be affected, these areas have land uses ranging from residential, commercial, institutional to heritage, conservation areas and also ecologically sensitive areas like khazan lands, salt pans, sand dunes, creeks, and estuaries and also Dr Salim Ali Bird Sanctuary. Major city roads, NH-4A, and the Patto Bridge that connects Panaji to Ribandar and Old Goa are also likely to be affected, in case of SLR. The major non-climatic stressors as found in the study are:

1. Impact of development activities on khazan lands, salt pans, and creeks
2. Impact of development on the natural drainage of the city causing floods during rains

3. Impact of high floating population on the infrastructure and services of the city

Figure 50: Schematic map showing vulnerable areas and uses in Panaji due to sea water rise



Source: Climate Change Resilient Development (CCRD), TERI, 2014

12.9.2 Major threats to Existing Natural Resources of Panaji

i) Khazan land and mangroves

The khazan lands are saline flood plains in Goa's tidal estuaries (below sea level at high tide) which have been reclaimed over centuries with an intricate system of bunds and sluice gates (Alvares 2002). They are community managed, integrated agro-fishery-saltpan ecosystems. These are mostly mangroves areas, reclaimed using a system of dykes, canals, and gates. The important natural anti-erosive barrier is provided by the mangrove vegetation near the external or internal bunds. Mangroves act as wave breakers and reduce the net erosive energy of the tides.

The biota of estuaries, mangrove swamps and forests, intertidal zones, mud flats, embankments, and the productive khazan farms constitute very vulnerable elements of the system. These lands serve as emergency storm water receptacles. If this land is destroyed or filled up, flooding (in surrounding area) is bound to occur. In present times, management of khazan ecosystems are impaired by various factors. These factors can be broadly divided into natural (infestation by boring agents and mud crabs), ecological (growth of mangroves and weeds), intensive agriculture and mining, and other socio-economic factors.

ii) Creeks

The Ourém creek is located in the East of Panaji in an area called Fontainhas. A historic bridge called Patto runs over the creek. The creek is dominated by mangroves on both its banks. The creek extends to Mala and St. Cruz region. Urbanization and construction in the vicinity of the creek is exposing it to increasing pollution.

The St. Inéz Creek in Panaji opens up into the Mandovi River which further joins the sea at Miramar. The St. Inéz creek is 3.7 km in length, with surface area of 65,750 sq m with an average width of 12.6 m. This beautiful creek in the past has now turned into a nallah since it has been receiving untreated sewage and garbage over the years. At present, the depth of the creek has been reduced and is found in the range of 1- 4.5 m along its course. The city garbage and floating litter getting stuck at various points along the length of the creek is being observed. With the creek blocked up with garbage, it leads to flooding in some parts during monsoon. New mega projects that are coming up near the creek would further aggravate the problem.

iii) Sand dunes in and around Panaji

A stretch of about 4.5 km of sandy shore exists from Miramar, Carnazalem to Panaji city. Due to rapid urbanization and tourism, most of the dunes are destroyed.





Ourem creek



Mangroves near Pattobridge



Khazan land along NH-4 near Kadamba bus stand



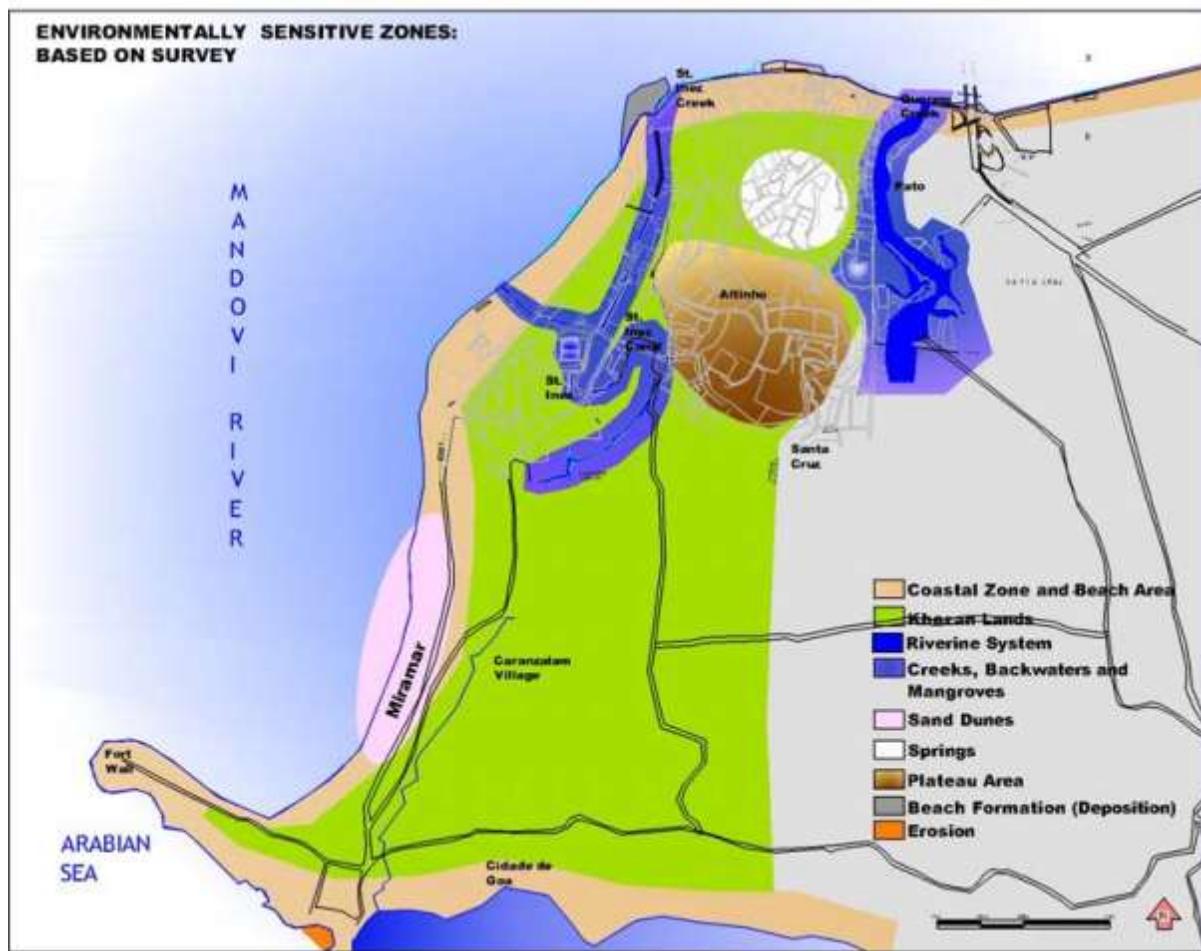
Salt pan at Ribandar

Sand dunes at Miramar

iv) The Coast line and beach areas towards the West of the city. More beaches are being formed in the city, especially along St. Inez Creek due to deposition of sand from nearby areas.

v) Springs located in the Fountain area are believed to be fresh water sources which used to supply water to the entire city at one time.

Apart from this, the Altinho hill and Western Ghats are other ecologically sensitive areas in and around the city. The Figure below shows the environmentally sensitive zones within the Panaji city area.

Figure 51: Environmentally Sensitive zones in Panaji

Source: *Urban Vulnerability Assessment for Panaji, ICLEI*

12.9.3 Identification of Key Vulnerabilities in Panaji

In Panaji, climate change is viewed as a longer term threat and therefore current challenges or vulnerabilities that are not necessarily linked to climate are viewed as more important and pressing issues that need to be dealt with. However, this non-climate related vulnerabilities would also be impacted either directly or indirectly by climate change³⁶.

The key impacts identified in the study on “Urban Vulnerability assessment for Panaji” by ICLEI are as listed below.

S. No.	Key Impacts	Climate Threats
1	Salt water intrusion - Salt water intrusion has impacted the quality of groundwater available. Parts of Tiswadi taluk are also impacted by this problem, especially along the coast, along Mandovi River and along Zuari River. Real estate activities and development in the city are using pumps to extract large volumes of groundwater for	The problem of salt water ingress due to unregulated groundwater extraction could be further exacerbated due to increasing temperatures that would lead to increased

³⁶ *Urban Vulnerability Assessment, ICLEI*

S. No.	Key Impacts	Climate Threats
	<p>construction purposes which has further caused salt water ingress into the city and increased levels of salinity in groundwater. Salt water ingress due to groundwater exploitation is also affecting the availability of drinking water in the city.</p>  <p>LEGEND</p> <ul style="list-style-type: none"> ○ Coastal water monitoring station ■ Area affected by saline water ⌚ Electrical conductivity in sea-water intrusion at 28°C □ HIL areas — State boundary — District boundary — Taluk boundary 	demand. The rise in sea water levels would also only further worsen the current situation.
2	<p>Formation of Beaches - Formation of beaches on Querem and St. Inez is already taking place; more so in St. Inez. This is indicative of the sand deposition trends along the Panaji coastline. The formation of this beach has led to blockage of water flow of the St. Inez creek into the Mandovi River and hence, has increased backflows.</p> 	The formation of beaches is not directly related to climate impacts as there could be several complex reasons leading to this phenomenon. However, it will cause blockage of water flow of the St. Inez creek into the Mandovi River which could lead to greater flooding threats.

S. No.	Key Impacts	Climate Threats
		
3	Loss of Mangroves - Thick mangroves on the outskirts of Panaji, are being reclaimed. In Panaji, there are a large number of cases where coastal stretches have been subjected to the forces of erosion due to cutting down of mangroves for land reclamation. However no formal mapping of change in the mangrove cover has been carried out.	In the scenario of rising sea levels or increased intensity of storms, mangroves would be an important component in reducing damages. Mapping of existing mangrove cover needs to be carried out.
4	Land Reclamation - At the Querem Creek, the river is deep and beach formation does not impact the flow to a large extent. The area has a good mangrove cover. St. Inez Canal carries a lot of waste and is polluting Mandovi River. Reclaimed areas are prone to water logging due to flooding in Zuari and Mandovi River. Most areas along the coast line of Panaji were earlier under marshes and have been reclaimed over time.	During the rainy season, reclaimed areas face the problem of water logging and the water has to be pumped out. Over the years the situation will be worse. Time series land use maps need to be prepared for the city in order to identify the reclaimed land over the time
5	High Water Table - Except for the Altinho area in Goa, most other areas have a high water table. Depth of water table is said to be 1 to 1.5m below ground. Due to the high water table in most parts of the city, soak pits are unable to drain properly and hence, pollute water sources, especially Mandovi River. The storm water drains need to be de-silted very frequently.	High water tables and increased run off combined with land use practices could lead to increased flooding situation with changing precipitation patterns. Increased flooding would also lead to greater chances of groundwater pollution and salt water ingress.
6	Loss of Sand Dunes - Dona Paula - Caranzalem – Miramar (Mandovi estuary), and Dona Paula - Agassaim (Zuari estuary) are the main sand dune areas in the city. The sand dunes in these areas are progressively being destroyed. At Campal, due to severe erosion, the only a small portion of the otherwise quite extensive beach now exists. Many sandy pockets are taken over by developers; heavy construction activity is seen along the coastal hill slopes. According to a report on the sand dunes of Goa by the National Institute of Oceanography, it has been observed that (i) construction of resorts and buildings, (ii) dune sand mining and (iii) roads in sandy strips are the major factors responsible for the large scale degradation and consequent elimination of sand	Like mangroves, sand dunes also provide a protective buffer from sea level rise and storm surges. The loss of sand dunes would therefore increase the vulnerability of the city to such events.

S. No.	Key Impacts	Climate Threats
	dunes.	
7	Lack of Sewerage Network - In Panaji, the sewerage network covers only the core city area and does not cater to the urban fringe areas like Ribander, Donapaula, Caranzalam. Also, the un-notified slum area does not have the sewerage coverage. These areas presently discharge untreated wastewater into St. Inez and other water bodies of the city. Due to this the soak pits also do not function in these areas and get clogged frequently leading to over flow of waste water. This is a major source of ground water pollution and also pollution of river Mandovi.	It will have an impact on health and availability of potable during flood events that could be caused by changes in precipitation. All the slum areas in Panaji city are un-notified. A mapping of these areas and its infrastructure needs is extremely crucial in order to assess their vulnerability.
8	Siltation of Storm Water Drains - The storm water drainage system dates back to the Portuguese period. The drains were nearly 5 ft high which are only 1 ft high presently due to high siltation. It occurs mainly due to the high water table and due to this and quite often city witnesses the flash floods coupled with the flushing of back waters from River Mandovi. Also, indiscriminate dumping of solid waste, discharge of untreated sewage and encroachment in some places leads to increased clogging of the drains. Further, the siltation of Mandovi and Zuari river cause the water level near the coast to rise which accentuates the impact of high tides causing backflow of storm water into the drains	Flooding due to precipitation changes and sea level rise are clear threats that could make the city more vulnerable to flooding events. Therefore measures at improving storm water drainage should be given high priority. It is exigent to have an infrastructural mapping done for the system for Panaji city in order to identify the entry points for improvement measures.
9	Health issues - Cases of various vector borne diseases have been reported in Panaji city. The key diseases affecting the citizens of Panajia are – Malaria, Dengue, Chikungunya, and Filaria	Climate change would have indirect impacts on health by creating flooding and increased unhygienic conditions (as discussed above) that could lead to greater incidences of the diseases mentioned above.
10	Contamination of River - High siltation levels observed in Mandovi and Zuari Rivers and are further amplified in the case of Mandovi River as all storm water drains in the city empty into Mandovi River. It has also caused the river level to rise above the High Tide Line. These factors are contributing to reverse flow in the drains and flooding. Further, the waste from casinos, hotels, and houses is directly dumped into the river causing increased pollution.	Risks of flooding are enhanced. In addition, though this vulnerable system would not necessarily be directly impacted by climate change threats, but would increase the chances of greater 'knock-on' impacts on health and availability of potable during flood events that could be caused by changes in precipitation.
11	Reclamation of area of Mala Lake - Mala Lake located towards the eastern edge of the city had a spread of nearly 75,000 sq. m but due to reclamation of marshes and development in surrounding areas, this has gone down drastically. Runoff from Altinho hill was earlier absorbed to a large extent by the Mala Lake but owing to incessant reclamation of marshes, the lake is now easily flooded and the excess runoff from Altinho hills also causes water logging in low lying areas of the city. Further, the high tide line, springs in core area and	The Mala Lake is clearly an ecosystem that, among its other services, provides the city of Panaji with flood protection. However, its mismanagement is increasing the vulnerability of the city to flood events. There is a need to identify and demarcate the catchment area of Mala Lake and identification

S. No.	Key Impacts	Climate Threats
	backwater areas causes flooding of Mala Lake as catchment area has been encroached.	of sensitive zones in the area is required.

Source: *Urban Vulnerability Assessment for Panaji, ICLEI*

12.9.4 City Sensitivity to Climate stressors

Sensitivity is the degree to which a system or species is affected, either adversely or beneficially, by climate stressors. The effect may be direct (for e.g., a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (for e.g., damages caused by an increase in the frequency of coastal flooding due to sea-level rise) (IPCC2014).

To understand this, 'vulnerability mapping' exercise was undertaken where SLR scenarios and sector-wise infrastructure assets and services were superimposed on the city Digital Elevation Model (DEM). This led to identification of sector-wise assets that are likely to be impacted in the SLR scenario and hence are sensitive. The Table below summarizes sector-specific sensitivity of the city.

Table 81: Sector-specific sensitivity of the city

Area	Sensitive sectors	Factors causing sensitivity
St. Inez	Solid Waste Management Social Infrastructure Tourism and Heritage Water Supply Transport Sewerage and Drainage Ecologically Sensitive Areas Energy and Telecommunication	SLR Low elevation Flood prone
Patto	Solid Waste Management Transport Sewerage and Drainage Ecologically Sensitive Areas Social Infrastructure Water Supply Energy and Telecommunication Tourism and Heritage	SLR Low elevation Flood prone High-density
Neugi Nagar	Social Infrastructure Tourism and Heritage Sewerage and Drainage Ecologically Sensitive Areas Water Supply Transport Energy and Telecommunication	SLR Flood prone Low elevation
Altinho	Tourism and Heritage	SLR Flood prone
Near Mala Lake	Solid Waste Management	SLR Flood prone

Area	Sensitive sectors	Factors causing sensitivity
		Low elevation
Fontainhas	Tourism and Heritage Water Supply Sewerage and Drainage Solid Waste Management Transport	SLR Flood prone Heritage area
Ribandar	Ecologically Sensitive Areas Energy and Telecommunication	SLR Flood prone Conservation area
La Campala Zone	Ecologically Sensitive Areas Sewerage and Drainage Transport Water Supply Social Infrastructure Solid Waste Management Energy and Telecommunication	SLR Flood prone Low elevation
Carnazalem	Ecologically Sensitive Areas Sewerage and Drainage Transport Water Supply	SLR Flood prone
Miramar	Ecologically Sensitive Areas Transport Water Supply Sewerage and Drainage Solid Waste Management Tourism and Heritage	SLR Flood prone Low elevation
Dona Paula	Ecologically Sensitive Areas Water Supply Sewerage and Drainage Tourism and Heritage	SLR Flood prone

Source: Climate Change Resilient Development (CCRD), TERI, 2014

From the above table, the identified critical infrastructure for resilience planning is identified as follows:

Water Supply - Water supply network is getting affected partially in some areas of the city as listed in above table depicting sectorspecific sensitivity of the city.

Solid Waste Management - Vulnerable infrastructure includes sorting centres, four-way segregation centres, and compost stations.

Sewerage and Sanitation - Trunk drains, surface drains, and community toilets in the listed areas of the city might get affected due to the impact of SLR.

Traffic and Transportation - NH 4A and the Patto Bridge that connects Panaji to Ribandar and Old Goa are likely to be affected. The Interstate Bus Terminal and the upcoming multi-level parking at Patto, and the Betim Ferry point may also be vulnerable. Apart from this, major and minor roads, bus stands, and parking areas might also get affected in SLR scenario.

Heritage and Tourism - The conservation area in the northern part of the city is likely to be partially affected. Apart from this, beach-facing hotels in the areas listed in above table depicting sectorspecific sensitivity of the city will also get affected.

Ecologically Sensitive Areas - Ecologically sensitive areas like khazan lands, salt pans, creeks, and estuaries in the northern part of the city are more likely to be affected. Apart from this, tidal influenced water bodies like the St. Inez creek, Rua de ourém, and River Mandovi will also be affected due to SLR. Sand dunes and beaches in Miramar, Dona Paula, and Caranzalem, and also Dr Salim Ali Bird Sanctuary are likely to be affected partially.

Social Infrastructure - Vulnerable infrastructure includes schools, hospitals, and clinics. They will be affected by flooding either due to extreme rainfall or SLR in the affected areas as listed in above table depicting sectorspecific sensitivity of the city.

Energy and Telecommunications - Vulnerable infrastructure includes electricity substations, gas stations, telecommunication lines, and towers in the affected areas as listed in above table depicting sectorspecific sensitivity of the city.

12.10 City Level Adaptation Strategies

CCP has initiated few steps to improve the urban environment quality in the city. They are as follows:

- Solid Waste Management system with segregation of waste at source, decomposing of the wet waste and segregation and disposal of dry waste. The city being a tourist destination is prone to high level of littering which is well maintained through CCP efforts.
- The city has a ban on hawking activities and related informal activities.
- Urban forestry initiatives and using recycled waste water for the same.
- The city has adequate green open spaces within its jurisdiction maintained by CCP and other departments on regular basis.
- The project proposal for rehabilitation of St. Inez drain which is the major drain of the city has been prepared by CCP to be taken up for future.

However, there is absence of city level adaption strategies formulated to counter the impacts of climate change at the CCP level based on the indepth study of the potential threats due to climate change in the city.

Adaptive capacity is the ability of a system to adjust to climate change (including climate variability and extremes) so as to moderate potential damages, to fully utilize the opportunities, or to cope with adverse consequences. The study report on Climate Change Resilient Development (CCRD) for Panaji highlights the adaption capacity of the city taking into consideration relevant city level plan documents, state level policies, acts and rules, stakeholder consultations, and discussions with sector experts.

A broad assessment of institutional and policy framework, disaster preparedness, infrastructure and services adequacy, and efficiency was conducted in order to understand the adaptive capacity of the city. Based upon this assessment, structural recommendations and enabling policy, and institutional recommendations have been suggested for resilience planning and increasing the adaptive capacity at city level. Besides this, the DBMS developed as part of this study provides baseline information for 10 sectors on coverage, location, capacity aspects. The inventory also colour codes certain data fields to be maintained by the city that will help in formulating and implementing policy and engineering decisions for increasing the adaptive capacity of Panaji. This inventory can further be refined/ developed in consultation with multiple departments/sectors to include several other infrastructure planning parameters as relevant to the particular city. The study also recommends a

detailed analysis of critical infrastructure sectors to understand the obstacles, barriers, or limitations that affect the city's ability to respond to climate and non-climate stressors, disasters, or impacts to implement measures for increasing its adaptive capacity.

Having identified the vulnerable areas and sector wise infrastructure assets and services, broad recommendations addressing specific sectors of the city have been formulated and suggested. The recommendations are said to have been 'broad' since structural adaptation interventions as well sector-specific adaptation interventions would need expert advice, planning, and detailed analysis, both technical and financial, to arrive at a decision for implementation.

Table 82: Recommendations w.r.t specific city infrastructure sectors

Broad Recommendations	Sectors addressed
Addressing the safety and resilience of the critical man-made infrastructure	<ul style="list-style-type: none"> ■ Social Infrastructure ■ Solid waste management ■ Heritage and Tourism ■ Water supply ■ Transport ■ Sewerage & drainage ■ Energy & Telecommunication
Addressing the safety & resilience of natural infrastructure	<ul style="list-style-type: none"> ■ Khazan Lands ■ Mangroves ■ Sand dunes ■ Creeks
Supporting and enabling measures	<ul style="list-style-type: none"> ■ Planning measures ■ Regulations & institutions ■ Capacity building and awareness generation

Source: Climate Change Resilient Development (CCRD), TERI, 2014

In addition to this, the study also highlights the primary enabling and supporting considerations like institutional and regulatory frameworks, financing mechanisms, and capacity-building, which would be required for planning of new infrastructure or retrofitting/climate proofing of the existing one. The Table below presents the key structural and non-structural measures and key data fields suggested for addressing the future sea-level rise and current and future vulnerabilities associated with SLR in the city.

Table 83: Sector wise key structural and non-structural measures and key data fields

Sector	Structural measures	Non-structural measures	Suggested data fields
Ecologically Sensitive Areas (khazan lands; mangroves; creeks)	<ul style="list-style-type: none"> ■ Rehabilitation and preservation measures around sand dunes and mangroves. For instance, plantation of vegetation along the dunes can help restore and stabilize 	<ul style="list-style-type: none"> ■ Spatial maps of natural assets like khazan lands, salt pans, mangroves, creeks, etc., should be maintained. The entire shore line ecosystem should be demarcated in 	<ul style="list-style-type: none"> ■ Sea-level rise will change the coastal morphology and soil characteristics. Cities must, therefore, maintain beach erosion information

Sector	Structural measures	Non-structural measures	Suggested data fields
	<ul style="list-style-type: none"> dunes. ■ Immediate need of identifying and curbing the point and non-point sources of pollution along its course, de-silting, and cleaning of the creek 	<ul style="list-style-type: none"> a GIS framework ■ The natural assets of the city should be demarcated and preserved and no construction /man-made interventions should be allowed in the ecologically sensitive areas 	
Solid Waste Management	<ul style="list-style-type: none"> ■ Introducing water proofing measures, like barriers to reduce contact from flood water, waterproof covers and rain shelters ■ Creating elevated storage spaces 	<ul style="list-style-type: none"> ■ Framing up of siting regulations (for landfill sites, sorting centres and compost stations) after assessing the vulnerable areas with respect to the impact of sea-level rise ■ Identifying a number of alternate disposal sites in case of restricted access due to flooding 	<ul style="list-style-type: none"> ■ Elevation of important disposal and treatment sites ■ Location of curb side refuse collection bins, primary collection, and segregation centres ■ The bins and centres located in flood prone areas
Water Supply	<ul style="list-style-type: none"> ■ Prevent water leakage and infiltration of flood water into the pipelines— marking and monitoring the infiltration points to facilitate maintenance 	<ul style="list-style-type: none"> ■ An emergency supply plan with demarcated network routes as well as alternate modes of supply to restore water supply in the affected zones ■ Quality monitoring has to be frequently carried out during rainy season. 	<ul style="list-style-type: none"> ■ Data on the age and capacity of treatment plants ■ Data on incidences of shutting down of pumps ■ Influent and effluent data from the treatment plant ■ Emergency supply plan ■ Seasonal reports on water quality should be maintained ■ Regular maintenance
Sewerage and Drainage	<ul style="list-style-type: none"> ■ The vertical elevation of the outfall channel should be above the high tide level to avoid back flows from sea 	<ul style="list-style-type: none"> ■ Identifying alternate energy sources in vulnerable zones housing pumping stations ■ Regular 	<ul style="list-style-type: none"> ■ Data on flood-prone areas ■ Yearly data on water logged areas ■ Locational details of drainage

Sector	Structural measures	Non-structural measures	Suggested data fields
	<ul style="list-style-type: none"> ■ Planning the gradual augmentation of the sewerage system—New drains to take into account the vulnerable zones of the city and appropriately in-built resilience features 	<p>maintenance – The drains must be cleaned periodically to avoid blockages during peak time</p> <ul style="list-style-type: none"> ■ Integrating vulnerability assessment and resilience planning in institutional framework and plans, acts, rules, bylaws, building codes, etc. 	<ul style="list-style-type: none"> ■ Height of outfall sewers from the mean sea level/ high tide level ■ Maximum capacity of pumps and treatment plants ■ Distance of waste water plant from sea
Transport	<ul style="list-style-type: none"> ■ Retrofit and adaptation of airport and sea port systems ■ Appropriate design of public transport systems— siting, entry and exits, drainage, manholes, considerations for safety of structures, equipment, and operations. ■ Building elevations and materials for structural safety ■ For transport networks, appropriate drainage provisions with optimum design capacity, length, depth, and the gradient are required ■ If the parking lot is not to be used for retaining water, provision of drains, impervious surface area and adequate slope at strategic locations to prevent flooding and water logging 	<ul style="list-style-type: none"> ■ Emergency transport arrangements and alternative route planning— SOPs ■ Emergency operations and control measures— SOPs ■ Planning new infrastructure: avoiding low-lying vulnerable hotspots ■ Integrating vulnerability assessment and resilience planning in institutional framework and plans, acts, rules, by-laws, building codes, etc. ■ Enforcement of CRZ Notification 2011 while development and siting of transport infrastructure and network ■ Siting of processing and industrial units in and around port areas as per the CRZ Notification 2011 	<ul style="list-style-type: none"> ■ Road infrastructure - Location and elevation of roads, bridges, subways, tunnels, etc, data on age, type of structures, building materials, etc., drainage information ■ Railways— Information on location and networks, maintenance plan and frequency, elevation, flood prone areas, data on disruptions due to extreme weather phenomena, data on railway buildings ■ Airport— Capacity, footfalls, age, building material, elevation, plinth level, entry to runway/taxi ways, details of low-lying/ flood-prone areas

Sector	Structural measures	Non-structural measures	Suggested data fields
	would be required		
Social Infrastructure	<ul style="list-style-type: none"> ■ Reducing the impact of flooding through appropriate building design solutions ■ Addressing the requirements after the flood has receded ■ Checking for building stability and efficiency 	<ul style="list-style-type: none"> ■ Planning forevacuation, response and relief in case of extreme events—SOPs ■ Planning new infrastructure: Avoiding low-lying vulnerable hotspots ■ Integrating vulnerability assessment and resilience planning in institutional framework and plans, acts, rules, by-laws, building codes, etc. 	<ul style="list-style-type: none"> ■ Health-Information on location of hospitals and health centres, ambulances, medicine stocks, doctors, nursing and paramedical personnel, yearly data on diseases, etc. ■ Education - Information on location of schools, number of students, available rooms and infrastructure, transport facilities, etc.
Heritage and Tourism	<ul style="list-style-type: none"> ■ Reducing the impact of flooding ■ Addressing the requirements after the flood has receded ■ Checking for building stability and efficiency 	<ul style="list-style-type: none"> ■ Flood proofing and conservation programmes based on expert advice ■ Emergency plan for the safety of the tourists, for example emergency evacuation, safe transport facilities, and health facilities. ■ Assessments regarding impact of sea-level rise on tourism activities for siting of upcoming infrastructure like hotels and beach tourism, etc. ■ All future tourism Infrastructure projects must comply with the Coastal Regulation Zone rules. 	<ul style="list-style-type: none"> ■ Data on intensity of tourist inflows in the city at a particular time of the year ■ Age, condition, and last maintenance carried out in heritage sites ■ An inventory of informal sector that supports tourism should be maintained
Energy and Telecommunication	<ul style="list-style-type: none"> ■ Appropriate building design 	<ul style="list-style-type: none"> ■ Planning new infrastructure: 	<ul style="list-style-type: none"> ■ Location and elevation of

Sector	Structural measures	Non-structural measures	Suggested data fields
	<p>solutions for reducing flood damage in vulnerable areas</p> <ul style="list-style-type: none"> ■ Appropriate on-sitedrainage on production and refuelling stations ■ Maintaining safe heights for infrastructure assets like Electric Substation and for leak-proof equipment storage ■ Appropriate reinforcement measures for the safety and stability of towers and cables/ lines 	<p>Avoiding vulnerable hotspots for siting</p> <ul style="list-style-type: none"> ■ Integrating vulnerability assessment and resilience planning in institutional framework and plans, acts, rules, by-laws, building codes, etc. ■ Enforcing state level Renewable Portfolio Obligation (RPO) in line with The Electricity Act of 2003 for promoting smaller, distributed power generation units to minimize and manage impact on grid and develop climate resilient power infrastructure 	<p>facilities—production sites, substations, etc.</p> <ul style="list-style-type: none"> ■ Details of transmission lines— location of towers, network, underground cabling details for flood prone and low-lying areas

Source: Climate Change Resilient Development (CCRD), TERI, 2014

The International Council for Local Environmental Initiatives ICLEI study on energy and carbon emission profiles for south Asian cities recommended the following climate change mitigation strategies to be adopted by ULBs. The same can be adopted for CCP.

Table 84: Recommended strategies towards climate change mitigation

<p>Street lighting</p> <ul style="list-style-type: none"> ■ Street Lighting Energy Efficiency Programme has high potential of energy savings (20-25%) ■ Retrofit tube lighting system for 40 watt streetlights ■ 100 % timer-based operation and installation of power saver ■ Performance-based contracts for street lighting maintenance ■ Design-based street lighting and LEDs for traffic signals ■ Use of energy efficient fixtures frequent energy audits. ■ Assessment through day light savings and incorporation in the switch on / off timings. ■ Reduction of the luminous levels during night hours (12:00 AM to 6:00AM) 	
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<p>Building and facilities energy efficiency programme</p> <ul style="list-style-type: none"> ■ Implementation of measures for lighting and fans such as micro controller for lights and fans, occupancy sensors, capacitors bank daylight sensors with dimmable ballast, electronic ballast and tri-band phosphor tube lights, etc. ■ Energy auditing at building level 	
<p>Pumping system efficient projects for water supply and drainage pumping stations</p> <ul style="list-style-type: none"> ■ Proper pump system design (efficient pump, pump heads with system head) ■ Water and Energy Audit to reduce UFW Installation of power saver and variable speed driver ■ Power factor improvement, e.g. installation of capacitors, etc. 	
<p>Residential/Commercial and Industrial Sector</p> <ul style="list-style-type: none"> ■ Solar water heating system mandatory for hotel buildings ■ Usage of energy efficient appliances in lighting suchas 25 per cent households replacing at least one 60 watt conventional incandescent bulb with a 15 wattCFL in the next five years ■ Integration of renewable technology to reduce the diesel consumption figure ■ Demand side management programmes such as for efficient appliances, etc. 	
<p>Transportation System</p> <ul style="list-style-type: none"> ■ Improve public transport system ■ Transport management system along major corridors ■ Developing cycle lanes along city roads and implementation of public bicycle sharing system ■ Restriction of vehicles in congested areas and developing multilevel car parks in the high parking requirement areas on pay and park basis. ■ Subsidy to government employees for using public transportation system. 	
<p>Public Awareness</p> <ul style="list-style-type: none"> ■ Creating awareness amongst citizens on suitable renewable energy and energy efficiency technologies ■ Awareness activities for school children on renewable energy and energy efficiency measures 	
<p>Health strategies</p> <ul style="list-style-type: none"> ■ Impart awareness about preventive measures ■ Better bio medical waste handling ■ Better health services in urban slum areas ■ Alert system against viral infections and water pollution ■ Awareness of hygiene, healthy practices, sanitation and spread of diseases ■ Prevention against seasonal disease spread by mosquitoes 	

12.11 Proposed projects

12.11.1 Jawaharlal Nehru National Solar Mission

The Ministry of New and Renewable Energy (MNRE) had launched a program on “Development of Solar Cities” in February 2008. The program has been modified /revised vide no. 5/4/2013-14/SC dated 17th January 2014 for implementation during the 12th five year plan. The Solar City Master Plan aims at minimum 10% reduction in projected demand of conventional energy at the end of five years, which can be achieved through a combination of energy efficiency measures and enhancing supply from renewable energy sources in the city.

A total of 60 cities/towns were proposed to be supported for development as “Solar/ Green Cities”. Panaji is one of the cities under the Development of Solar Cities program of the MNRE.

Under this program, cities are required to prepare a solar city master plan for the city and set up a solar city cell in the city. However as per the documents available in public domain (website of the MNRE) suggest that the DPR for the Panaji Solar city is in progress and the city level solar cell is yet to be constituted by the city. The documents also suggest that the MNRE has sanctioned Rs.43.30 lakhs towards preparation of master plan, solar cells and other promotional activites in the city. Out of the total funds sanctioned by the MNRE, the city of Panaji has received Rs.1.65 lakhs from the MNRE as per the information available in the public domain.

12.11.2 Solar City Master Plan for Panaji

The Solar city Master Plan for Panaji is prepared to envision and implement the scheme as per the guidelines of MNRE.

The study includes the preparation of the present energy baseline of CCP and highlights the energy consumption pattern of the last five years. Further, it assesses the trend of energy consumption in various sectors, based on the projections forecasts future consumption and sets a target for achieving energy efficiency and renewable energy options in the city.

The solar city programme envisage a 10% reduction in conventional energy demand through a combination of various demand side and supply side measures spread across all the sectors by the end of next 5 years. Accordingly, the target for CCP turns out to be equal to 45 Million Units of electricity as the consideration of 10% reduction. The target for the solar city programme for CCP has been taken as to achieve reduction in the demand of electricity equivalent by 45 MU by next five years through various supply and demand side measures in residential, commercial and institutional sectors. It emphasises on adoption of the concept of Green Building & energy efficiency for buildings in residential, commercial, municipal and industrial (Hotel) sector.

The Master Plan includes energy planning in residential, commercial, municipal and industrial sectors. The various renewable energy and energy efficiency strategies and the implementable projects in the city has been identified and taken into consideration for investment. **The total investment estimated under the Master Plan for Solar city in Panaji is Rs 541.33 crores which include Rs 290.32 crores for implementation of renewable energy strategies and Rs 251.01 crores for energy efficiency strategies.**

It also provides a framework to compare and analyze the alternative strategies and policies, in order to facilitate councils review and decision making process. This study has identified biggest potential for energy savings in the residential sector and huge potential for implementation of various solar projects.

13. CULTURAL RESOURCES, HERITAGE AND TOURISM

13.1 Historical Importance of the city

Panaji was a small fishing village covered with dense vegetation, creeks and fields. For centuries, it remained so and was a neglected ward of Taleigao village with the only massive structure, Palace of Adil Shah by the Mandovi River. In 1632 the 3.2 km causeway linking Panaji with Ribandar village known as the "Pointe de Linhares" was built. It was the longest bridge at that time when it was constructed. During this time, against the backdrop of the decline of Old Goa, the idea of Panaji becoming the Capital of Goa slowly gained momentum. The then Viceroy, shifted his residence from Panelim (near Old Goa) to Panaji in the newly re-modelled Adil Shah Fort, since known as "Idalcao's Palace". He began the process of slowly reclaiming land, initiated public projects, drainage systems and was also responsible for many of its government buildings and set the stage for Panaji to evolve into a magnificent city. By a royal decree on March 22, 1843, its status was elevated to a "City" and became the capital of Goa and was called "Nova Goa". There are two old sections of the city existing today, one called "Fontainhas" and the other "San Tome". The hillock overlooking the city is called "Altinho".

13.2 Existing Situation for Heritage (protected and unprotected)

Panaji is the capital city of the state of Goa, and the city has been declared as a heritage city under the JnNURM for urban renewal scheme. The city is spotted as one of the most attractive tourist destinations in India. Panaji is known for its Indo-Portuguese cultural heritage having a number of heritage structures, buildings, monuments and sites of significant importance. The city houses several beautiful residential, institutional buildings having rich architectural heritage. These areas have been designated as conservation/ preservation areas due to the existence of monuments and structures having rich architectural heritage.

The Outline Development Plan 2011 (ODP) of Panaji has declared five areas as "Conservation Zone", and marked as "F" category. They are (1) Campal, (2) Mandovi river fronts (3) Fontainhas & Portais, (4) Altinho and (5) Fonduvem, Ribandar. The area comprises of 62.00 hectares' and works out to be approximately 15% of the settlement area of Panaji Municipal limit excluding the unbuildable slope. The Fig below shows the heritage zones located in the city.

Figure 52: Identified Heritage zones within the city

Source: DPR of Heritage Conservation for Panaji, 2008-09

Mandovi River Front: This consists of the first row of buildings along Avenida Brazil. Land use pattern is heterogeneous with predominance of non-residential use. Rapid development and architectural quality of this area is under threat of rapid change. This is first visual contact with built form of Panaji for all water based activities. At present a nice walkway is developed along river side.

Campal: This also lies along river Mandovi and predominantly a residential area occupied by higher economic group of population. The area is serene and tranquil away from the main hub of activity. Architectural elements such as verandahs, balconies, cornices, windows corners etc. play an important role in the appearance of conservation areas. Opposite to this lies the Kala Academy.

Fountainhas and Portais: This is original cultural center of Panaji. Land use pattern is predominantly mixed commercial , institutional and residential use. Narrow winding roads and buildings with Portuguese architecture makes distinct homogenous group. It has pedestrian access Portais: Consists of many old buildings, predominantly of residential use. This has also scope for expansion of new buildings. If the architectural balance is not maintained, it will ruin the quality of environment.

Ribandar: This area starts from Ribandar, Patto up to Sao Pedro within Panaji Municipal Corporation. This is low density residential area.

Mala: Mala heritage area is also one of the very old residential area consisting of numerous old heritage structures and residential houses. The Mala Lake is also located in this heritage area. These five conservation areas consists of distinct heritage value (comprising of 1000 odd buildings) within the city. There are guidelines that control development in these areas. However, existing laws are interpreted such that only the façade needs to be retained and ineffect even complete demolition of the internal structure is allowed. Further several heritage structures in core city areas are not protected at all and are being demolished to make way for commercial high rises. Increasing traffic

and parking mars the character of this heritage city. Only a small fraction of the true potential of the city's heritage is being currently realized.



Panaji post the 1980's was subject to market forces that have changed the urban image of the city. Goa emerging as a major tourist hub has also influenced the growth trends in cities like Panaji which is the political and administrative capital. The growing demand for built space has circumvented planning and building regulations. New buildings with disproportionate height, scale and character have come up in the city. The heritage buildings are getting abandoned and public places are losing the heritage image. New buildings are built in very different configurations, architectural style, materials and technology. Therefore they hardly compliment the historical character of the city. Some of the age old customs, techniques and tradition are in state of extinction. Natural heritage elements are also in constant depletion. Further bad management of urban systems such as sewage getting into natural water bodies, improper deposition of garbage, urban development conflict the natural systems are also contributing to the loss of natural heritage. Diminishing green areas in the city have caused several environmental problems such as flooding in the low lying areas. Developmental activities and the influx of tourists have put great pressure on the infrastructure of the city.

Conservation of heritage resources needs to be a major trend in the coming period. There has been a major increase in awareness of conservation in the recent periods. With increase of globalization there is also a pressure of safeguarding the local culture which has been the integral part of the indigenous population. The older areas of a city serve as its nerve center and are also the cultural, economic and historical hubs of the city. These areas are often on the verge of transformation to accommodate future needs. The judicious mix of the historical fabric and modern amenities in conjunction is the need of the day.

13.3 Heritage Conservation Initiatives

The Town and Country Planning Department is the nodal agency responsible for the heritage conservation in the city. There are other private institutions like Charles Correa Foundation (CCF) which are working on various proposals for heritage conservation in the city.

13.3.1 Survey and Listing of Heritage Structures

The Town and Country Planning Department (T&CP) has surveyed the structures in the city and listed all the structures and sites in the city having heritage value. As per this list there are about 118 heritage structures/ sites in Panaji itself located in the heritage zones earmarked. Out of these, the ODP for Panaji has included as many as 40 buildings, houses, sites and monuments which needs to be addressed for conservation on priority. These heritage structures and areas have come under threat of the upcoming new developments due to improper approach by the agencies involved in conserving including the people at large.(Refer Annexure 4)

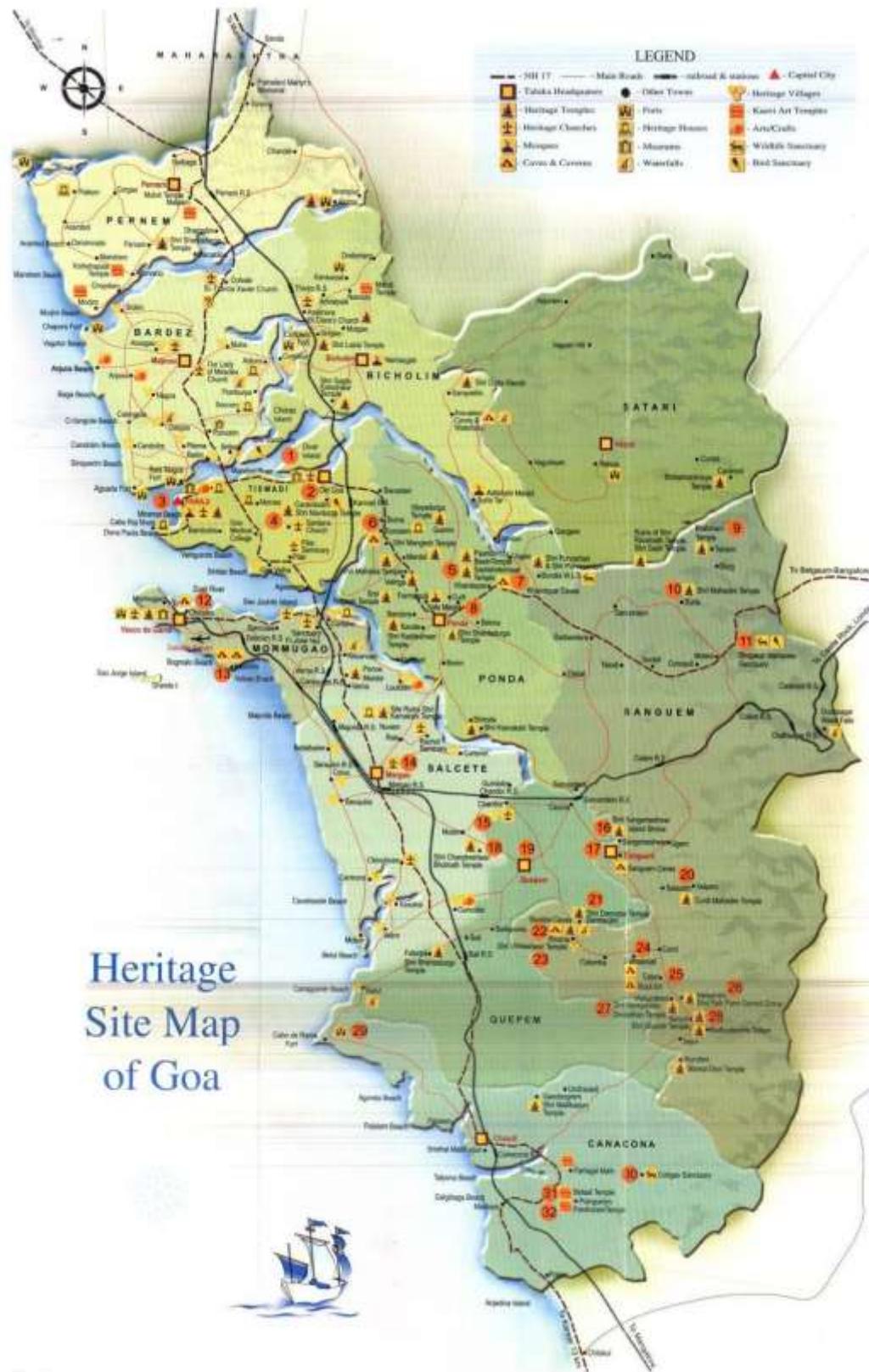
A Detail project report (DPR) has been prepared for the heritage conservation of the prime areas and overall city heritage under the JnNURM funding. The objectives of the DPR for heritage conservation was to re-vitalize the precincts for meaningful and value added use and to formulate a project proposal that is technically feasible, commercially viable, financially sustainable and socially acceptable. The following have been identified as projects for detailed demonstration.

1. Redevelopment of Panaji Church square
2. Conservation of Cabo fort
3. Restoration of our Lady of Ajuda Church and Restoration & Adaptive reuse of HealthCentre
4. Conservation of Cistern
5. Restoration and Adaptive reuse of Masano de Amorim

The DPR for Heritage Conservation for the City of Panaji was prepared and submitted to the MoUD in 2010. It was approved by MoUD with total project cost of Rs 3.62 crores and tendered by CCP in 2013. CCP had received the first installment of Rs 72.45 lakhs from the central government in July 2011 and was issued a completion date of June, 2014. However none of the project components were implemented in the stipulated period and at present the funds have been reversed back to the centre. Although, the DPR for heritage area in the city was a comprehensive and in depth study and needs to be reconsidered and hence the projects proposed in the DPR have been included in the proposed projects under Revised CDP for Panaji. The DPR needs to be reformulated and resubmitted to avail approval and funding under new urban development mission.

The TCPD heritage cell with assistance of CCF has been also working on a project proposal of listing and grading of heritage structures in Panaji. As discussed earlier there are no building regulations for the new constructions in the heritage zones of the city. The present kind of building constructions, elevation facades and high rise structures do not blend with the heritage structures in the city. This will not only disrupt the heritage value of the city but also lead to its extinction in future under the high pressure of urbanisation. This project aims to grade all the heritage structures in the city based on its heritage value and physical condition and formulate building norms which will specify the type of construction permissible in the heritage areas as per these grades. The project proposal has been prepared by CCF and submitted to TCPD for review and comments.

Figure 53: Heritage and Tourist locations in the state



Source: DPR of Heritage Conservation for Panaji, 2008-09

13.4 Tourism Scenario

13.4.1 Tourism Scenario in the state

Tourism is essentially an expression of a natural instinct for learning, experience, education and entertainment. The motivating factors for tourism include social, religious, business interests and quest for knowledge. The economic implications of this phenomenon are wide ranging and capable of influencing the development process. Tourism contributes positively to reconciling environment protection, economic development by creating revenue through economic movement and foreign exchange earnings, contribution to the government revenue, economic and social benefits to the under developed areas, income and job creation, raised living standards and preservation and conservation of natural and cultural environment.

The state of Goa is a tiny paradise with some of the loveliest beaches of the world girdling its 105 kms long palm fringed coast, interspersed with enchanting coves and estuaries against a back drop of green hills covered with lovely woods, rolling down to emerald paddy fields, cool and shady coconut palms, cashew and mango groves. It is dotted with tiny picturesque villages, towns, temples, churches, mosques, forts and monuments which offer a fantastic panoramic view of the unrivaled beauty. It can also boast of its unique and distinctive creations of human imagination and talent from dainty handicrafts to majestic cathedrals, charming baroque villas, nestling amidst gardens to grim forts, the silent eloquent witness of an embattled past. The rich heritage of Goa is expressed in the traditional folk music, dance, drama and literature, colourful festivals, pageants and feasts besides the superb specimen of temple architecture like Mangueshi, Shantadurga, Tambdi Surla, Basilica of Bom Jesus and Se Cathedral otherwise no less renowned as centres of worship and pilgrimage for devotees.

Tourism in Goa has assumed the role of major economic activity having direct and indirect correlation with all other sectors. The tourism sector contributes close to 33% to the state's GDP. About the half a million people are dependent, directly and indirectly on it. It contributes Rs 1500 crores as taxes to the state and centre combined. The state is a unique cultural mosaic with diversity of tourism resources. Planned tourism development in Goa started after Liberation of Territory in 1965. The Goa Tourism Development Corporation was established in 1982 which deals with the operations in the tourism sector and provides budget accommodation, sightseeing tours and river cruises. The Government of Goa has declared Tourism as an Industry with effect from 2000. The Master Plan for tourism development up to 2011 has been prepared while efforts are underway for preparing new Master Plan for the next decade.

Goa has been a major destination on the itinerary of international and domestic tourists. Tourism development is a composite subject. Beaches having been the main assets of attraction, the department has been concentrating and promoting beach tourism. However, presently the Department of Tourism (DoT) has started substituting beach tourism with other hinterland, eco and adventure aspects, which has been a major destination on the itinerary of international and domestic tourists.

The new tourism policy for Goa acknowledges the role of the private sector in the development of tourism infrastructure within the state. The thrust of the policy is on the diversification and value addition of the tourism product while emphasizing on the basic role of the government as a prime facilitator responsible for upgradation of the quality of infrastructure. It also provides encouragement to existing private tourism initiative through an appropriate package of fiscal and friendly taxation measures, generation of an investor friendly environment for new private initiatives through a combination of prompt processes and progressive fiscal and fixation policies. Also, entrust regulatory

measures to ensure social, cultural and environment sustainability by involving local community in the tourism sector for its own benefit and create trained manpower primarily from the local population. Life safety along the beaches has been given a major thrust by deploying trained life guards with the necessary equipments.

13.4.2 Tourism Scenario in Panaji

The capital of Goa and headquarter of North Goa district, Panaji is a small city located on left bank of River Mandovi in serene environs. It is rich in natural scenic beauty, exuberant greenery, attractive beaches, temples, churches and distinctive architecture. All these are a great source of attraction for the tourists. Apart from its natural and cultural resources the city is well equipped with good quality tourist infrastructure and acts as a halting point for the major tourists visiting the state. Its good regional connectivity to the tourist destinations in the state facilitates the tourist's accessibility from the city.

13.4.3 Major Tourist Spots

The city of Panaji is a heritage zone which itself houses important heritage, cultural, eco tourism as well as recreational spots. Apart from this Panaji commands a strategic location in terms of accessibility, approach and infrastructure much further beyond the corporation boundary limit. It is well connected to other tourist spots in North Goa district and serves as the halting point for the tourists with varied class of accommodation facilities. Hence, the tourism sector needs to be studied at a larger perspective to analyze the present trend of tourism economy within the city. The destinations within the city as well as in its vicinity have been discussed and included among the major tourist destinations for Panaji.

13.4.3.1 Eco tourism destinations

Goa has 105 kms long coastline dotted with some of the most exquisite beaches in the world. There are in total 34 numbers of important beaches in North (16 nos.) and South Goa (18 nos.) Out of these Miramar, Bambolim and Dona Paula are three popular beaches located near Panaji.

Miramar Beach – It is located 3 kms from the city centre. It is major recreational area of the city and attracts the tourists visiting the city. This beach is one of the more crowded beaches in Goa, which remains full with local and international tourists throughout the year.

Dona Paula – It is located 7 kms from the city centre. It is the meeting point for two of Goa's famous rivers, Zuari and Mandovi where it offers a pictureque view of the Zuari River and Mormugao harbour. It is one of the very famous tourist destination in the city and also has water sports activities available. The official residence of the Governor of Goa, known as Cabo Raj Bhavan, is situated on the Western most tip of Dona Paula.

Mala Lake: This lake is situated in Panaji on foothill on Ourem road. This place has a scenic beauty and has the potential to be developed as a city recreational space.

Dr. Salim Ali Bird Sanctuary - Close to Panaji located at the western tip of the island of Chorao along Mandovi river Dr. Salim Ali Bird Sanctuary is one of important eco tourism spot in Goa. The sanctuary spreads over 1.78km² area and fully covered with mangrove species. Varieties of local and migratory birds frequently visit the place. Salim Ali Bird Sanctuary is a bird sanctuary named after the ornithologist Dr Salim Ali. The sanctuary,



located in the village of Chorão, near Panaji, plays host to rare and endangered bird species—both migratory and resident

Apart from this the city is located in close vicinity of the major North Goa beaches located in Tiswadi, Bardez and Pernem taluka. They are as listed below.

Table 85: List of major beaches located near Panaji city

S. No.	Name of the beach	Distance from Panaji (in km)	Taluka
1	Sinquerim Beach	13	Bardez
2	Calangute Beach	16	Bardez
3	Baga Beach	19	Bardez
4	Anjuna Beach	18	Bardez
5	Candolim Beach	13	Bardez
6	Vagator Beach	22	Bardez
7	Coco Beach	12	Bardez
8	Morgim Beach	29	Pernem
9	Arambol Beach	35	Pernem
10	Mandrem Beach	32	Pernem
11	Querim Beach	42	Pernem
12	Vaingnanim Beach	06	Tiswadi
13	Siridao Beach	10	Tiswadi

Source: Department of Tourism, Panaji



13.4.3.2 Religious/ Cultural destinations

The city of Panaji has been the administrative, cultural and heritage center of the region since times of Adil Shah and Portuguese. It houses rich heritage and cultural resources which comprises of private mansions, churches, temples, mosque and other administrative buildings built during the time of various rulers. The religious places located within Panaji city are listed below.

Church of Our Lady of Immaculate Conception: The heart of the city is the Praça da Igreja (Church Square) or Municipal Garden with the Portuguese Baroque Our Lady of the Immaculate Conception Church, originally built in 1541. Most important church of Panaji, located on heart of the city

Jami Masjid: Situated on Dr. Dada Vaidya Road, this is one of the important spot in Panaji

Shree Hanuman Temple: Located close to Panaji city is a beautiful red coloured structure distinct from rest of the temples. It is located at Malā on the hill top (Altinho) and its annual jatrā in February is a major attraction of Panaji.

Kala Academy - Kala Academy is a cultural centre known for its structure built by architect Charles Correa. It is a place where Goa showcases its art and culture

Old Goa Heritage Zone: The nearest heritage destination near Panaji is Old Goa. It was founded by Adil Shah and is located on East of Panaji at a distance of 10 km. Under the influence of Portuguese rule, Goa in general and Tiswadi taluka in particular has a number of churches which date back to the 16th century and are best example of Manueline and Gothic architecture. Some of the very important churches are located in Old Goa which has been declared as world heritage structures. The table below lists the churches in Old Goa.

Table 86: List of monuments in Old Goa Heritage zone

S. No.	Name of Churches	Year of Construction	Heritage Importance
1	Chapel of St. Cathedral	1510	World Heritage Monument and 1st Church of Goa
2	Church of St. Francis of Assissi	1510	World Heritage Monument
3	Chapel of St. Anthony	1510	-
4	Church of Our Lady of Immaculate Conception	1541	Major Landmark of Panaji city
5	Church of Our Lady of Mount, Velha	1541	-
6	Church of St. Anne, Velha	1541	-
7	Church of Our Lady of the Rosary	1543	World Heritage Monument
8	Church and Convent of St. Augustine	1572	World Heritage Monument
9	Brasilica of Bom Jesus	1605	World Heritage Monument
10	Church & Convent of St. Monica	1672	-
11	Church of Our Lady of Mercy	1672	-
12	Church & Convent of St. Lawrence	1631	-
13	St. Cathedral	1631	World Heritage Monument
14	Church of St. Cajetan	1656	World Heritage Monument
15	Church & Convent of St. John of God	1685	-

Source: CDP Panaji, 2006

Major temples: The major temples located in the vicinity of Panaji are Shree Mungesh Temple (Ponda Taluk), Shri Gomanteshwar Devasthan (Ela, Old Goa) and Shanti Durga Temple (33 kms from Panaji)

Other tourist attractions include the old and rebuilt Adilshahi Palace (or Idalçao Palace), dating from the sixteenth century, the Menezes Braganza institute, the Mahalaxmi Temple, the Chapel of St. Sebastian and the Fontainhas area—which is considered to be the old Latin Quarter. Panaji hosted the relics of Saint John Bosco (also known as Don Bosco) till 21 August 2011 at the Don Bosco Oratory.

13.4.3.3 Other Tourist destinations

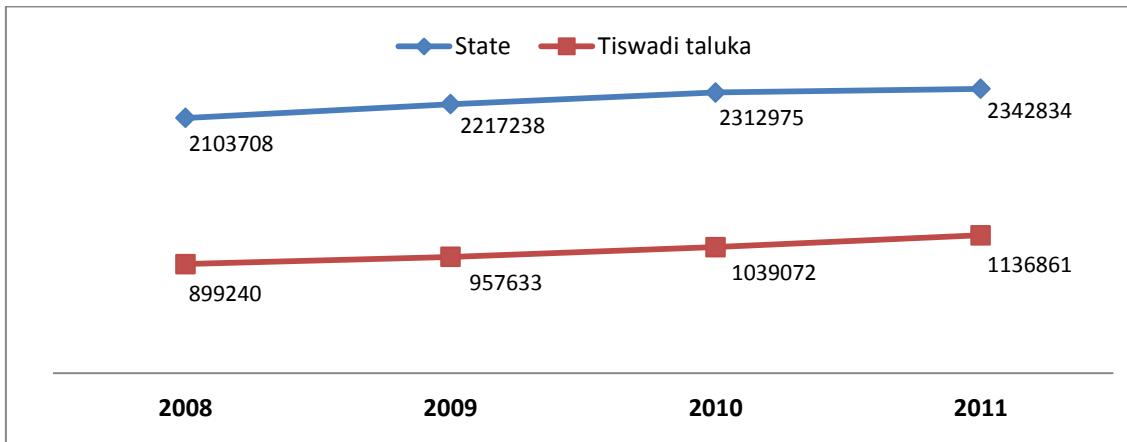
18th June Road - The other well-known tourist place in Panaji is the 18th June Road which is a busy thoroughfare in the heart of the town and a shopping area for tourists and locals.

Goa Science Centre - Also located near Panaji, is the Goa Science Centre which was opened to the public in December 2001.



13.5 Tourist arrival

The tourist statistics from 2008 to 2011 has shown a gradual increase in the number of domestic as well as foreign tourists visiting the state as well as in Tiswadi taluk. However, the state has observed 11% increase in the total tourist arrivals from 2008 to 2011 while Tiswadi taluka has observed 27% increase during the same duration. This is due to the strengthening of the connectivity to Panaji the district headquarters of Tiswadi and state capital, availability of good infrastructure and its vicinity to the tourist destinations in adjoining talukas. The Figure below shows the trend of tourist arrival from 2008 to 2011.

Figure 54: Tourist Arrival Trend, 2008-2011

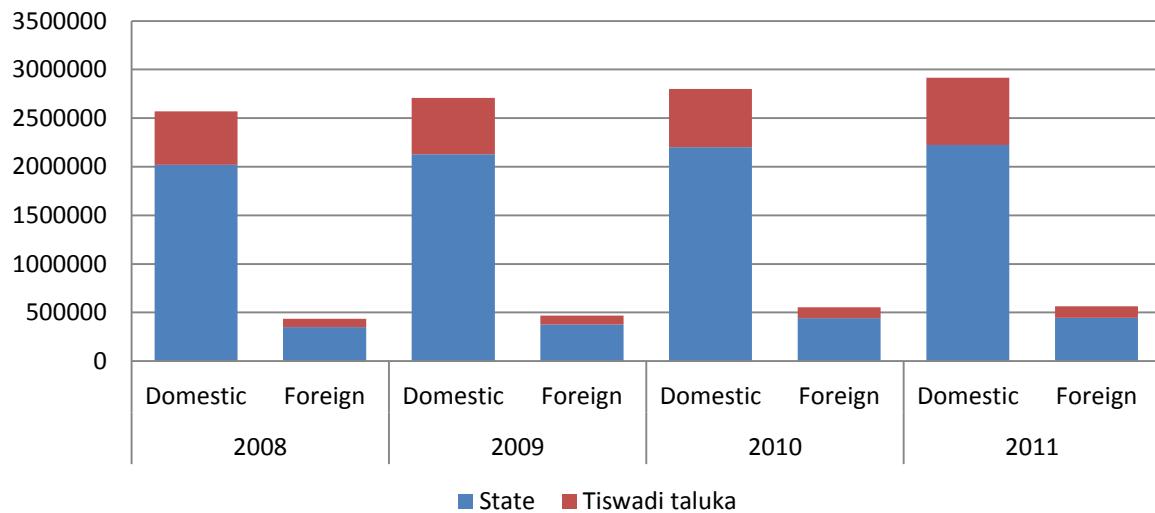
Source: Department of Tourism, Panaji

The review of the domestic and foreign tourists' arrivals for the state and Tiswadi taluka from 2008 to 2011 has shown increase in the foreign as well as domestic tourists. The Tiswadi domestic tourist arrivals w.r.t the state tourist arrivals have increased from 27% in 2008 to 31% in 2011. The foreign tourist arrivals in Tiswadi taluk in comparison to the state tourist arrivals have also shown an increase from 24% in 2008 to 26% in 2011. The Table below depicts the tourist arrival trend for the state and Tiswadi taluka from 2008 to 2011.

Table 87:Tourist Arrival Trend in state and Tiswadi taluka

S. No	Detail s	Annual Tourist arrival							
		2008		2009		2010		2011	
		Domestic	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
1	State	2020416	351123	2127063	376640	2201752	441053	2225002	445935
2	Tiswa di taluka	548117	83292	580993	90175	598019	111223	690926	117832

Source: Goa Department of Tourism, Panaji

Figure 55: Tourist Arrival Trend in state and Tiswadi taluka

Source: Goa Department of Tourism, Panaji

13.6 Tourist Infrastructure facilities

The present accommodation facilities in Tiswadi taluka include 225 numbers of hotels (8% of total number of hotels in state) with 4400 rooms and 8259 numbers of beds. Most of the hotels are located in and around Panaji city. Most of the destinations fall under budget accommodations targeted for the domestic tourists. Goa Tourism Development Corporation (GTDC) facilitates numerous tourist accommodations in various parts of the taluka and city. The Table below lists the number of hotels located in Tiswadi taluka.

Table 88: Number of hotels registered in Tiswadi taluka, 2011

S. No.	Category	Numbers	No of rooms	No of beds	Ratio of no of rooms to no of beds
1	A	15	1506	2600	1.7
2	B	27	873	1546	1.8
3	C	56	1144	2400	2.1
4	D	127	877	1713	2.0
	Total	225	4400	8259	1.9

Source: Goa Department of Tourism, Panaji
The other prominent tourist infrastructures which need to be considered in the city are public toilets, signage, restaurants and parking areas. The present numbers of public toilets are inadequate and needs upgradation. The signage in the city has been provided for directions, parking areas and one-way/two way lanes. However, there is lack of signages for heritage areas, streets, tourist amenities like police station, restaurants, hotels and emergency services. The parking areas are highly inadequate and have being a pain point for the city residents due to the congestion caused by increased floating population in the city.

13.7 Fairs and Festivals

The city of Panaji has a intermix of various religions. The major festivals celebrated are Christmas, Dasera and Holi. The Carnival celebrations in February include a colourful parade on the streets. This is followed by the Shigmo/xigmo or Holi. The Narkāsūr parade on the night before Diwali in the city is very colourful. The city is also one of the most soughted destination among the tourists for new year celebrations. The major national and international events organised in Panaji are as listed below.

International Film Festival - Goa is the permanent venue for the International film festivals and it attracts a lot of national and international film fraternity. This prestigious event is held at the Kala Academy located in Panaji. It is a festival to appreciate film art and understand films of different cultures across the world and hence help to reduce the gap among the cultures of different countries. The state utilises this opportunity to promote its tourism at a global platform. It also serves as a major event for local Goan artist to be recognized by audiences outside Goa and showcase their talent.



Goa International Travel Mart – This event is carried out every year to showcase Goa as a travel destination. It strives to bring about a face to face interaction of the travel-trade, hoteliers, and other stake holders from Goa with leading travel agents from India and abroad.

Goa Carnival - This 4 day extravaganza of fun, frolic, amusement and festivity covers the entire state and the festivities include a parade of colorful floats and troupes of masked revelers attired in gorgeous costumes singing and dancing to lively music that is usually performed live. It offers visitors the opportunity to experience cuisine and culture, through a unique blend of food, fun, local and national live music performances, fashion shows, and entertainment.



Mary Immaculate Conception Church Feast - This feast is one of the major Christian festivals and is held in the very famous and important church of Goa, Our Lady of Immaculate Conception Church. The church is located on a hilltop which oversees the Panjim city. The feast is celebrated all over the state. In Panaji, the celebration goes on for three days. During these three days, there is a fair held in the vicinity of the church that provides a lot of shopping options for tourists. The feast is held in the commemorating the conception of Christ. There is a firework display carried out every night during the feast days.

Shigmo - Shigmo is Goa's answer to Holi, which is a festival of colour. It is the state's biggest spring festival. The festival honours the homecoming of the warriors who had left their homes and families at the end of Dusshera to fight the invaders. Huge dance troupes perform intricate movements of folk dances on the road all through the length of the parade. Many troupes number more than 100 and they dance tirelessly, as they have been doing for centuries.



Goa Arts and Literature fest - The International Centre Goa in association with Government of Goa is organizing a major cultural event at national level with participants from all over

the country. It is held at the International Center at Dona Paula, Panaji.

13.8 Proposed projects for the improvement /potential destinations

The Department of Tourism, Goa has listed the following destinations/ projects which have been taken up presently for tourism development in the state. They are as given below. Out of these two projects viz. multi level car parking and information plaza are being implemented in Patto area of Panaji city.

- Multilevel car parking at Patto, Panaji
- Expansion and renovation of existing tourism jetty
- Baga circuit development is in progress
- Convention centre at Margao
- Information plaza at Patto, Panaji

At present, the project of multilevel car parking and the information plaza at Patto, Panaji is under implementation and will be soon commenced.

13.8.1 Tourist destinations and projects identified

Presently no potential tourist location/sites are located within the Panaji city. The Department of Tourism, Goa has listed the following destinations/ projects which can be taken up in the future for tourism development in the state. They are as given below.

- Bud Bud lake in Netroim village of Sanguem taluka
- Development of Medicinal stream at Collem with provision of basic facilities
- Land acquisition for providing basic facilities at Savem lake, Pernem
- Land acquisition for basic facilities at Palolem island, Canacona taluka
- Land acquisition of Nanda lake at Kakoda Curchorem (for development of eco tourism)
- Heli tourism
- Operation of Amphibian aircraft

Savree waterfall in Netroim village of Sanguem taluka

1. Parking, road widening at Velsao beach
2. To ease parking problem, multi level car parking project in the heart of Panaji city
3. Roadside improvement in the Panaji city
4. Construction of bridge linking Patto Plaza with Neuginagar / Goa Handicraft building
5. Sky walkway in Panaji city at various locations

13.9 Key Concern Area for Tourism Development

- Conservation and preservation measures of the various heritage areas within the city area has been gaining momentum among the city administration as well as the locals.
- The projects proposed for the heritage conservation of the city needs to be given utmost priority by the city administration. This will not only preserve the cultural and heritage of the city but also maintain its global identity. The heritage areas in the city also needs to be marketed and promoted to divert the tourists which arrive mainly for experience of beach tourism.
- Lack of tourist activities highlighting the art, culture and heritage of the city which is one of its most important resource.

- The increasing tourist inflow to the city over the years has been putting pressure on the tourist infrastructure facilities in the city. The core city is subjected to heavy congestion, noise and air pollution, wear and tear of the road network, haphazard parking etc due to increased tourist arrivals. Apart from this, the city also has to cater to additional requirement of drinking water, sewerage system, solid waste management, public toilets etc to cater to the tourist needs.
- The city lacks centralised system of information dissemination which would facilitate the tourists in accessing the various tourist destinations in and around the city, information about the heritage areas, major events, festivals etc which will be going on at a given point of time.
- Lack of proper signage at all the major tourist destination routes showing their interconnectivity within the circuit as well as city level locations viz. heritage areas, streets, police station, hotels, restaurants, emergency services etc

13.10 Heritage and Tourism under 1st Generation CDP – Status Review

1st Generation CDP Report

Parameters	Description
Heritage Importance	<ul style="list-style-type: none"> ■ The city has been designated as heritage area because of their distinct historical and architectural characteristics
Tourists visiting India visit Goa	24%
Total tourist arrivals in Goa visited Panaji in 2004	30.6%
Tourist Accommodation facilities	Out of 2167 hotels in the state, 114 (5%) located in Panaji

Source: CDP 2006

The CDP highlighted upon the following issues

- Internal transportation within city is very congested. There is only one major road available in the city i.e. Dayanand Bandodkar road for all the traffic.
- The cruise point available in Mandovi River is an extension and modification of fishing jetty, which is not at all proper location to handle heavy traffic on evening time.
- Many of the heritage buildings are in dilapidated conditions in the city. No proper conservation initiatives
- The conservation areas were never designed for heavy traffic. The closely built-up areas like Fountainhas, Portais should be given priority for conservation.
- Lack of proper signage along the city routes
- Increasing commercial establishments/ hotels putting pressure on the city infrastructure

The Strategies proposed to achieve the vision are as listed below.

- Heritage Strategy for Panaji incorporating Tourism
- Conservation of natural and build Heritage
- No-plastic zone needs to be practiced
- Tourism calendar needs to be worked upon
- Establishing tourism promotion board and Urban Art Council
- Panaji is linked to festivities / traditional festivals
- Developing Infrastructure for events like IFFI
- Proposed Projects and its components

- The proposed projects and its components under CDP 2006 are as depicted in Table below. A total cost estimate of Rs. 18.42 crores was proposed for the projects for improvement of tourism infrastructure and conservation of heritage value of the city.

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
1	Listing documentation and of tourist places	
2	Provision of tourist infrastructure and facilities	i. Tourist Reception Center/Tourist Information Cell (1 no) ii. Signage & street furniture at all tourist location iii. Development of Campal and Miramar Beach (20000sq. m.) iv. Tourist/ delegate/ artist accommodation center (tourist hostel- 50 beds each) v. Development of theaters within premises of Inox (2 nos)
3	Heritage Conservation Development and	vi. Campal vii. Fontainhas viii. Portais ix. Riverfront Area/ St. Tomb Ward x. Ribander Conservation area xi. Springs at Boca de vaca and Fontainhas xii. Establishment of Panaji Heritage Foundation
4	Other Projects	xiii. Establishment of Urban Art Council xiv. Development of Heritage Walkway

- Source: CDP 2006
- Status of Projects
- The Detail Project Report for Heritage Conservation of Panaji city was prepared in 2010 by Panaji CCP with estimated cost of 39.18 crores and sent for approval to MoUD. However, MoUD approved the project with sanction amount of 3.62 crores in July, 2011.
- Current Status
- Out of the total sanctioned amount of Rs. 3.62 Crores, Rs. 2.90 Crores will be central funding. An amount of 72.45 lakhs has been released on 27th July, 2011. The completion date as per the approval is March, 2014 but it has been not yet utilized for the implementation of the project. The project has not been implemented as per the stipulated time allotted and hence the fund received from centre in first installment has been reverted back.

14. URBAN GOVERNANCE

14.1 Urban Governance System

CCP is agency responsible for city governance in Panaji but there are other state level departments performing urban infrastructure provision and development functions. These institutions can be categorized statutory authorities and government departments.

14.1.1 Institutional Framework in Panaji city

The city of Panaji Corporation Act 2002 has been enacted under the Goa Municipalities Act, 1968. The Act has been implemented taking into consideration the 74th Constitutional Amendment Act. Although the act defines the power, discretionary and obligatory functions of municipality, most of the functions are still performed by the state level departments. Panaji being a small city and Goa being a small state, it is possible for the various state authorities to manage the services at state level. The civic infrastructure, planning and design, construction and execution, operation and maintenance are responsibility of different departments within the city. These departments and authorities are categorized as state level and city level.

The other state level departments involved are Public Works Department (PWD) (Road construction and building department), Public Health Engineering Department (PHED), Goa State Electricity Board (GSEB), Kadamba Transport Corporation (KTC), Directorate of health services, fire service department, Town and Country Planning department (TCPD), North Goa Planning and Development Authority (district/city) (NGPDA), Archaeological survey of India, Goa Housing Board, State forest department and State tourism department. The Table below lists the concerned authorities for various urban infrastructures within CCP.

Table 89: List of concerned authorities for various urban infrastructures in Panaji CCP

S. No	Urban Infrastructure facilities in the city	State/CCP	Concerned Authority
1	Water supply	State	Public Health Engineering Department
2	Sewerage	State	Public Health Engineering Department
3	Solid waste management	CCP	City Corporation of Panaji
4	Storm Water Drains	CCP	SWD design and laying of new drains done by Water Resource Department/ PWD. The SWD within CCP are maintained by CCP
5	Roads	State and CCP	Public Works Department and maintenance by City Corporation of Panaji
6	Street lighting	State	Goa State Electricity Board
7	Public Transport	State	Kadamba Transport Corporation
8	Traffic and Circulation	city	Traffic Police
9	Health facilities	State	Directorate of Health Services
10	Educational facilities	State	Directorate of Education

S. No	Urban Infrastructure facilities in the city	State/CCP	Concerned Authority
11	Fire Services	State	Fire Service Department
12	Parks, Open Spaces	State and CCP	City Corporation of Panaji/ Forest department
13	Master Plan, Land Use, Building Bylaws	State	North Goa Planning and Development Authority / Town and Country Planning Office
14	Slum Development	CCP	City Corporation of Panaji
15	Heritage Building Conservation	State	Archaeological Survey of India / State Tourism Board

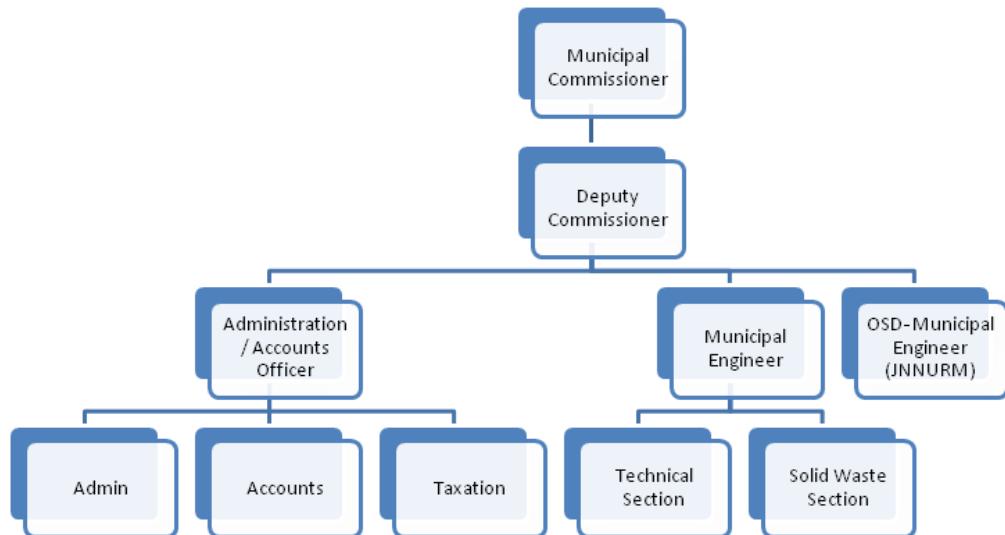
14.1.2 Governing Structure of CCP

The CCP Act, 2002, has been established under the Goa Municipalities Act, 1968. The act has been implemented taking into consideration the 74th Constitutional Amendment Act. Although the act defines the power, discretionary, and obligatory functions of the corporation, most of the functions are performed by the state-level departments due to various reasons. Panaji was accorded the status of a municipal corporation in year 2002 and a governing act, the CCP Act was enacted. As per the CCP Act, 2002, responsibility of CCP is only to the extent of providing services w.r.t. construction licenses, solid waste management, and birth and death registration. The governance structure of the City Corporation consists of 30 elected members and administrative staff.

- a) **Elected Members** - The elected members of the CCP comprises of the Mayor, Deputy Mayor and councilors representing each of the 30 wards. The Deputy Mayor assists the mayor in his duties and is elected from among the councilors. The term for Mayor and Deputy Mayor is five years. Panaji has one MP and one MLA of the local constituency.
- b) **Functional Committees** - The CCP has four functional committees. The prime objective of the formation of these committees is to provide expertise and to oversee the discharging of various municipal functions and services.
- c) **Ward Committees** - The Municipal Corporation of Panaji has a total 30 wards. The formation of Ward committees is essential for ward level or decentralized planning, decentralization of the functions and active public participation. The Municipality constitutes these ward committees and in Panaji, these ward level committees are yet to be formed.
- d) **Administrative Staff** – The administrative staff of CCP includes Commissioner, Deputy Commissioner, Head Technical, Accounts Officer and Taxation Officer followed by technical, clerical and supporting staff.

Human Resource Assessment and Technical Capabilities

The corporation's executive wing is headed by the Municipal Commissioner appointed by the state government for a particular period of time. The Commissioner is assisted by a Deputy Commissioner, also appointed by the state government. Other than Municipal Commissioner, Accountant, Taxation officer, and Municipal Engineer are state cadre and appointment for these posts is carried out by the Directorate of Municipal Administration, GOG. All the Heads of Departments (HODs) report to the Deputy Commissioner. The overall structure of the corporation is given in Figure below.

Figure 56: Organizational Set up of CCP, Panaji

At present CCP Panaji consists of 413 numbers of sanctioned staff for its operation out of which 403 numbers of employees are working. Presently 10 sanctioned posts in CCP Panaji are still vacant. Overall the CCP Panaji has adequate staff strength which is presently operational. The present establishment cost is very high which accounts to 70% of the total revenue expenditure. Post wise details of the staff available in CCP is presented in Annexure 10

14.1.3 Transfer of functions

CCP functions under the ambit of the CCP Act 2002 falls short to meet the challenges of urban development and municipal management.

Table 90: Status of Transfer of Functions under 74th CAA

Sr. No.	12th Schedule Functions	Status of transfer and the name of the agency/s responsible
1	Urban planning including town planning	Preparation of outline development plan – North Goa Planning and Development Authority (NGPDA) and Town and Country Planning Department of Government of Goa (GoG)
2	Regulation of land-use and construction of buildings	Only building plan approval and issuance of construction licence have been transferred to CCP. Preparation of outline development plan and control of land-use in the city is with the state T&CP
3	Planning for economic and social development	Due to lack of adequate and qualified manpower with the municipal corporation, this function has not been transferred to CCP and is delivered by NGPDA under the purview of GoG.
4	Roads and bridges	Prior to the formation of CCP, this service was provided by the PWD of GoG as the corporation was not equipped with adequate technical staff, however even now this service is delivered by the PWD,

Sr. No.	12th Schedule Functions	Status of transfer and the name of the agency/s responsible
5	Water supply- domestic, industrial, and commercial	During the discussions with the officials of the CCP it is understood that, prior to the formation of the CCP, water supply was provided by the PWD of the GoG as the corporation was not equipped with adequate technical staff, however even now this service is with delivered by the PWD,
6	Public health, sanitation, conservancy, and SWM	Only solid waste management service is provided by CCP and other functions w.r.t. public health and sanitation are delivered by the state public health department.
7	Fire services	The state government is of the opinion that specialized services such as fire services should remain with the respective state departments due to lack of technical capacity, and financial constraints of CCP. The Department of Fire and Emergency Services, GoG, is currently delivering this function in the CCP area.
8	Urban forestry, protection of environment and ecology	Urban forestry and protection of the environment and ecology are specialized services and require training and qualified manpower. CCP does not have institutional capacity to deliver this function; thus, as per the opinion of the state government, this service should be handled by the Forest Department, GoG.
9	Safeguarding the interests of weaker sections of the society including the handicapped and mentally retarded	This function has not been transferred to CCP and is delivered by the Department of Social Welfare, GoG.
10	Slum improvement and up-gradation	This function is with CCP. As per the discussions with the department officials, there are no slums in the CCP area, but slum-like settlements exist in the fringe area of the city. For up-gradation of services in these areas, CCP has prepared a project for Basic Services for Urban Poor (BUSP) under Jawaharlal Nehru National Urban Renewal Mission, however CCP is yet to prepare the DPR.
11	Urban poverty alleviation	This function has been transferred to CCP.
12	Provision of urban amenities and facilities- parks, gardens, and playgrounds	This function is jointly managed by the CCP and the State forest department.
13	Promotion of cultural, educational, and aesthetic aspects	This function has not been transferred to CCP and is delivered by the Goa Educational Development Corporation, GoG.
14	Burials and burial grounds, cremations, cremation grounds and electric crematoriums	This function has been transferred to CCP.
15	Cattle pounds, prevention of cruelty to animals	This function has been transferred to CCP.
16	Vital statistics including registration of births and deaths	This function has been transferred to CCP.

Sr. No.	12th Schedule Functions	Status of transfer and the name of the agency/s responsible
17	Public amenities including street lighting, parking lots, bus stops, and public conveniences	Street lighting function has not been transferred to CCP and is delivered by the Goa State Electricity Board. Urban transportation in the CCP area is managed by the Kadamba Transport Corporation, GoG.
18	Regulation of slaughter houses and tanneries	This function has been transferred to CCP.

14.1.4 Status of JnNURM implementation

Public disclosures

CCP is presently not disclosing the information of balance sheets and budget copies on its website. However, the procurement process and tenders related to new works are updated from time to time on the website.

Status of citizen's charter

The citizen's charter has been prepared and disclosed to the public through the website of CCP. The charter is in the form of an informative booklet so as to appraise the citizens about the official procedures. The corporation deals with the following services and the processes to be followed for availing the services provided by the CCP are given in separate sections:

1. Construction licence
2. Occupancy certificate
3. No objection certificate for water/electric/sewerage connections
4. House/property tax transfer
5. Income certificate
6. Trade licence
7. Advertisement permission
8. Taxes (house tax)
9. Certificate of birth and death
10. Information under Right to Information Act
11. Permission to use municipal premises/gardens/public places/hearse van
12. Public grievances

Presently CCP does not mention the timeline in the citizen's charter. Therefore, it is recommended that it should develop a time frame to be allotted for disposing complaints pertaining to various services and other citizen grievances.

Governance and Training

There is no training calendar prepared or training provided by the corporation. CCP has not carried out a training need assessment for any of its departments. CCP needs to frame a detailed HR policy for recruitment, promotions, leave, attendance, and for providing training to all its employees.

The Table below highlights the training programmes at various levels of staff cadres, the staff which needs to be imparted training programmes and at present its level of availability in the CCP as well as other concerned departments. In CCP at present the staff is neither been sent for any kind of training nor any training programs are arranged internally. This aspect needs to be prioritised for better governance of its functions in future.

Table 91: Trainings received by the Staff of CCP

Field	Staff Grade	Departments	Training Programmes	Availability
Personality Development	Class-I&II	Accounts, Municipal Engineer, Taxation, GAD	Personality Development	NA
Computer Programming	Class-I,II&III	Accounts, Municipal Engineer, Taxation, GAD, Waste Management Cell, Construction License, PWD	Computer Programming	NA
Technical Training	Class-II&III	Construction License, Waste Management Cell, Property Tax, PWD	Technical Training	NA
Management Training	Class-I	Municipal Commissioner, Accounts, Municipal Engineer	Management Training	NA
Accounts and Financial Management	Class-II	Accounts and Taxation	Accounts and Financial Management	NA
General Governmental Proceedings	Class-II & III	All departments	Online database management of the various projects/proposals	NA
PPP in Urban Service Delivery	Class-I&II	Accounts, Taxation, Municipal Engineer, PWD	PPP Inventory and project formulation	NA
GIS Based Property tax administration	Class-II & III	Taxation	GIS operations and assessments	NA
Urban Planning and efficient land use management	Class-I&II	Municipal Engineer, NGPDA	GIS Mapping	NA
Grievance Redressal Mechanisms	Class-I&II	Taxation, Accounts, Municipal Engineer, PWD	Online data base system management	NA

Source: Panaji CCP

14.1.5 Progress in implementation of urban reforms

As mentioned, CCP is not part of the JnNURM scheme. However, CCP has taken initiatives to implement the reforms at the city level. Following is the status of mandatory reforms at CCP.

Table 99: Mandatory Reforms status

	Reforms	Commitment Year/ Status	Status Update
L1	e-Governance setup	2007-08	Only e-tendering is made compulsory by the state government for the works above value of Rs. 5 Lakh. In April 2013, a GIS based e-governance project for the CCP is approved for Rs. 19.79 Crores and not

	Reforms	Commitment Year/ Status	Status Update
			yet implemented
L2	Shift to accrual-based double-entry accounting	2011-12	The State Government issued a Notification amending the Goa Municipal Account Code in January 2008, incorporating the Accrual Based Accounting Formats. The Goa Municipal Accounts Code, 2007 had already been published and the software on this code is prepared by the National Informatics Centre (NIC). Currently the CCP is maintaining cash based single entry accounting system.
L3	Property tax (85% coverage)	2010-11 (80%) 2011-12(90%)	Coverage : 60% (2012-13) Collection Efficiency : 61% (2012-13)
	Property Tax (90% collection efficiency)	2009-10 (90%)	
L4	100% cost recovery (Water supply)	NA	
	100% cost recovery (Solid waste management)	2007-08	Sanitation fee from each and every household as well as commercial entity is collected by the CCP. Rs. 30 per month is collected from the Household along with the house tax and for the commercial entities, sanitation fees on per month basis is collected which varies from Rs. 100 per month to Rs. 7500 per month based on the type of the commercial entity.
L5	Internal earmarking of funds for services to urban poor	2008-09	No action has been taken towards implementation of this reform as committed in the tripartite Memorandum of Agreement signed with the state and central government.
L6	Basic services to urban poor	2007-08	No action has been taken towards implementation of this reform as committed in the tripartite Memorandum of Agreement signed with the state and central government.

Following sections describes on the status of E-governance implementation at CCP.

Table 100: Status of E-governance

Module	Status	Remarks
Property tax	Partially Implemented	Only database and bill generation activity is computerized.
Accounting	In progress	Software developed by the National Informatics Centre (NIC). Customization of software is in progress.
Water supply and other utilities	NA	Service handled by PWD of GoG. Computerization is required.
Birth and death registration	Implemented	A computerized system of birth and death registration is in place.
Citizen's grievance	Not Implemented	A manual complaint registration system is in place.

Module	Status	Remarks
monitoring		
Personnel management system	Not Implemented	Human resource records are maintained manually. The module will be implemented under the recently approved e-governance project.
Procurement and monitoring of projects	Partially implemented	Finance Department, GoG, vide its circular in May 2012, has made it mandatory for all corporations in the state to switch to the e-tendering system. There is no module for monitoring of projects.
e-Procurement	Implemented	As above
Project/ward works	Yet to be initiated	A manual process is followed.
Building plan approval	Yet to be initiated	A manual system is in place. No steps are being taken for the online approval process.
Health programmes	Yet to be initiated	Functions are with the state health department.
Licences	Yet to be initiated	A manual system is followed currently.
Solid waste management	Yet to be initiated	Currently, no tracking of vehicles is being done.

Table 100: Following is the status of optional reforms

	Optional Reforms	Commitment Year/ Status	Status Update
01	Introduction of Property Title Certification System	2009-10	No action has been taken towards implementation of this reform as committed in the tripartite Memorandum of Agreement signed with the state and central government.
02	Revision of building byelaws – Streamlining the approval process	2008-09	Maximum time limit for approval of building and receive a construction licence has been set to 60 days by the CCP and detailed process of the process has been incorporated in the citizen charter which is available on the CCP website.
03	Revision of building byelaws - Mandatory rainwater harvesting in all buildings	2008-09	<p>The Government of Goa, through the Official Gazette, published in September, The Goa Land Development and Building Construction Regulations, 2010 has made mandatory for the buildings to have rain water harvesting facility. The details of which are presented below;</p> <ul style="list-style-type: none"> ■ Public Buildings with area more than 1000 m² ■ Institutional Building Complexes with total built up area of more than 1,000 m² and ■ Private Buildings of more than 20 dwelling units <p>Water available from such storage facility is used for secondary uses such as flushing of WC, gardening/landscaping car washing etc., through a separate parallel line in the plot/premises. The payment of subsidy on reimbursement basis to the owners of the building on the expenditure incurred for cost of structures constructed for roof top rainwater harvesting structures would be done by</p>

	Optional Reforms	Commitment Year/ Status	Status Update
			the Water Resource Department, Government of Goa as per their notified policy.
04	Earmarking 25% developed land in all housing projects for EWS/LIG	2008-09	No action has been taken towards implementation of this reform as committed in the tripartite Memorandum of Agreement signed with the state and central government.
05	Simplification of legal and procedural framework for conversion of agricultural land for non-agricultural purpose	2009-10	The simplified process has been adopted and published in the Citizen Charter of the District collector's office.
06	Introduction of computerized process of registration of land and property	2010-11	No action has been taken towards implementation of this reform as committed in the tripartite Memorandum of Agreement signed with the state and central government.
07	Byelaws on reuse of recycled water		No action has been taken towards implementation of this reform as committed in the tripartite Memorandum of Agreement signed with the state and central government.
08	Administrative reforms	2008-09	No action has been taken towards implementation of this reform as committed in the tripartite Memorandum of Agreement signed with the state and central government.
09	Structural reforms	NA	Municipal Cadre has been created, Municipal Engineer, Accountant is recruited directly by the Directorate of Municipal Administration.
10	Encouraging public-private partnership	2008-09	No major PPP projects are been implemented in the CCP area.

Source: CCP, Panaji

14.2 Role and Responsibility of various state level Institutions/departments

14.2.1 Public Works Department

The PWD is the line department of the State Government of Goa. It is a functional arm of the government for providing road infrastructure (roads, bridges, flyover, underpass, pathways road over bridge etc), departmental building works, conservation of historical monuments and buildings. PWD (Goa) is responsible for maintenance and construction of state highways, district roads, other district roads and village roads. The department is also responsible for laying of new roadside storm water drains within the city.

14.2.2 Public Health and Engineering Department

The PHED is the line department of the state Government of Goa. It is a functional arm of the government for provision of water supply and sewerage system throughout the state including urban water supply and sewerage facilities.

The PHED is responsible for provision of safe drinking water supply to city. This includes securing water sources, treatment of water, transmission and distribution of water, providing water connections, billing of water charges, disconnections of water charges, repair of damages etc. Implementation of urban and rural water supply projects, Operation and maintenance of urban and rural water supply projects, and water quality testing and monitoring. The department is also responsible for management of dam's marked for drinking water purpose and rainwater harvesting and creating water awareness. The department ia also responsible for design, implementation, operation and maintainence of the sewerage system in the state. PHED is responsible for provision of water supply and sewerage system within the city.

14.2.3 Water Resource Department

The Water Resource Department is in-charge of (i) Major and Medium Irrigation Works (ii) Minor Irrigation Works (iii) Allied sectors of Command Area Development (iv) Flood Control, Anti-Sea Erosion and Drainage Works and (v) Minor Irrigation Works under Hill Area/Western Ghats Development Programme (HADP/WGDP). Other works include Conservation of Water Resources, Water Shed Development and Development of Water Resources for domestic and industrial use. Its Jurisdiction extends over the entire State of Goa. Within the CCP area the maintainence of the major drains is looked after by this department.

14.2.4 Goa state Electricity Board

The electricity department was created as a Govt. Department in the year 1963. The electricity department is the only licensee in the state of Goa for transmission and distribution of electrical energy. The street lights in the all the rural and urban centres in the state are installed and maintained by the department. The switching on and off the streetlights is also done by the department. For new street lights, the village Panchayat or municipality has to pass a resolution and request the electricity department for providing street lights as per Resolution. New fixtures and its type, wattage is decided by the department, considering the requirement of illumination level of a particular location. The department also provides fixtures even without request from village panchayat / Municipality wherever it is essential. The street lighting facilities in the Panai CCP is also maintained by GSEB.

14.2.5 Town and Country Planning Department

The Town and Country Planning Department is statutory body formed under the T&CP Act 1974 and responsible for all the developmental activities under the other relevant Acts, Regulations/Byelaws/Rules framed under them applicable in the state. It is a physical planning and development control department for the state, with an objective to implement various development plans like regional plan, outline development plans/ zoning plans, traffic & transportation plan, conservation area plans, development plans for areas around railway stations, rehabilitation/ layout plans for residential/ industrial developments, landscape planning and listing of heritage buildings/ sites. The city landuse pattern, building byelaws, heritage conservation regulations etc are governed by TCPD.

14.2.6 North Goa Planning and Development Authority (NGPDA)

The North Goa Planning and Development Authority is the planning and regulatory authority under which Panaji CCP is included. The main function of NGPDA is to prepare and prescribe land uses within the city area and to prepare schemes of development and undertake their implementation within the framework of Outline Development Plan proposed for Panaji city. They also regulate and monitor the building byelaws followed as per the ODP.

14.2.7 State Tourism Department

The administration of tourism activities in the state lies with Ministry of Tourism which operates through State Department of Tourism. Other stake holders in Goa tourism are the Goa Tourism Development Corporation (A Government of Goa undertaking) and the Travel and Tourism Association of Goa (TTAG). The Goa Tourism Development Corporation Ltd. (GTDC) carries out tourism commercial activities like conducting sightseeing tours and river cruises apart from operating the hotels under the Department of Tourism. All the tourist spots and related tourist infrastructure in and around the city are developed and maintained by Department of Tourism. Apart from this, it also proposes the tourism policy for the state and maintains tourist related data.

14.2.8 Kadamba Transport Corporation

Kadamba Transport Corporation Limited was set up by the Government of Goa as a company in the year 1980 with the objective of providing safe, reliable, time saving, efficient, comfortable and affordable services to the travelling public. The entire share capital of the company is held by the state government. It is presently responsible for intercity as well as intracity transportation system in the city

14.2.9 Goa Housing Board

The Goa Housing Board is an autonomous body which was constituted under Goa, Daman & Diu Housing Board Act 1968. The objective of the Board is to provide residential house sites and housing facilities to the population at reasonable price. The Goa Housing Board also takes up commercial schemes and allots land for Institutions, and commercial buildings.

14.2.10 Directorate of health services

District Health Services (DHS) has an important role in the provision and administration of health services in the city. The Directorate of Health Services primarily seeks to provide preventive, promotive, curative and rehabilitative health services to the people through primary health care approach. The health facilities in the city are maintained by this department.

14.2.11 Fire Service Department

District Fire and Emergency Service was established in 1984 to provide an efficient and effective fire and emergency services to aid people in distress and to protect the gains accrued through our sustained efforts in the State of Goa. The role of public fire protection service is to save life and property from fire and allied incidents and to minimize the outbreak of fires and its consequential loss within the jurisdiction of its responsibilities. It serves the Panaji city region with provision of fire emergency services in case of fire accidents.

14.2.12 Goa Forest Department

The main objective of the Goa Forest Department is the conservation of the forests in the state. Apart from this, protection of wildlife is another important area in which the department plays a vital role. The forest department has also taken initiatives to promote wildlife/eco tourism to enable people to see and appreciate the rich biodiversity and scenic beauty of the forests in the state. In Panaji CCP, the forest department maintains some parks under its jurisdiction.

14.3 Key Issues

- The CCP is not in charge of all the municipal services pertaining to the city. Presently the various infrastructure facilities in the city are under various state government agencies. This creates problems in taking a holistic approach towards planned development of urban infrastructure in the city.
- Out of the total sanctioned staff of 413 only 403 numbers of staff are filled. There are 10 vacant posts at present mainly comprising the lower cadre posts and administration staff.
- The post of the Admin/ Accounts Officer is vacant presently. The responsibility of the accounts and the property tax management is vested on the accounts and taxation officer which creates the work pressure.
- The National Informatics Centre (NIC) has created software for implementation of the accrual based double entry accounting system (DEAS) in CCP and there is a lack of qualified staff for coordination with NIC for customization of the software as per the CCP requirement.
- The software for the DEAS is also maintained by the NIC but no staff of the CCP is being trained for the maintaining this software. This will create dependence on the external agency for software management.
- Urban planning function has not been transferred to the CCP it is undertaken by the North Goa Planning and Development Authority (NGPDA).
- There are multiple agencies involved in urban planning and building control regulations, outline development prepared by NGPDA, approved by Town and Country planning department of GoG, and building construction licenses given by the CCP.
- No budget provision to implement the master plans within budget of the CCP.
- Manual system for approval of building plans within CCP
- There is a lack of understanding of the urban planning reforms and land-use management practices in CCP. Also, there is no exposure to geographical information system based (GIS) based land-use management practices.
- No mechanism to monitor the implementation of reforms at the CCP level.

14.4 Urban Governance under 1st Generation CDP – Status Review

Pre and Post 1st Generation CDP Scenario

Generation CDP Report

Parameters	Description
Major Issues	<ul style="list-style-type: none"> ■ The civic infrastructures, planning & design, construction & execution, operation & maintenance are responsibility of different departments in CCP. ■ The data base maintenance is very poor and maintained in the form of registers and not computerized. ■ A significant proportion of total municipal staff strength consists of cleaning staff, clerical staff and other non-technical staff.

Source: CDP 2006

The CDP highlighted upon the following issues

- Non-implementation of 74th CAA in spirit-JNN does not have financial/taxation powers, budget to be approved from Department of Local Self Government.
- Devolution of more powers and functions to CCP, in the spirit of 74th CAA.
- High dependency on state government for resources and approvals that is against the spirit of the 74th CAA.
- No transfer of Infrastructure assets / services created by Line department
- Overlapping of functions
- Revenue collection system inefficient.

The Strategies proposed are as listed below.

- Decentralization of urban functions to local bodies and implementing 74th CAA in spirit.
- Establish clarity of roles and responsibilities.
- Training to enhance capacity building.
- Collective action especially in programmes for solid waste management, water resource management, and development of urban poor.
- People's Participation in Governance

Proposed Projects and its components

The proposed projects and its components under CDP 2006 are as depicted in Table below. A total cost estimate of Rs. 1.37 crores was proposed for the projects for improvement of urban governance system along with 18.26 crores estimated for GIS data base of the Municipal Administration and the various infrastructure facilities and land use.

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
1	E-Governance	<ul style="list-style-type: none"> i. E Governance - For efficient management of increasing administrative responsibilities and the welfare activities ii. Preparation of Town planning and Information systems (maps)
2	GIS mapping of Panaji City	<ul style="list-style-type: none"> iii. Municipal GIS(Implementation of E-Governance system for Municipal Administration) iv. Water supply map

S. No	Projects proposed under CDP 2006	Project components and estimate investment in Rs lakhs
		v. Sewerage vi. Storm water drainage vii. Electricity cables viii. Property
3	System Modernization	ix. Modernization of Bus Depot and Workshop x. Medical benefits and equipments to sanitary workers
4	Asset Management System for Water Supply	xi. Procurement and installation of system software consisting of network asset management, operation, and management, demand management, network analysis with optional billing and customer information xii. Geo radar survey for areas in core city and heritage area xiii. Hardware and networking
5	Surveys, Studies and Community Awareness Program	xiv. Preparation of restoration manuals and guidelines xv. Community Awareness and public participation program for Solid Waste Management xvi. x. Create awareness about the long-term value of heritage conservation
6	CapacityBuilding	xvii. Developing a transport planning cell xviii. Capacity building for Traffic Police

Source: CDP 2006

Status of Projects

The Detail Project Report has been prepared by the CCP for implementation of E-Governance as proposed in the 1st Generation CDP. The DPR was sent for approval to State Commission and was approved in 2010 for sanctioned amount of 19.79 crores. It was further sent to MoUD for approval. It was approved by MoUD. There is no implementation of the project proposal till date.

Current Status

The consultant are appointed and CCP is in process of initiating the works for the implementation of projects under E Governance

14.4.1 Proposed Projects as per 1st Generation CDP

The Detail Project Report has been prepared by the CCP for implementation of E-Governance as proposed in the 1st Generation CDP. The total estimated cost for the various projects was 19.63 crores. The DPR was sent for approval to State Commission and was approved in 2010 for sanctioned amount of 19.79 crores. It was further sent to MoUD for approval. It was approved by MoUD and tendered. However, till date the project remains unimplemented. The project proposal now has to be updated and resubmitted to central government to seek approval under the JnNURM -2 scheme. Hence, the project components of the DPR for E-Governance for Panaji have been included in the Revised CDP for Panaji as a major project proposal under the sector of Urban Governance.

15. MUNICIPAL FINANCE ASSESSMENT

15.1 Overview

Urban local bodies (ULB) are service organisations and efficient management of municipal finances is imperative to serve the urban population. The key sources of revenue for ULB consist of taxes, charges and state transfers while the key items of expenditure are staff salaries, establishment cost and operation and maintenance of infrastructure.

The municipal accounts data from the annual accounts of CCP was collected, compiled and analysed for the period from 2007-08 to 2011-12 i.e. the assessment period. The review of finances involves a time series analysis of the receipts and expenditure of the CCP to ascertain the trends and the major sources and uses of funds. In addition to this, certain key financial indicators relating to property tax, water tax, per capita income, per capita expenditure and debt servicing have been considered to assess the financial performance of CCP.

15.2 First Generation CDP– Key Features of Municipal Finance

The 1st generation CDP has provided the financial status of CCP for the review period 2001-02 to 2005-06. The status of revenue account, capital account and collection of taxes and charges is shown below:

Revenue receipts: Share of taxes decreased from 84.5% to 71.1% during the review period.

Revenue expenditure: The establishment expenditure accounted for 12% of revenue expenditure in the review period. The O&M expenditure accounted for 76% of the revenue expenditure on an average in the review period.

Revenue surplus/Deficit: The overall status of revenue account indicated a net surplus of over Rs. 3.0 crores in the financial year 2005 -06.

Capital receipts: On an average, the grants accounted for 50% of capital income and the rest of the capital income were through the sale of land, water/ drainage deposit and other own sources of income. The share of capital account income has increased from 6.6% to 10.1% in the review period.

Capital expenditure: Capital expenditure has been directed towards public health and convenience viz. repair works of storm water drains, construction of public toilets and purchase of SWM equipment.

15.2.1 Key Issues identified under 1st generation CDP

- Overall the share of general account and capital account has increased and share of suspense account has decreased in the overall revenue and capital expenditure of Municipal Corporation of Panaji.
- It may be concluded that the share of general account has decreased and share of capital account and suspense account has increased in the overall revenue income of the Municipal Corporation of Panaji.
- The comparative analysis of the revenue income and revenue expenditure pattern indicates that revenue income has been more than revenue expenditure for the financial years 2001-02, 2003-04 and 2005-06, and on the contrary it has been less for the financial years 2002-03 and 2004-05.

- Absence of proper and effective finance organization structure
- Need for an accrual based double entry accounting system.
- High dependency on funds from the state budget.
- Lack of community participation in budget preparation.
- Need to identify the areas of intervention to augment the revenue for CCP.
- Need for introduction of PPP in various facets of municipal services.

15.3 Status of Key Financial Indicators

Based on the review of the current municipal finances during the assessment period, financial indicators depicting the health of the municipal finances of CCP are assessed. The following table provides a snapshot of the current financial indicators at CCP.

Table 92: Key financial indicators

S. No.	Indicators	Unit	Value
1.	Own revenues as a proportion of total revenue receipts	%	77
2.	Per capita own revenues	Rs	2718
3.	Non-tax revenues as a proportion of own revenues	%	22
4.	Per capita property tax demand – Current	Rs	2985
5.	Coverage for property tax net		-
6.	Property tax collection performance – Current	%	57
8.	Operating ratio (revenue expenditure/ revenue receipts)		1.08
9.	Per capita O&M expenditure	Rs	3873
10.	Salary as percentage of Revenue Income	%	38
11.	Salary as percentage of Revenue Expenditure	%	21
12.	Staff per 1000 population	Nos.	10
13.	Debt Servicing Coverage Ratio		1.18

Source: CCP and Analysis

15.4 As Is Assessment of Municipal Finance

CCP is practicing the single entry system, and recently, the state government has appointed a consultant for migration to Double Entry Accounting System (DEAS). Tally software has been deployed at CCP, data entry has been started, and the training programmes have been conducted for the staff. However, the complete migration to DEAS is yet to be achieved.

In order to review and carry out the municipal finance assessment for CCP, we have split CCP's financials into the following main sections: Revenue Account (RA) and Capital Account (CA). Following sections would provide the detailed analysis and performance of each item.

We have presented below, CCP's Municipal Fund Statement for the period Financial Year (FY) 2008-09 to 2012-13 (herein after referred to as the "analysis period"). The statement provides a snapshot of

the financial position of CCP during the analysis period. The statement has been prepared based on the financial information provided in the budget documents of CCP.

Table 93: Municipal financial status, CCP

Items	2007-08	2008-09	2009-10	2010-11	2011-12	CAGR
	Actuals (Rs. lakhs)					%
Opening Balance		3631.86	2831.14	5239.73	4618.07	
Revenue Account						
Receipt	1015.18	1293.42	1653.79	1766.57	1834.62	15.9%
Expenditure	1356.03	1373.49	1412.93	1828.73	1977.89	9.9%
Operating Surplus/ (Deficit)	(340.85)	(80.07)	240.86	(62.16)	(143.27)	
Capital Account						
Receipt	102.9	3892.79	1092.28	2591.48	9141.16	207.01%
Expenditure	162.78	3446.30	2042.07	1443.18	3599.78	116.85%
Capital Account Status	(59.88)	446.49	(949.79)	1148.3	5541.38	
Extraordinary Account						
Receipt		144.61	142.16	186.28	272.77	23.56%
Expenditure		135.68	131.71	139.02	145.99	2.47%
Closing balance	1062.71	1073.17	1120.42	1247.20		

Source: CCP annual accounts and CRIS Recast

Revenue Income (a combination of General and Water Account) of CCP has grown from of Rs 1015.18 lakhs in FY 2007-08 to Rs 1834.62 lakhs during FY 2011-12, registering a compounded annual growth rate (CAGR) of 15.9%, while revenue expenditure increased at a CAGR of 9.9%.

The capital income of CCP comprises grants from state for development works for various city projects and other funding from JNNURM during the past five years. The CCP receives SFC grants from 11th or 12th finance Commission funding which contributes to 15-20% of the total income which is quite on a lower side and hence it is more dependent on its own revenue and central funding / external agencies. CCP has not availed of any loans for capital expenditure. It is observed that capital income from state and central government is huge and that the capital account is continuously in surplus. This indicates non utilisation of the total funds released by the state/central government for approved projects.

The following sections provide an in-depth review of the revenue and capital account, in order to assess the municipal fiscal status and to provide a base for determining the potential of each of the sources and the ability of CCP to sustain the extent of planned investments identified under the CDP.

15.5 Revenue Account

The Revenue account comprises: (1) Revenue Income, comprising taxes, non taxes, assigned revenues and grants and contributions; and (ii) Revenue Expenditure, comprises establishments, operation and maintenance (on urban basic services) and debt servicing. The Revenue account of

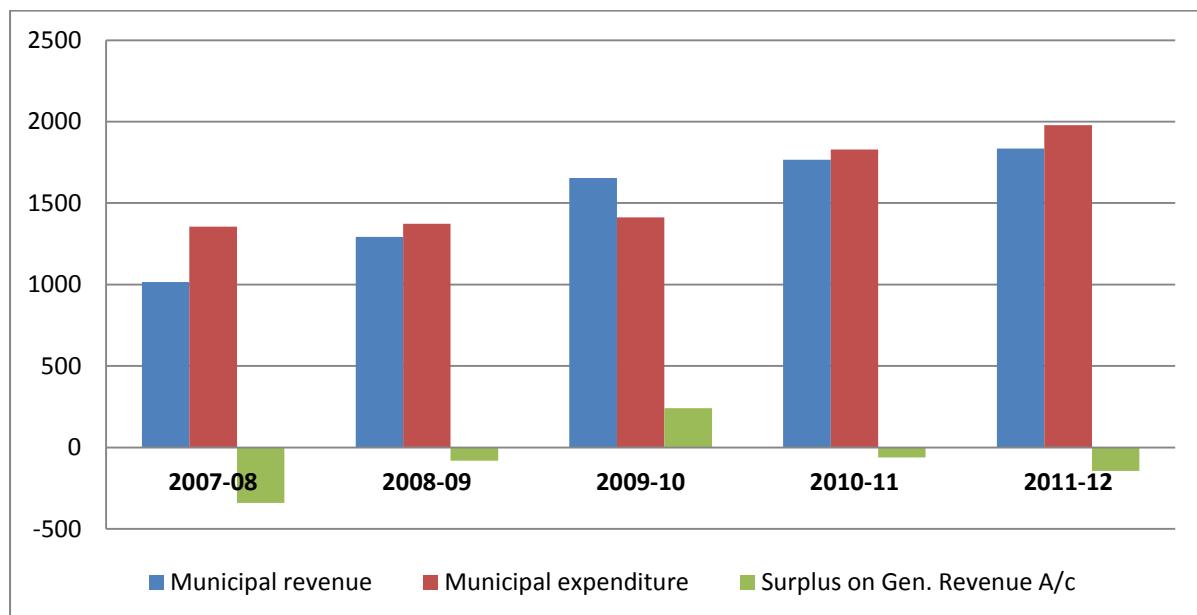
Panaji CCP over the period of last five years shows a deficit except in 2009-10. The Table below depicts the status of Panaji CCP Revenue Account.

Table 94: Summary of Municipal Finance (2007 to 2012)

Particulars	2007-08	2008-09	2009-10	2010-11	2011-12
	(Rs in lakhs)				
Municipal revenue	1015.18	1293.42	1653.79	1766.57	1834.62
Municipal expenditure	1356.03	1373.49	1412.93	1828.73	1977.89
Surplus / Deficit	-340.85	-80.07	240.86	-62.16	-143.27

Source: Panaji CCP and Analysis

Figure 57: Income and Expenditure pattern of CCP



Source: Panaji CCP and Analysis

15.5.1 Revenue Income

The revenue income of CCP can be divided into three parts viz. own source tax revenue, own source, non-tax revenue and Grants (In case of Panaji, mainly it is through its own sources). The own source taxes include property tax, general purpose tax, and scavenging tax. It has shown an increase over the years from 50.8% in 2007-08 to 59.3% in 2011-12. It is a major contributor to CCP revenue. The own source non taxes comprises of income from municipal properties and fees on municipal services (building permissions etc.) It has also shown an increase over the last five years. Its contribution to the total revenue income of CCP has increased from 19.3% in 2007-08 to 28% in 2011-12. The Revenue grants and contribution comprises State Finance Commission (SFC) grants, special establishment grants and other special grants that the state government transfers annually to Panaji CCP. The share of SFC grants has been declining in last five years. It has declined drastically from 15.6% in 2007-08 to 7.2% in 2011-12. About 7.2% of the CCP revenue income is obtained from other miscellaneous sources. The revenue income of the CCP has increased by 81% from 2007-08 to 2011-12. The overall growth rate for revenue income in the CCP over the last five years (2007-2012) is

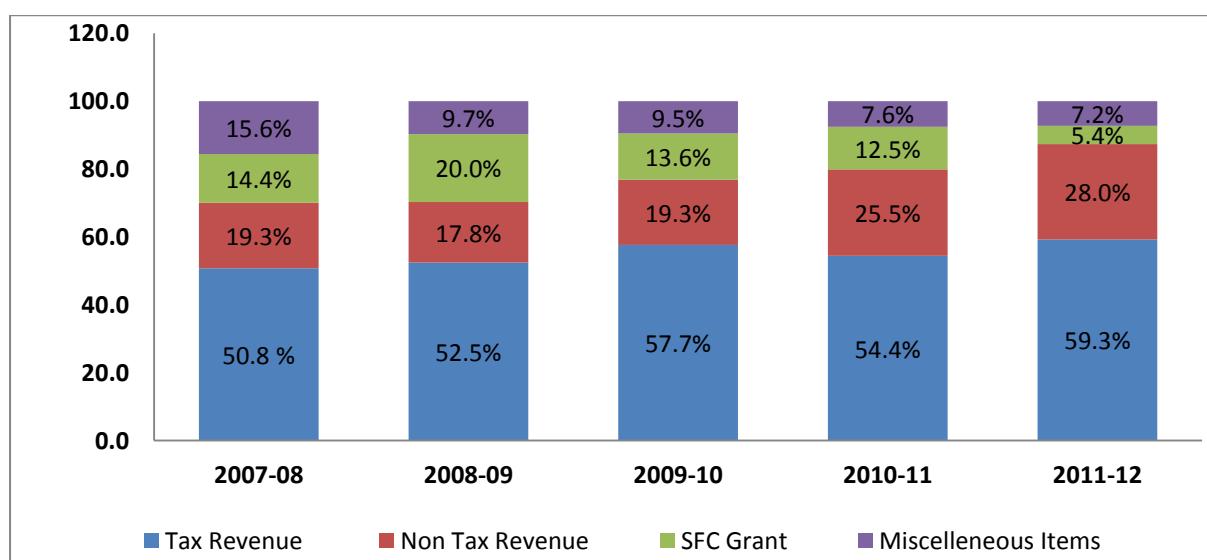
15.94%. There is a considerable growth of 151% in the house tax collection in the last five years. The Table below depicts the revenue income figures under the various sources for the period of last five years.

Table 95: Revenue Income Statement

Particulars	Years	(Amount Rs in lakhs)				CAGR
Revenue	2007-08	2008-09	2009-10	2010-11	2011-12	%
Tax Revenue	515.76	678.86	953.52	961.3	1087.72	20.51
% to total Revenue	50.8	52.5	57.7	54.4	59.3	
Under Special Acts (Recovery of house tax and arrears of others)	0.75	12.36	17.93	24.25	29.74	150.94
% to total Revenue	0.1	1.0	1.1	1.4	1.6	
Revenue from Municipal properties	194.97	218.24	300.54	425.8	484.65	25.56
% to total Revenue	19.2	16.9	18.2	24.1	26.4	
SFC Grant	145.69	258.63	224.57	221.38	99.59	-9.07
% to total Revenue	14.4	20.0	13.6	12.5	5.4	
Miscellaneous Items	158.01	125.33	157.23	133.83	132.92	-4.23
% to total Revenue	15.6	9.7	9.5	7.6	7.2	
Total Revenue Receipts	1015.18	1293.42	1653.79	1766.56	1834.62	15.94
Total Percent (%)	100	100	100	100	100	

Source: Panaji CCP and Analysis

The Figure below shows the revenue share of the various municipal sources for the period of last five years.

Figure 58: Revenue Income (2007-12)


Source: Panaji CCP

15.5.1.1 Demand and Collection

The demand, collection and balance details of Panaji CCP with respect to property tax, signboard/hoarding tax, trade and occupation tax and rent of municipal buildings/plots for the year 2011-12 has been given in the Table below. The collection efficiency of Panaji CCP w.r.t various own source tax and non-tax is only 42% as on 2011-12. The major share of income which CCP obtains from is property tax which shows only 57% of collection efficiency. Other major concern is CCP rental income from the various assets showing only 19% collection efficiency. The collection efficiency from remaining sources i.e. sign board/hoarding tax and trade and occupation tax is 38% and 33% respectively. The city which is the prime centre of tourist influx throughout the year generates subsequent amount of economy from commercial activities. Even then the CCP has not been able to tap this revenue under this taxation. The Table below shows the demand and collection of CCP under various sources for 2011-12.

Table 96:Demand and Collection for CCP, 2011-12

Item	Demand (in Rs.)	Collection (in Rs.)	Balance (in Rs.)	Collection performance (%)
Property tax	119444892	67598037	51846855	57
Sign board/ Hoarding tax	13904407	5313944	8590463	38
Trade and Occupation tax	16042446	5241630	10800816	33
Rent of municipal buildings/plots	72015501	13776327	58239174	19
Total	221407246	91929938	129477308	42

Source: *Panaji CCP*

15.5.2 Revenue Expenditure

The revenue expenditure of CCP can be divided into four categories viz. General administration and tax collection, operations and maintenance, public health and convenience and sanitation and debt servicing. The general administration comprises of expenditure on pay and allowances of elected representatives, salary and other operational expenses related to general administration and revenue collection, pension and gratuity payouts and provident fund contributions. The expenditure share under this has increased from 15.7% in 2007-08 to 20.9% in 2011-12 of the total revenue expenditure. The operation and maintenance expenditure comprises of expenses for public safety like public works and roads, public health and conservancy, vehicle and equipment maintenance. The expenditure share under this has remained almost same except in 2011-12 where it has increased to 1.8% of total revenue expenditure.

The public health and convenience expenditure comprises of equipment maintenance, electricity charges, maintenance and construction of public toilets, development of open space and gardens, markets, petrol and lubricants etc. This forms the major share of expenditure of CCP total revenue expenditure. It has shown decline from 82.4% in 2007-08 to 76.6% in 2011-12. About 0.7% of the CCP revenue expenditure is spent on other miscellaneous items. The debt servicing comprises of interest payments on external borrowings. Presently Panaji CCP does not have any outstanding debt liabilities.

The overall growth rate for revenue expenditure in the CCP over the last five years (2007-2012) is 9.90%. Considering the growth rate under various expenditure heads it has been observed that the growth of public safety (54.38%) and administration expenditure (18.19%) is on higher side compared

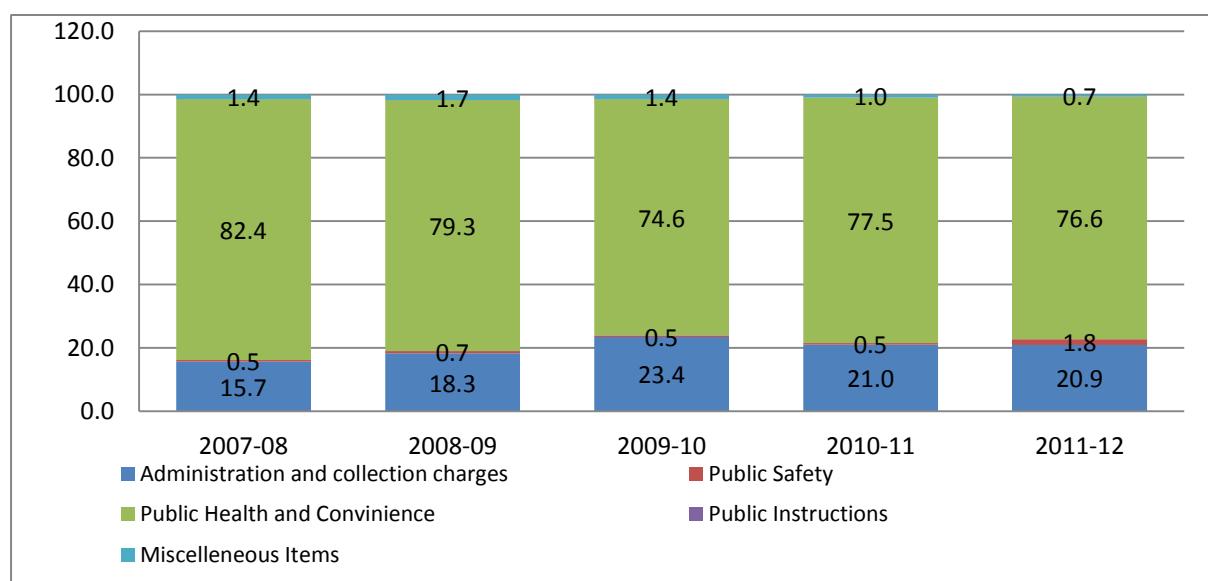
to other expenditure items. The Table below depicts the Revenue income figures under the various sources for the period of last five years.

Table 97: Expenditure Statement

Particulars	Years (Amount Rs in lakhs)					CAGR %
	2007-08	2008-09	2009-10	2010-11	2011-12	
Expenditure						
Administration and collection charges	212.3	250.97	330.58	383.88	414.19	18.19
% to total Expenditure	15.7	18.3	23.4	21.0	20.9	
Public Safety	6.22	9.6	7.41	9.58	35.33	54.38
% to total Expenditure	0.5	0.7	0.5	0.5	1.8	
Public Health and Convenience	1117.2	1088.54	1054.36	1416.66	1514.57	7.90
% to total Expenditure	82.4	79.3	74.6	77.5	76.6	
Public Instructions	1.04	0.5	0.69	0.58	0.79	-6.64
% to total Expenditure	0.1	0.0	0.0	0.0	0.0	
Contributions	0	0	0	0	0	0.00
% to total Expenditure	0.0	0.0	0.0	0.0	0.0	
Miscellaneous Items	19.27	23.88	19.89	18.02	13	-9.37
% to total Expenditure	1.4	1.7	1.4	1.0	0.7	
Total General Expenditure	1356.03	1373.49	1412.93	1828.72	1977.88	9.90

Source: Panaji CCP and Analysis

The Figure below shows the expenditure under the various heads for the period of last five years

Figure 59: Revenue Expenditure (2008-12)


Source: Panaji CCP

The operating ratio of CCP has improved from 1.34 in 2007-08 to 1.08 in 2011-12 owing to higher growth rate of the revenue income (15.9%) than the revenue expenditure (9.9%).

15.6 Capital Account

The Capital account comprises of income and expenditure for and on capital works. The capital income comprises of capital loans, capital grants and contributions and own sources like sale of assets/ properties. The capital income in Panaji has been mainly through state funds and grants under JnNURM. The capital expenditure comprises of all the expenditure on creation of infrastructure works and purchase of plant, equipment and machinery.

It has been observed that the state funds have been utilised for various development works within the city while JnNURM funds have been earmarked for projects proposed under JnNURM. The last two years shows a surplus in capital account which indicates that the funds are not utilised by the CCP for various development works. The Table below depicts the summary of capital/ specific grant receipts and expenditure thereof in the last five years.

Table 98: Details of Capital account

Particulars	Years (Amount Rs in lakhs)				
	2007-08	2008-09	2009-10	2010-11	2011-12
Capital/Specific Grant Receipts	102.91	389.28	109.23	259.15	914.12
a. State Funds	102.91	367.68	107.93	244.56	911.99
b. JnNURM	0.00	21.59	1.30	14.59	2.13
Capital/Sp. Grant Expenditure	162.78	344.63	204.2	144.32	359.98
a. Other Development Works - City Development works	162.78	289.41	187.61	131.17	357.97
b. JnNURM	0.00	55.22	16.58	13.14	2.00
Surplus/ Deficit	-59.88	44.65	-94.97	114.83	554.13

Source: Panaji CCP and Analysis

15.6.1 Capital Income

Capital Income (CI) consists of grants received by CCP under various schemes for capital works and other sources. Key capital grants received by CCP during the analysis period were:

- From Govt for Roads, Flyovers, Bridges & Footpaths
- Others - JnNURM / Central Funding
- Other Sources

Over the period starting 2007-08 to 2011-12, CCP received capital grants worth Rs. 1774.67 lakhs from various sources mentioned in the Table above. CCP has received capital funds every year in the review period from the state and central grants (JnNURM) to take-up the capital works.

In addition to that, CCP has not taken any loans or municipal bonds during the review period. Therefore, the capital income consists of only capital grants received from various sources.

15.6.2 Capital Expenditure

The capital expenditure of Panaji CCP over the last five years has shown expenditure on various city level infrastructure development projects viz. solid waste management, traffic and transportation, water body, basic service to urban poor, heritage/ tourism conservation, urban renewal and urban governance. The total capital expenditure over the period of last five years is 1215.89 lakhs against the total capital grants receipts of Rs 1774.67 lakhs. Thus, only 69% of the capital grants has been utilised by the CCP.

15.7 Salient Features

- Revenue Income has increased from Rs. 1015.18 lakhs in 2007-08 to Rs. 1834.62 lakhs in 2011-12, registering a CAGR of approximately 15.9% over the analysis period.
- The figures indicate that tax and non-tax revenues are contributing around 77% of total revenue income. This indicates a good sign for CCP.
- Property tax is the major contributor to tax revenue which accounts for approximately 57% of tax revenue followed by sign board/hoarding tax and trade and occupation tax is 38% and 33% respectively
- On an average, the operating ratio is 1.08 indicates CCP is not able to manage the Revenue Expenditure.
- Capital account comprises of the capital grants receipts from various Central and state government funding. For Panaji CCP it is mainly through state government funds and JnNURM central government funds.
- The capital account of Panaji CCP for the 2011-12 is showing surplus funds.

15.8 Key Issues and Concerns

- Despite higher revenue income growth compared to revenue expenditure, the CCP has ended up with deficit in revenue account over the period of five years under review except in 2009-10. For the period under review, average deficit was 5.09% of the aggregate revenues from over the assessment period.
- Own revenues accounted for 76.94% of the total revenues wherein tax revenues are accounting to 54.94% and non-tax revenues 22.00% - while only 13.18% was accounted by the revenue grants which are mainly from the state finance commission.
- The aggregated revenue expenditure for the assessment period is 105.09% of the revenue receipts showing a negative balance with 19.86% spent on general administration and 78.08% spent on public health and convenience.
- The revenue receipts are growing at a higher rate (15.9%) when compared to the revenue expenditure (9.9%). However, despite higher growth rate of the revenue receipts, its expenditures are yet to be optimized. In absence of expenditure optimization, the operating ratio has remained 1.08 indicating that CCP is spending more than they earn which results in to non-availability of any surplus to divert towards the capital account as own contribution for undertaking capital works.
- The collection efficiency of various own source tax and non-tax is only 42% as on 2011-12. There are large amount of defaulters and the amount of arrears on the defaulters are substantial. The accounts and taxation officer during the discussions mentioned that in absence of stringent (such as sealing and auction of the property) provisions in the CCP act, without imposing which, it is difficult for the CCP to improve the recovery of tax.

- The property tax shows only 57% of collection efficiency as 2011-12. It was understood based on the discussions with CCP officials that general assessment survey of properties has not been undertaken in the last 8-10 years. And also the information related to the properties in the city needs to be updated.
- Property tax is one of the major sources of revenue for the CCP. It was understood based on the discussions that general assessment survey of properties has not been undertaken in the last 8-10 years. And also the information related to the properties in the city is not updated.
- Out of the total grants received by the CCP over the period of 2007-2012 only 69% has been utilized. This shows that the CCP has not spent the funds allotted for various development works.
- The State capital funding to the CCP is limited to the works related to improvement of roads, bridges, flyovers etc. The share of SFC grants has been declining in last five years. It has declined drastically from 15.6% of the total revenue receipts in 2007-08 to 7.2% in 2011-12.
- CCP received sanction of two projects for implementation with financial assistance under JNNURM. As per the project implementation status under JNNURM for July, 2014 the CCP Panaji has received central grantsinstalments under JnNURM, one for heritage conservation of the city (Rs 362.25 lakhs) in 2011 and the second for water supply system (Rs 7121.83 lakhs) in 2012. Out of the total grant approved the CCP has received Rs 72.45 lakhs and Rs 1424.37 lakhs for the two projects. However, the amount received remains un-utilised by the CCP till date.

16. CITY VISION, DEVELOPMENT GOALS AND STRATEGIES

'Vision' in the context of the CDP is vivid and idealized descriptions of a desired outcome that inspires, energizes, and helps the stakeholders create a future picture of the city with positive changes. It can also be defined as that position which the city aspires to reach in the medium to long term (beyond 5 years but within 15-20 years). It can also be said that vision is a dream with deadlines. It is important that the vision for a city is defined in simple terms, which all citizens can share and identify with.

In the above context, CRIS team had conducted a wide range of stakeholder consultations in the city. Further, the team in association with CCP organized a consultative workshop on 19th February, 2014 at CCP's council hall. The objective of the workshop was to discuss the status and performance of the service delivery and to understand the aspirations of the citizens on city development and framing of the vision for Panaji. The workshop was attended by the various stakeholders of the city. Stakeholder Consultations

The Government of India (GoI) has directed in the revised CDP guidelines to prepare the CDP through a process which is consultative and participatory in which the involvement of stakeholders at the ULB, regional and state level is required. At the Interim phase which included the completion of situation analysis and identification of issues and gaps in the present situation, CRIS team conducted consultative meetings with various stakeholders of the city. The main focus was to discuss about the status and performance of services, aspirations of the citizen on the city development and to ensure a participatory and inclusive development process.

CRIS team carried our discussions with various stakeholders of the city about priority sectors for service improvement. The Table below gives the indicative priority list of sectors to be addressed in the Revised CDP of Panaji.

Table 99: Priority sectors - Revised CDP

Sector	Description	Rank
Traffic management	Road widening, pedestrian pathways, parking lot, integration of transport nodes etc	1
Governance	Efficient administration system in CCP, E-governance	2
Heritage	Conservation of natural and built heritage of the city	3
Environmental conservation	Conservation of water bodies and marine resources, prevention of coastal erosion, reduce levels of air, water and noise pollution, degradation of the natural resources and preservation of the environmentally sensitive zones in and around the city	4
Tourism	Improvement of tourist infrastructure in the city, and develop heritage and culture based tourist attractions within the city	5
Storm water drainage	Proper mapping and assessment of existing storm water drainage system, rehabilitation of the major outfall drains and extension of storm water drains in	6

Sector	Description	Rank
	uncovered areas	
Urban Poverty	Mapping and conducting detail study to identify the urban poor section, provision of basic infrastructure services as well as housing, social security and employment opportunities.	7
Solid Waste Management	Improvement of the present SWM system with provision of efficient solid waste collection, segregation, disposal and treatment.	8

16.1 Focus Group Discussions

The CRIS team has conducted stakeholder consultations with officials of CCP, various parastatals agencies as well as other prominent agencies which are involved in the city development. The study analysis involved one to one discussions with the officials of various departments pertaining to the present scenario of urban infrastructure services in the city inclusive of the sectorwise issues and gaps. Sector wise strategies and project proposals which needed to be included in the city investment plan under Revised CDP were also discussed and further taken into consideration.. The Table below lists the various stakeholders who were involved in the Focus Group Discussions (FGD) process actively throughout the preparation of the Revised CDP Report

Table 100: List of consultations with CCP officials

S. No.	Stakeholder
1	Mr. Sanjit Rodriges, Commissioner, CCP
2	Mr. Mohan. S, CCP
3	Mr. Sachin Ambe, SWM section, CCP
4	Revenue Department officials
5	Officials of General Administration

Table 101: List of consultations with other departments

S. No.	Stakeholder
1	Executive engineers and Asst. Executive Engineers, PHED, Panaji
2	Executive engineers and Asst. Executive Engineers, PWD, Panaji
3	Director, North Goa Planning Development Authority, Panaji
4	Officials of Goa Pollution Control Board, Panaji
5	Director, Fire Department, Panaji
6	Officials of Health Department, Panaji
7	Officials of Education department, Panaji
8	DSP and officials of Traffic department, Panaji
9	Officials of RTO, Panaji
10	Officials of Housing Board, Porvorim
11	Officials of Meteorological department, Panaji

S. No.	Stakeholder
12	Asst. Manager and officials of Department of Tourism, Panaji
13	E.E and A.E of State Electricity Board, Panaji

16.2 Interim Workshop Process

In order to ensure a participatory and inclusive development process, CRIS team in association with CCP organized a consultative workshop in CCP Council Hall on 19th February, 2014 at 10.30 am. The objectives of the Interim stage workshop were to discuss the status and performance of the infrastructure services delivery mechanism in Panaji, city's strengths, weaknesses, opportunities and threats, and to understand the aspirations of the citizens on city development and framing of the vision for Panaji.

The date and time of the workshop were already fixed by the Municipal Commissioner well in advance. The CRIS team with consultation with CCP prepared a list of various stakeholders which were identified as potential stakeholders and invitation letters were sent by CCP on the basis of this list. The participation from various sections of people in the city was also ensured by taking into consideration of builders association and academicians and city level CBOs and NGOs.

The CRIS team approached the CCP one day prior to the workshop to discuss the workshop preparations and the arrangements of the venue of the workshop. CCP had ensured sufficient outreach for the stakeholder workshop through sending formal invitation along with personal follow up with all the departments and various other stakeholders. The confirmations from various departments were received from various departments with vigorous follow up from the consultants and CCP officials. During the consultations carried out prior to the workshop, the relevant stakeholders were apprised on the need for revision of city development plan for Panaji.

The workshop was presided by the Hon'ble Commissioner of CCP and had a turnout of more than 35 participants. The other stakeholders included CCP officials, officials from various departments and representatives from prominent city based organisations. The representative from parastatal agencies like NGTPDA, Kadamba Transport Corporation (KTC), Department of Tourism (DoT), State Electricity Department, Public Health & Engineering Department, Fire Services Department, Public Health Division etc attended the consultation meeting. Other than these, representative from Charles Correa Foundation and eminent citizens also attended the stakeholder workshop.

The workshop was organized at the council hall of CCP and 30-35 stakeholders participated in the workshop. The Hon'ble Commissioner welcomed the gathering and briefed them about the revised city development plan for Panaji. CRIS team made a presentation on the city level assessment and SWOT analysis. Subsequent to the presentation, a brief question and answer session was conducted to address the concerns of the stakeholders.

On the day of the workshop good participation from various stakeholders was observed. The participants have shown proactiveness in sharing their visions for the city development. Following are the key issues and strategies suggested by the stakeholders during the stakeholder consultation.

16.3 Stakeholder Suggestions during Interim workshop

The stakeholder workshop for Panaji CCP prime objective was to take inputs and suggestions from various stakeholders on the study and the projects which needs to be incorporated in the CDP proposal. The following suggestion/opinions were raised during the workshop meeting.

Table 102: Stakeholder's Suggestions

S. No.	Area of Suggestion	Suggestion/ Remarks
1	Traffic and Transportation	<ul style="list-style-type: none"> ■ The city core needs to be decongested in priority. Some ways suggested were shifting of the godowns and whole sale markets, garages etc. would help in achieving the same up to some extent. Traffic and congestion is major issue for the city. ■ The city roads are prone to regular wear and tear hence needs to be upgraded from Water Bound Macadam (WBM) to Cement Concrete (CC) roads. ■ New and best practices power saving and eco-friendly options to be adopted for street lighting like LED lighting
2	Storm Water Drains	<ul style="list-style-type: none"> ■ Flooding in the city is part of natural process due to the geographical settings of the city. However, it was suggested that a Vulnerability Area Study of the City Area w.r.t to flooding and its mitigation measures needs to be prepared to address this issue. ■ Measures to restrict the heavy flow of rain water from Altinho to the city which contributes to flooding during monsoons.
3	Urban Governance	<ul style="list-style-type: none"> ■ Inadequate Capacity building initiatives which needs to be addressed in priority. ■ It was highlighted by the consultants that the SFC funds at present procured and utilised by the CCP is less which needs to be looked into to extract maximum benefit for the development works in the city.
4	Urban Environment	<ul style="list-style-type: none"> ■ There is need to conserve the Mala lake by provision of Treatment Plant and making it usable for drinking water for the city. ■ Development and Conservation of Mala lake

16.4 SWOT ANALYSIS

Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis are an integral part of assessment of city. 'Strengths' and 'Weaknesses' relate to factors internal to the city and indicate the effectiveness and speed with which it can adapt to changes in its external affairs while 'Opportunities' and 'Threats' evaluated and ranked according to the probability of occurrence and the impact its occurrence would have on the development and future competitiveness of the city. The city level SWOT analysis has been carried out based on an assessment of status of service sectors of the city.

The competitive position of the city in terms of efficiency in governance, competitive economic growth, and sustainable development, and infrastructure efficiency, skilled labour has been analyzed to understand the strengths, weakness, opportunities and threats in the city. The competitive position increases or decreases based on the projects/initiatives taken up by CCP and other parastatal agencies. The present competitive position of CCP (as identified by city stakeholders) has been presented in the table below

Table 103: Competitive position of the city

Parameter	Scale	Remarks
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Parameter	Scale	Remarks
Efficiency in Governance	Low	E – Governance mechanisms not yet implemented though efforts are initiated towards its implementation
Competitive economic growth	High	Panaji city is most preferred tourist destination in the state and administrative and economic centre
Sustainable environment	Medium	Efficient Solid waste Management implemented in the city and under further improvement and coverage to be extended to its surrounding areas. Adequate open spaces within the city limits. However, lacks proper measures for traffic management causing pollution, environmental conservation and heritage conservation.
Efficient Infrastructure	Medium	Present infrastructure available to city is being upgraded and efforts towards its improvement taken on periodical basis. New projects initiated under JnNURM and other state funding programmes. Lacks on ground implementation.
Skilled and motivated workforce	High	58% of the population is in working age group. However the total workers percentage in the city is only 43%. Literacy rate in the city is 87% in 2011 while it has a increasing sex ratio over the last five decades (981 in 2011)
Protected Heritage structures/ sites	Medium	The Town and Country Planning Department (T&CP) has surveyed the heritage structures in the city and listed all the heritage structures and sites in the city. Lack of enforcement of heritage regulations in the heritage zones and institutional framework for its preservation. There is high level of awareness among the locals.

16.4.1 SWOT Analysis

The SWOT analysis gives a cursory snapshot of existing potentials that favour the growth of city. Further, The issues major aspects impacting contributing to the city development strengths, weaknesses, opportunities and weaknesses of the city have been identified and are discussed. For these issues the ranking of importance in a scale of high to medium has been developed through interactions with stakeholders and city officials. In case of opportunities and threats, the possibility of occurrence has also been identified.

The city is the state capital for Goa and a major tourist and commercial hub in the district. The city has good connectivity with the urban centres in the state as well as to major cities like Mumbai, Pune and Bangalore. The city has a perennial source of water supply and presently has adequate availability of water for present and future needs. It is also one of cleanest cities in the country with good practices of SWM system. All these factors have great impact on the growth of economic activities and related employment opportunities. The city has potential to become the economic hub with increase in commercial activities and increased real estate investments. Apart from this, its likeliness of the city to be has been selected for under JNNURM JnNURM phase 2 which would certainly have a positive impact on the service delivery within the city. The Tables below lists the major aspects under Strengths and Weaknesses and their level of importance

Table 104: Strengths

Strengths	Importance
State Capital with heritage & cultural importance	High
Acts as the Tourist hub for the state as accessible to tourist spots in the state	High
Panaji city is the regional centre for surrounding rural areas and settlements	High
Regional settings and good inter and intra State connectivity – road, rail, air and waterways	Medium
Availability of surface water source	High
Clean city with best practices of SWM	High

Table 105: Weaknesses

Weakness	Importance
Lack of coordination between ULB and parastatals state agencies	High
Core city is already saturated with high density and congestion related issues	High
Inadequate city infrastructure w.r.t. storm water drains, sewerage, traffic management, parking etc.	High

On the other hand, the city suffers from lack of proper disposal facilities for storm water and sewerage generated. The flooding of the city during monsoons may cause unhygienic conditions and water logging of the roads. Due to the high demand for developable land practice of land reclamation, blocking the natural drain pattern etc. the natural hazards are overlooked and neglected which will cost a huge loss in future in case of its occurrence. The city density is growing year by year with migration from surrounding areas as well as states increasing the demand for better infrastructure facilities within the city and its surroundings. The following table presents the ranking of identified opportunities and threats in terms of impact on the city and the possibility of occurrence.

Table 106: Opportunities and threats in the city

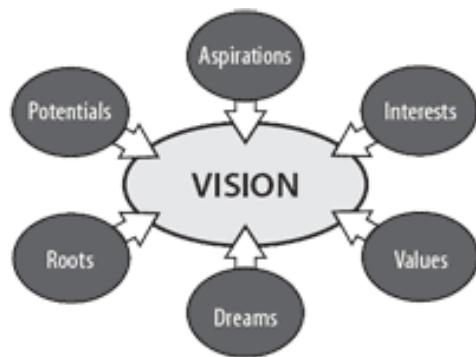
Opportunities	Possibility of occurrence	Impact on city
Development of Tourism, Heritage and cultural potential	High	High
Increase in economic activities/ trade/ commercial activities	High	High
Development of local skills and handicrafts	High	Medium
Increase in Real Estate investments and housing demand	High	High
CBUD project and potentiality to be JNNURM city in the second phase	High	High

Table 107: Threats in the city

Threats	Importance
Environmental degradation– land reclamation, violation of building byelaws, blocking of natural drainage pattern	High
High Migration rate causing increase in population density	Medium
Heavy loss in case of natural disasters	Low

16.5 Vision Statement

Subsequent to the group discussion on the issues and strategies, the discussion was carried out on the city vision. The city vision has been framed based on the common consensus that emerged among the stakeholders during the interim workshop. The vision statement has been framed to balance the competing demands rising from the various sectors as well as from the different stakeholders in the city.



Keeping in view the various economic activities in the city, regional setting with neighbouring cities and the towns, and existing infrastructure status in the city, the vision for Panajicity has framed as:

To develop the city as a clean, environment friendly and ecologically sustainable with a focus on improvement of the city urban infrastructure facilities, tourist infrastructure, conservation of the natural elements and heritage structures by adoption of eco friendly alternatives and techniques”

The city vision has been built on the three pillars of development which are economic growth, quality of life and environmental sustainability. The city of Panaji has been one of the most preferred tourist destinations in the country. The city's prime challenges are proper traffic and transportation system, environmental conservation, climate change resilience, heritage conservation and provision of basic infrastructure like water supply, sewerage system, solid waste management and storm water drains. However, the priority of the city remains provision of adequate provision of basic infrastructure which needs to be addressed in prioritizing taking into account the prime challenges of the city towards a sustainable development model. Development of infrastructure to enhance tourism aspect in the city is also one of the major requirements of the city.

The city has the potential to become model for clean, eco friendly and resource based tourist destination in the country with the development of various adequate and new infrastructure facilities. Hence, the major thrust has been on the enhancement and coverage of various basic services, tourist infrastructure, traffic management, and urban environment, heritage conservation and growth of the economic activities within the city. The Thematic Figure below depicts the vision envisaged for the city.

Figure 60: Thematic Representation of City Vision

16.6 Development Goals

Based on the city level assessment and the city vision framing, the wish list of the citizens has been translated into the development goals with specific strategies of the key sectors. The sectors such as water supply, sewerage and sanitation, solid waste management, storm water drainage, traffic and transportation, urban poverty and slum improvement, local economic development, urban environment, social infrastructure and heritage conservation are covered under the development goals. The development goals have been framed on the basis of priority areas, to achieve the common goals for the city and to meet the desired sector specific service level benchmarks and indicators.

Table 108: Sector-wise developmental goals

Sector	Vision	Development goals	Action points
Local Economic Development	To enhance the city's potential as tourist hub and trade centre	<ul style="list-style-type: none"> ■ Provision of designated commercial and trade areas ■ Provision of good quality tourist infrastructure facilities 	<ul style="list-style-type: none"> ■ Development of commercial areas in the outskirts of the city with advance infrastructure ■ Develop various essential tourist infrastructure in the city viz. well designed signage, designated parking areas, modernised toilet blocks, well planned pedestrian zones, bicycle routes in the core city area etc.
Water supply	To provide 24 x 7 water supply to the city region with adequate water supply, pressure and quality	<ul style="list-style-type: none"> ■ Provide 24 X 7 water supply ■ The quality of the water should meet the CPHEEO standards. ■ Undertake tariff revision and reduction in non revenue water to achieve 100% O&M cost recovery ■ Minimize the energy consumption during water supply operations 	<ul style="list-style-type: none"> ■ 100% water supply network coverage in the city region ■ Move towards 24x7 water supply in a phased manner. ■ Provision of household connections with 100% coverage w.r.t the existing and future population ■ Proper monitoring of the water distribution from the source to the water connections to avoid water losses due to various faults in the distribution network ■ Improvement and repairs of the existing water supply network ■ Proposing new water supply network in uncovered and newly developing areas. ■ Metering the existing connections in a phased manner ■ Introduce water pricing to control its wastage ■ Carry out water and energy audits on regular intervals ■ Awareness programs to be conducted for optimizing the usage of water. ■ To introduce online maintenance and updation of the data pertaining to the number of present meters, applications/ approval for new connection, payment of water bills etc to facilitate speedy and efficient operations
Sewerage and Sanitation	To provide safe and reliable collection, treatment, and reuse/disposal of waste water	<ul style="list-style-type: none"> ■ 100% coverage of sewerage system within the city ■ Replacement of the old damaged pipelines and provision of new network in 	<ul style="list-style-type: none"> ■ Ensure health and hygienic conditions in the city with provision of 100% coverage by Under Ground drainage system within the ciy region. ■ Undertake mapping of the existing sewerage connections and database of septic tanks for effective sludge management in the city ■ Rehabilitation of the existing UGD

Sector	Vision	Development goals	Action points
	towards an eco-friendly approach for the city	<p>uncovered areas.</p> <ul style="list-style-type: none"> ■ Develop decentralised sewerage collection, treatment, and disposal system within the uncovered areas ■ Ensure 100% treatment of sewerage water and safe discharge into the rivers ■ Explore the reuse and recycle of waste water for various uses. ■ Maximize the cost recovery and collection efficiency 	<p>system in the city</p> <ul style="list-style-type: none"> ■ Providing UGD system depending on the topography as well as the anticipated/ estimated phased growth and development for the uncovered population at present and projected till 2041. ■ Provision of community toilets at core city area, public places and markets ■ Provision of low cost sanitation units in the slum households. ■ Explore the recycling technologies for the better use of treated water for various uses viz. fire fighting, urban forestry, agriculture, industrial etc.
Storm water drainage	To provide efficient storm water drainage system in the city	<ul style="list-style-type: none"> ■ Improve the storm water collection efficiency with provision of proper drainage system ■ Rejuvenate the existing natural drainage course and water bodies in the city ■ Rehabilitation and desilting of the major drains ■ Measures to minimize the water logging areas and flooding incidence in the city 	<ul style="list-style-type: none"> ■ Mapping and making database on the existing storm water network of the city, drainage pattern, flooding pattern and changes in course of natural drains. ■ Provision of 100% coverage of storm water drainage in the city ■ Reconstruction / renovation of the existing drains and sizing them according to the storm water load. ■ Redevelopment of natural drains with provision of proper lining, desilting, restrict direct disposal of garbage and sewage, provide green belt along the natural courses etc. ■ Revive the natural water bodies which will facilitate drainage of storm water as per the city's topography. ■ Regular maintenance of the existing storm water drains. ■ Provision of well designed and planned SWD network for uncovered areas as per the natural drainage pattern of the city. ■ Effective implementation of the building bye-laws and development control regulations to avoid constructions along ponds/natural drainage system
Solid waste	Efficient	<ul style="list-style-type: none"> ■ 100% door-to- 	<ul style="list-style-type: none"> ■ 100% door to door collection system

Sector	Vision	Development goals	Action points
management	integrated solid waste management system and complying the MSW 2000 rules	<p>door collection and segregation of waste at source</p> <ul style="list-style-type: none"> ■ Maximize recycling and reuse capacity and minimize disposal at landfill ■ Disposal mechanism should be followed as per the CPHEEO norms 	<p>to be implemented in a phased manner</p> <ul style="list-style-type: none"> ■ 100% segregation of waste at source into decomposable (wet waste) & non-decomposable (dry waste) wastes. ■ Provision of adequate SWM equipments and composting units for proper maintenance. ■ Provision of adequate trained staff and street sweepers for meeting the proposed solid waste action plan ■ Provision of scientific landfill site for disposal of inert waste and integrated SWM. ■ Organizing awareness programmes & IEC campaigns on segregation of waste at source and on environment friendly actions ■ Phased programme to ensure community participation in waste segregation ■ Develop Public Private Participation (PPP) in collection, transportation & disposal
Traffic and transportation and street lighting	To make city a transportati on node for the region with efficient road network and safe, reliable public transport system	<ul style="list-style-type: none"> ■ 100% coverage of road network system with appropriate surface improvement ■ Maximize the share of public transport and minimize traffic congestion ■ Minimize road accidents and improve pedestrian related infrastructure ■ Improve parking facilities across the city ■ Develop eco mobility options within the core city ■ Improvement of the transport nodes and its connectivity to the city 	<ul style="list-style-type: none"> ■ Upgrading all BT roads to CC roads ■ Improvement of the existing junctions and road geometry. ■ Propose new road network required for the future needs of the city ■ Provision of traffic control measures and proper traffic signage to ensure the safety of the vehicular and pedestrian traffic ■ Comprehensive Traffic & Transportation study for the city has been proposed which needs to be brought to implementation. ■ Develop multi-storied parking and paid parking in the congested core city area. ■ Traffic awareness programmes through IEC campaigns ■ Promotion of eco mobility measures in the core city area like pedestrian pathways, public share bicycle system, opting for low emission mode of transport etc. ■ Improvement of the city bus stand with good quality infrastructure facilities on PPP basis. ■ Installing streetlights for the uncovered areas and spacing them as per the

Sector	Vision	Development goals	Action points
		<ul style="list-style-type: none"> ■ Develop water transportation of the city with nearby areas and urban centres 	<ul style="list-style-type: none"> norms ■ Underground ducting for the present street lighting wiring system ■ Replace the existing fluorescent lamp to LED lamps ■ Technology up gradation like auto switch on/ off system to avoid power wastage, online information system to be introduced
Urban Poverty	To provide proper infrastructure facilities and housing for the urban poor section	<ul style="list-style-type: none"> ■ To integrate the urban poor section with the main stream of the society through the provision of basic, physical infrastructure and social service and thus improve their quality of life. 	<ul style="list-style-type: none"> ■ Provision of affordable housing for urban poor residing in vulnerable areas of the city. ■ Provision of adequate number of community / individual water supply connections to cater the needs of the urban poor ■ Provision of adequate community bins/ collection bins ■ Provision of proper drainage system in the slums ■ Provision of adequate number of community toilets ■ Organization of community health education and other health interventions, with focus on maternal and child health, and commonly prevalent diseases in the slums.
Urban environment	To provide a pollution-free and sustainable living environment to the citizens	<ul style="list-style-type: none"> ■ CCP to frame a policy to mitigate the various sources of pollution and conservation of natural resources in the city ■ Develop green zones/breathing spaces in the city to improve the quality of the life ■ Utilize the potential for ecosystem service to improve resilience, subsistence and livelihoods in the city 	<ul style="list-style-type: none"> ■ Urban forestry measures and landscaping along the footpaths in the core city. ■ Detail study of ecologically sensitive areas and features in the city and identification of measures to restrict its future degradation ■ Conservation of lakes/ city level water bodies. ■ Introduce measures to reduce the air & noise pollution due to vehicular traffic in the city. ■ CNG buses to be introduced for public transport system within the city ■ Promotion of Low emission vehicles, bicycles and pedestrian movement in the core city area ■ Awareness programmes and workshops to make the locals and tourists about the conservation of city environs. ■ Revitalization of the old core areas and conservation of the heritage aspects of the city

Sector	Vision	Development goals	Action points
Social Infrastructure		<ul style="list-style-type: none"> ■ Making city well equipped with recreational areas 	<ul style="list-style-type: none"> ■ Improvement of the city parks with good landscaping and developing recreational activities to attract tourists ■ Development of landscaped recreational area around the city level water bodies/ water front
Heritage and Tourism		<ul style="list-style-type: none"> ■ Provide good quality tourist infrastructure ■ Conservation and preservation of the heritage areas and structures ■ To promote cultural and heritage resource of the city ■ Develop new tourist attractions in the city tourist places 	<ul style="list-style-type: none"> ■ Improvement of the road sections in the city linking major tourist destinations - pathways, signage, street lighting, sitting, plantation of trees, proper parking areas ■ Evolve development control regulations for the core city area ■ Provision of adequate signage indicating the destination located in the city and modernised public toilets. ■ Sound and light show at Dona Paula with cultural shows, local cuisine – improvement of the Dona Paula area - ■ Improvement of hill steps at Cortini with proper paving, sitting, lighting, landscaping etc. ■ Development of the Mala heritage area
Disaster Management and Climate Change		<ul style="list-style-type: none"> ■ Develop city based disaster management system ■ Measures for improvement of the city's climate change resilience 	<ul style="list-style-type: none"> ■ Identification and assessment of potential disaster which the city is prone to. ■ Develop well equipped disaster management cell within the CCP which will work on the lines of disaster management proposed for the city ■ Study and analysis of the climate change phenomenon in the city and the major threats which may contribute to it. ■ Develop measures to improve the city's resilience towards climate change ■ Develop an proper institutional framework and policy level measures for effective adoption and implementation of climate change measures

17. SECTOR PLAN, STRATEGIES & INVESTMENT PLAN

City Investment Plan (CIP) in line with the identified vision for the city has been prepared through a comprehensive process of gap assessment and through stakeholder consultation. This assessment has also led to the identification of sector specific strategies, implementation actions, and associated reforms with specific inputs from stakeholders too.

The strategies adopted primarily have three dimensions: improving the service delivery by efficiency measures, improving service delivery by creating infrastructure assets; and improving the governance aspects. This section summarises the capital investments required for creating infrastructure assets and various strategic interventions required in the implementation of such projects.

The phasing of the identified projects and Investments is based on the following principles:

- Priority needs, with developed areas receiving priority over future development areas
- Inter and intra-service linkages, viz. Water supply investments shall be complemented by corresponding sewerage/sanitation improvements
- Size and duration of the requirements, including preparation and implementation period
- Project-linked revenue implications,

The need for the CIP is on account of:

- Assessment of city growth and infrastructure needs
- Scheduling of investments for on-going projects
- Assigning of priorities within the constraints of available financial resources

The CIP is the multi-year scheduling of identified and prioritized investments. The scheduling or phasing of the plan is based on:

- Studies of fiscal resource availability (for new investments and O&M),
- Technical capacity for construction and O&M, and
- The choice of specific improvements to be carried out for a period of four to five years.

17.1 Institutionalizing CIP

The CIP is an important element and is significant in terms of the city's management process and sustainability with regard to the delivery of basic services. The CIP also provides a framework for the annual budget cycle for the future 6-10 year period. The CIP identifies the roles and responsibilities of various stakeholders in the implementation of identified projects. The CIP involves the identification of public capital facilities to cater to the demand of the city population for the medium and long term infrastructure needs.

The project identification has been carried out through a demand-gap analysis and the stakeholder consultation. Further, project prioritisation and strategising of the investments/phasing of investment are based on the strategies listed out under each service sector as identified through stakeholder consultations.

The projects derived are aimed at ensuring the optimal and efficient utilisation of existing infrastructure systems and enhancing the capacity of the systems/services to cater to the demands of future population additions. Certain projects have been identified in consultation with the stakeholders.

The CIP and forecasted future needs for provision of capital facilities under each identified sector are presented below. These assets will help to universalise services for the current population as well as accommodate the expected increase in population.

In sectors where long-term planning is required (for example, source development for water supply, sewerage, etc.), a 25-year planning horizon is considered. Assets created in such sectors consider the projected population in this horizon. These infrastructure assets would not only guarantee services to the citizens but also signal a proactive commitment to potential investors considering the region.

17.2 Water supply

As discussed in the water supply section in the previous chapters, the key challenges are system losses due to old distribution network and uneven water supply distribution across the city. 100% coverage of water supply network is observed w.r.t the existing roads within the CCP area though only 79% of the total household have access to metered household connections. There is a lack of proper mechanism in place for monitoring and evaluation of water losses which accounts results in high NRW to of 35% at present. The gap analysis presents the current deficit in the system and future requirement for the design year 2041.

Table 109: Water Supply Sector Plan

Sector Goals					
Sector Goals	<ul style="list-style-type: none"> ■ Provide 24 X 7 water supply ■ The quality of the water should meet the CPHEEO standards. ■ Undertake tariff revision and reduction to achieve 100% O&M cost recovery ■ Minimize the energy consumption during water supply operations 				
Design Parameters					
Design parameters	<ul style="list-style-type: none"> ■ Base year as 2014 and design year as 2041 ■ Demand estimation based on the projected population for CCP plus the surrounding out growth areas and additional 0.25 lakh population per day (floating population) ■ Daily water supply demand calculated on the basis of daily per capita water supply norm (135 lpcd plus the average water supply losses assumed in a decreasing trend) ■ 100% treatment capacity and minimum 33% of water supplied as storage capacity ■ Distribution network coverage – 100% in habitation areas ■ Cost recovery through user charges (100% operation and maintenance 				
Demand Gap Assessment					
Demand Gap Assessment	Component	Existing Levels	Gap (2014)	2021 (Short Term)	2041 (Long Term)

				Demand	Gap	Demand	Gap
Demand Gap Assessment	Source (Daily Supply in MLD)	24.20	0.00	17.55	-	28.15	3.95
	Distribution network coverage (km)	77.00	0.00		28.31	179.06	102.06
	Elevated Storage capacity (MLD)	10.10	4.26	105.31	-	9.38	-
	Treatment capacity (% of Water Supply)	24.2	0	5.85	-	28.15	-
	Refurbishment of old pipelines	-	-	-	-	-	-
Desired Outcomes							
Desired Outcomes	Component	2014	2017	2019	2021		
	Network coverage to households	79%	90%	100%	100%		
	Per capita supply (lpcd)	198	135	135	135		
	24/7 water supply	25%	50%	70%	100%		
	Quality of water	N.A.	100%	100%	100%		
	Non-revenue water	35%	30%	30%	30%		
	Consumer metering	100%	100%	100%	100%		
Action Plans							
Increase the household level coverage	<ul style="list-style-type: none"> ■ Increase water supply coverage through provision of individual service connections with 100% coverage ■ Provide water supply to newly developed/developing areas and uncovered areas. 						
Water Supply System Rehabilitation Plan	<ul style="list-style-type: none"> ■ This will mainly focus on partial or complete restoration of the existing network with new pipelines. ■ The old, defunct, and inadequate piping system needs to be replaced by a proper distribution network. 						
Comprehensive Water Supply Plan	This will focus on adequate storage, distribution network and treatment facilities for future requirement.						
Operation and Maintenance Plan	<ul style="list-style-type: none"> ■ E Governance mechanism for various O & M functions as well as revenue collections ■ Develop the asset inventory. ■ Training calendar to be prepared and capacity building programmes for the staff throughout the year on O&M of assets ■ Trainings for expenditure control and reduction of O&M cost on key services. ■ Introduce water pricing to control its wastage 						
Monitoring and	<ul style="list-style-type: none"> ■ Proper monitoring of the water distribution from the source to the water 						

Evaluation	connections to avoid water losses due to various faults in the distribution network
Awareness Programmes	<ul style="list-style-type: none"> ▪ Awareness programs/ campaigns to be conducted for optimizing the usage of water.

17.2.1 Capital Investment Plan

Table 110: Projects identified– Water supply

Project	Component	Estimated cost in Rs. Crores	Implementing Agency
A. Source Augmentation	<ul style="list-style-type: none"> ▪ Augmentation of 12.25 MLD additional water source from River Khandepar by 2041 for the city ▪ Provision of raw water pumping main 	18.62	PHED
B. Elevated storage Reservoirs	<ul style="list-style-type: none"> ▪ Development of new ESR (7.38 MLD for 2041) capacity ▪ Shifting of utilities and rehabilitation of existing reservoirs 	16.99	PHED
C. Distribution network	<ul style="list-style-type: none"> ▪ Laying of new water supply distribution network for 2041 	54.18	PHED
D. Other Investments in water based on consultation	<ul style="list-style-type: none"> ▪ Measures for reduction of NRWDesign and implementation of SCADA system for water supply in Panaji region ▪ Implementation of Training program of officials and comprehensive capacity building on smart water management 	8.37	PHED
Total investment (2041)		98.16	
Total investment envisaged for 2021		93.56	

Table 111: Projects Details – Water supply

Project	Proposed Projects
A. Source Augmentation	<ul style="list-style-type: none"> ▪ There is no gap in water supply at present in the existing water supply demand. However, in order to meet the future requirement for the ultimate population of 2021 and 2041, the city requires around 27.26 MLD of additional water for the region including CCP. The existing water supply head works at River Khandepar which is the present source should be augmented.Hence source augmentation works of intake works at Opa Reservoir and laying of raw water mains from Opa to Altinho WTP in Panaji (1.5 km) are proposed.
B. Elevated storage Reservoirs	<ul style="list-style-type: none"> ▪ The future requirement for storage capacity for the design year 2041 has been forecasted to cater to the desired water supply.The capital investment has been envisaged for development of new ESR (7.98 38 MLD for 2041) capacity, shifting of utilities and rehabilitation of existing reservoirs. and refurbishment of old ESRs.
C. Distribution network	<ul style="list-style-type: none"> ▪ It is recommended that the network in newly merged areas be

Project	Proposed Projects
	<p>laid in an incremental manner in the dense settlements. The system may be integrated with the existing transmission and distribution system of the city. The investment has been envisaged for laying of new distribution network requirement for the 2041 demand. and replacement of the old network.</p>
D. Other Investments in water based on consultation	<ul style="list-style-type: none"> ▪ Various measures need to be taken for reduction of NRW. This includes metering of the household connections, water auditing system, revision of water tariffs etc. ▪ Further, in order to prevent transmission and distribution losses, regular water monitoring and SCADA system has been proposed. ▪ The staff needs to be made well versed to use the E-Governance tools and imparted knowledge of best practices which has been done through capacity building programmes.

17.2.2 Possible intervention through PPP

The entire project from distribution to metering of water connections can be developed on Public Private Partnership mode

- Under the PPP model the developer would invest PHED's financial contribution and would take care of any additional cost under the project
- Undertake implementation of capital works and O&M of system
- The entire project can be awarded for a period of 15 to 20 years
- Developers can bid on either tariff required to operate and maintain the project or annuity support from PHED

PHED need to set performance parameters for the private developer which are required to oblige during the contract period. The annuity payment should be a factor of performance parameters achieved by the developer

- The performance parameters would in the area of PHED
- Maintaining daily hours of supply
- Maintaining supply levels as stipulated by PHED
- Maintaining quality of water as per CPHEEO norms
- Improvement in coverage of water supply connections
- Reduction in non-revenue water
- Improvement in collection efficiency
- Frequency of billing of water bills
- No. of complaints received

The above model is indicative. PHED would require to appoint a transaction advisor to undertake adetailed feasibility assessment, preparation of bid documents (request for qualification – RFQ, request for proposal – RFP), and bid process management leading to award of contract to a private developer.Examples in PPP in water sector are listed below.

- Latur water supply – O&M contract
- Chandrapur – BOT
- Bhiwandi - BOT
- Mysore - BOT

- Salt lake Calcutta – BOT
- Khandwa – BOT

17.2.3 Phasing of Investment

Table 112: Project Phasing - Water Supply

Sector/ Component	Invest ment (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018 -19	2019 -20	2020 -21
Water supply	93.56	16.48	22.07	27.27	20.61	5.62	0.00	0.00
1 Source Development (daily supply)	14.46	4.34	4.34	2.89	2.89	0.00	0.00	0.00
2 Provide raw water pumping main	4.16	1.25	1.25	0.83	0.83	0.00	0.00	0.00
3 Distribution Network (% Roads Covered)	54.18	5.42	10.84	16.25	16.25	5.42	0.00	0.00
4 Shifting of utilities and rehabilitation of reservoirs	15.94	4.78	4.78	6.38	0.00	0.00	0.00	0.00
5 Reduction of NRW	1.05	0.32	0.32	0.21	0.11	0.11	0.00	0.00
6 Design and implementation of SCADA system for water supply in Panaji region	37	11	7	15	4	0.00	0.00	0.00
7 Implementation of Training program of officials and comprehensive capacity building on smart water management	0.90	0.27	0.18	0.36	0.09	0.00	0.00	0.00

Note: The investments in the Water Supply sector are to be undertaken by the PHED functioning under the States PWD. The above table presents the phasing of the investment based on the perspective of the implementation of the project. However actual phasing need to be worked out by the department as per their own financial condition.

The total investment envisaged for Water Supply system in the Revised CDP for the city is 98.16 crores for 2041 and 93.56 crores for 2021. However, under 1st Generation CDP under JNNURM, a water supply improvement project has been proposed and under implemented in Panaji city and surrounding areas by PHED. The approved project cost of the project is Rs. 71.22 crores. The project covers the following components for the design year 2041.

- Augmentation of the Water supply source and transmission network
- Treatment capacity (including merged areas)
- Distribution System Management – Laying new pipelines and water supply distribution infrastructure
- NRW reduction programme and Capacity Building
- E- Governance in O& M of water supply system
- PMC Consultancy cost

The project is taken up for implementation at present and covers all the components listed in the Revised CDP except capacity building of the staff, awareness programmes and implementation of E-governance system.

17.3 Sewerage and Sanitation

As discussed in the sewerage sector assessment, the key challenges are inadequate coverage of underground drainage system and poor condition of the old sewerage network in the city. At present the existing UGD system covers only the core city area with 56% coverage w.r.t the existing roads. While the adjoining and outer areas of the city are devoid of sewerage system and mostly dependent of the system of individual soak pits or septic tanks. Only 42% of households in the region have access of sewer connection while 52% depend on soak pits. The ground water contamination is high due to due to high water table observed within the city usage of soak pit still prevalent. The public toilets in the core city are inadequate considering the tourism activities within the city. At present there is urgent need for rehabilitation of sewerage system pipelines and 100% sewerage coverage of properties in the city. The gap analysis presents the current deficit in the system and future requirement for the design year 2041.

Table 113: Sewerage and Sanitation Sector Plan

Sector Goals							
Design Parameters							
Demand Gap Assessment							
Demand Gap Assessment	Component	Existing Levels	Gap (2014)	2021(Short Term)		2041(Long Term)	
Demand Gap Assessment	UGD network (km)	45.00	0.00	105.31	60.31	179.06	30.00
	Sewerage Treatment	15.07	4.29	14.04	0.00	22.52	7.45

	Plant (MLD)					
Desired Outcomes						
Desired Outcomes	Component	2014	2017	2019	2021	
	Households covered with UGD	56%	70%	90%	100%	
	Treatment capacity	77.8	85%	95%	100%	
	Reuse and recycling of wastewater	N.A.	5%	10%	20%	
	Cost recovery on sewerage services	N.A.	60%	80%	100%	
Action Plans						
Comprehensive sewerage plan	<ul style="list-style-type: none"> ■ Achieve 100% coverage of sewerage network within city region ■ Replace the existing out-dated sewerage network in the CCP area ■ Explore cost effective STPs to meet future demand and cater the uncovered areas ■ Laying of new pipelines as per the topography and appropriate technology ■ Provision of modernised public toilets at public places and markets 					
Institutional strengthening and capacity building	<ul style="list-style-type: none"> ■ Prepare the training calendar and provide capacity building programmes and training to all the staff members on regular basis on O&M of assets and using E Governance systems. 					
Operation and maintenance plan	<ul style="list-style-type: none"> ■ Develop the asset inventory ■ Proper mapping and GIS based data to be developed for easy updation and better monitoring and evaluation of the system ■ E –Governance tools to be introduced for better O & M and M&E. ■ Conduct the workshops on sewerage sector to educate the citizens ■ Increase the sewerage user charges to meet the O&M expenses for new infrastructure to be developed 					
Recycling and Reuse	<ul style="list-style-type: none"> ■ Recycling and reuse of the treated water for various purposes like urban forestry, fire services, recharging the existing water bodies etc 					

17.3.1 Capital Investment Plan

Table 114: Projects identified– Sewerage and Sanitation

Project	Component	Estimated cost in Rs. crores
A. UGD network	<ul style="list-style-type: none"> ■ Identification and replacement of the old sewage collection pipes from the city area of Panaji and provision of the new pipelines through pipe bursting method. 	100.20

Project	Component	Estimated cost in Rs. crores
	■ Provision of the new collection network in the non-covered areas of the CCP	15.00
B. Sewage Pumping stations	■ Up-gradation of the pumping stations based on the vacuum pumping technology	30.00
C. Sewerage Treatment Plant	■ Provision of 7.45 MLD additional sewage treatment plant by the end of 2041.	37.24
D. Sanitation	■ Improvement of existing public toilets within the city (37 nos.)	2.59
	■ Construction of new toilets with international design standards (40 nos.)	6.00
	■ Provision of Bio / Mobile toilet vans	1.5
Total investment (2041)		192.53
Total investment envisaged for 2021		153.47

Table 115: Projects Details – Sewerage and Sanitation

Project	Proposed Projects
A. UGD network	■ Replacement of old sewer network for a length of 30 kms within the CCP area using pipe bursting technology.
B. Sewerage Treatment Plant	■ Provision of new sewerage network in the uncovered areas of the city which includes a total length of 15 kms.
C. Sanitation	■ For a city like Panaji, where availability of land is a major constraint, a technology like sequential batch reactor would substantially reduce the area required per ML. It is estimated that the city requires about 7.45 MLD additional sewage treatment plant by the end of 2041
D. Other Sewerage and Sanitation Investments	■ E-Governance system to be implemented for better O & M of the services. Capacity building and regular knowledge sharing programmes to be introduced for better operations of the new technologies and E-Governance tools. ■ GIS mapping of the present sewerage system for database which will assist in better and immediate detection of the ongoing problems/ wear and tear across the network. ■ Awareness programmes for the locals for proper household level sewage disposal, cleanliness of the public toilets etc.

17.3.2 Possible intervention through PPP

The environment for implementing the PPP projects in the state is improving and there are various projects in the urban infrastructure including the basic services water supply and sewerage collection, being implemented under this mode. However appropriate pre-feasibility for implementing such projects needs to be undertaken. In PHED following measures may be considered for improving these sewerage services.

- Construction, O&M of STPs can be provided by PHED on Public Private Partnership (PPP) mode. Under the PPP model the developer would

- ◆ Invest PHED's financial contribution and would take care of any additional cost under the project
- ◆ Undertake implementation of capital works and O&M of system
- ◆ The project can be awarded for a period of 10 years
- ◆ PHED can ask private developer to consider selling of treated water as part of contract
- ◆ Developers can bid on annuity support from PHED
- ◆ PHED need to set performance parameters for the private developer to be obliged during the contract period. The annuity payment should be a factor of performance parameters achieved by the developer
- ◆ The performance parameters would in the area of
- ◆ Quality of treated water
- ◆ Number of closure days of STP

The above model is indicative. PHED would require appointing a transaction advisor to undertake detailed feasibility and preparation of bid documents (request for qualification – RFQ, request for proposal – RFP) and bid process management leading to award of contract to private developer.

- Examples of PPP in sewerage – Kolhapur STP project – Construction and O&M of STP on BOT basis. Presently at bid process stage

17.3.3 Phasing of Investment

Table 116: Projects Phasing – Sewerage

Sector/ Component	Investm ent (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
Sewerage	151.22	16.60	32.43	22.35	21.30	32.47	11.17	14.90
1 Identification and replacement of the old sewage collection pipes	70.14	0.00	14.03	14.03	21.04	21.04	0.00	0.00
2 Sewerage Treatment (% of water supply)	37.24	0.00	0.00	0.00	0.00	11.17	11.17	14.90
3 Provision of the new collection network in the non-covered areas of the CCP	15.00	6.00	6.00	3.00	0.00	0.00	0.00	0.00
4 Up-gradation of the pumping stations .	24.00	9.60	9.60	4.80	0.00	0.00	0.00	0.00
5 Improvement of existing public toilets	2.59	0.78	0.78	0.52	0.26	0.26	0.00	0.00
6 Construction of new toilets with international design standards	2.25	0.23	2.03	0.00	0.00	0.00	0.00	0.00

Sector/ Component	Investm ent (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
7 Provision of Bio / Mobile toilet vans	150	0	45	60	45	0	0	0

The total investment envisaged for sewerage system in the Revised CDP for the city is Rs. 192.53 crores for 2041 and Rs.153.47 crores for 2021. However, under 1st Generation CDP under JNNURM, a sewerage improvement project has been proposed for Panaji city and surrounding areas by PHED and under process of DPR finalisation. The project covers the following components for the design year 2041.

- Construction of Sewage Treatment Plant at Tonca, Ribander and Patto (39 MLD)
- Construction of Sewer Network
- Provision of Sewer Cleaning equipments
- Cost of Implementation of Environmental Management Plan
- Cost of PMC Consultancy

The project is under reformulation w.r.t the costing of the projects proposed in the DPR at present and covers all the components listed in the Revised CDP except proposals of GIS mapping of sewerage network, capacity building of the staff, awareness programmes, implementation of E-governance system and construction/ improvement of public toilets.

17.4 Solid Waste Management

As mentioned in the previous chapters, 100% of the households are covered with SWM coverage and around 65% waste of the total waste generated is being collected through door to door collection in the city. The city has 100% household covered in door to door collection. The present SWM system is well organised with segregation of waste at the source, sorting and disposal of dry waste and decomposing of wet waste into manure for reuse.

However, the key challenges at present are inadequate infrastructure like composting units, workshop, waste segregation centre, protective equipments for workers, good transportation vehicles , scientific land fill site for disposal of inert waste and a scientific management of slaughter house. The city surroundings area has yet to be included in the present system of SWM which is presently dumping waste in open areas. The gap analysis presents the current deficit in the system and future requirement for the design year 2041.

Table 117: Solid Waste Management Sector Plan

Sector Goals	
Sector Goals	<ul style="list-style-type: none"> ■ 100% door-to-door collection and segregation of waste at source ■ Maximize recycling and reuse capacity and minimize disposal at landfill ■ Disposal mechanism should be followed as per the CPHEEO norms
Design Parameters	
Designparameters	<ul style="list-style-type: none"> ■ All the households should be covered with the door-to-door waste collection system. ■ Waste to be collected on daily basis from all sources ■ Segregation of waste at source – (ensure 100% of waste would be segregated at the source)

	<ul style="list-style-type: none"> ■ Optimum fleet utilization (No. of trips/ vehicle/ day - average minimum of 2) ■ Desired capacity of composting and processing facility-100% of generated waste ■ Desired landfill site– not more than 20% of the waste generated 						
Demand Gap Assessment							
Demand Gap Assessment	Component	Existing Levels	Gap (2014)	2021 (Short Term)		2041 (Long Term)	
				Demand	Gap	Demand	Gap
	Vehicles for transportation of waste (capacity in MT)	73	0	71	0	175	102
	Waste Treatment (Tonnes)	47	-2	71	24	175	128
	Landfill (in acres)	0	1	5	5	26	26
Desired Outcomes							
Desired Outcomes	Component	2014	2017	2019	2021		
	Door-to-door waste collection	100%	100%	100%	100%		
	Segregation at source	100%	100%	100%	100%		
	Mechanised waste handling	N.A.	60%	80%	100%		
	Cost recovery of O&M	49%	80%	100%	100%		
	Private participation sector	No PPP	50% primary waste collection	100% primary waste collection	Complete collection, transport, treatment, and disposal		
Action Plans							
Door-to-door waste collection	<ul style="list-style-type: none"> ■ Door to door collection of waste on PPP basis and the new surroundings areas of the city to be covered under door to door collection 						
Source segregation and collection of waste	<ul style="list-style-type: none"> ■ Coverage of 100% households with collection bins and wet waste composting units ■ Develop Public Private Participation (PPP) in collection, transportation & disposal ■ Provision of adequate SWM collection equipments and transportation vehicles. ■ Design and implementation of the scheme for promotion of waste segregation at source from all possible sources. 						
Composting of organic waste	<ul style="list-style-type: none"> ■ Development of transfer stations with compactors and recycling units ■ Odour control of the compost plants across CCP area 						
Scientific landfill	<ul style="list-style-type: none"> ■ A regional landfill site with closure mechanism for inorganic wastes is to be developed in accordance with the CPHEEO norms. 						

Monitoring systems	<ul style="list-style-type: none"> ▪ Development of realtime monitoring system for the value chain of the solid waste management within the city. The CCP should implement GPS and GIS based monitoring system for the SWM.
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17.4.1 Capital Investment Plan

Table 118: Projects identified– Solid Waste Management

Project	Component	Estimated cost in Rs. crores	Implementing Agency
A. Door-to-door waste collection	<ul style="list-style-type: none"> ▪ Provision of 37,842 numbers of push carts (1 push cart for 350 Household) 	75.68	CCP
	<ul style="list-style-type: none"> ▪ Odour Control of the Compost plants across CCP area 	1.50	CCP
B. Vehicle Capacity Required (Vehicle Carrying Capacity)	<ul style="list-style-type: none"> ▪ Purchase of tractors, compactors, JCB and heavy transport vehicles (10 nos.) 	12.81	CCP
C. Development of Disposal and Landfill site (2031)	<ul style="list-style-type: none"> ▪ Development of transfer stations with compactors and recycling units 	10.00	CCP
	<ul style="list-style-type: none"> ▪ Provision of Scientific Landfill site as per the demand for 2041 – 26 acres 	26.37	CCP
	<ul style="list-style-type: none"> ▪ Development of new centralized MSW processing facility (80 TPD) 	8.73	CCP
D. Capacity building of the SWM staff	<ul style="list-style-type: none"> ▪ Proper training and capacity building programmes for the SWM workers 	0.5	CCP
E. Monitoring systems	<ul style="list-style-type: none"> ▪ Supply installation testing and commissioning of IT based tracking and monitoring system for value chain of SWM 	0.72	CCP
Total investment for 2041		138.81	
Total investment envisaged for 2021		138.81	

Table 119: Projects Details– Solid Waste Management

Project	Proposed Projects
A. Door-to-door waste collection	<ul style="list-style-type: none"> ▪ The components envisaged under primary collection are push carts (1 push cart for 350 Household) ▪ Odour control measures to be implemented for the household level as well as community level composting units.
B. Vehicle Capacity Required (Vehicle Carrying Capacity)	<ul style="list-style-type: none"> ▪ Investment has been proposed for purchase of tractors, compactors, JCB and heavy transport vehicles.
C. Development of	<ul style="list-style-type: none"> ▪ Development of transfer stations with compactors and recycling units

Project	Proposed Projects
Disposal Landfill and site (2031)	<ul style="list-style-type: none"> ■ Development of new centralized MSW processing facility (80 TPD) ■ The area required for scientific landfill has been projected in view of accumulated waste and future waste generation. It is assumed that on development of treatment facility, about 50% of waste would be sent for land filling. Accordingly, the investment has been envisaged for the development of a landfill of 26 acres with required infrastructure
D. Other equipment	<ul style="list-style-type: none"> ■ Equipments for transportation and collection of waste
E. IEC Programmes	<ul style="list-style-type: none"> ■ Investment envisaged towards development of compost plant, waste processing plant, RDF plant and Bio gas plant.
F. Capacity building of the SWM staff	<ul style="list-style-type: none"> ■ Capacity building programmes to train the SWM staff in the present ways of collection, transportation, segregation, processing and disposal of solid waste generated..

17.4.2 Possible intervention through PPP

The environment for implementing the PPP projects in the state is improving and there are various projects in the urban infrastructure including the basic services water supply and sewerage collection, being implemented under this mode. Substantial investment through private sector is also happening in managing the municipal waste in the city. However appropriate pre-feasibility for implementing such projects needs to be undertaken. In CCP following measures may be considered for improving these sewerage services.

- PPPs in SWM is in accordance to nature of work viz.,
- Collection and transportation of waste
- Processing of waste only
- Integrated including end to end scope in compliance with the MSW Rules

CCP can adopt PPP in collection and transportation of waste under which the private developer is deployed to undertake door to door collection of waste from all residential and commercial premises

- Such contracts can be awarded for 1 or 2 years and can be renewed based on performance
- CCP need to set performance parameters for the private developer to be obliged during the contract period. The tipping fee should be a factor of performance parameters achieved by the developer. The performance parameters would in the area of
 - ◆ Coverage of door to door collection of waste
 - ◆ Amount of waste collected
 - ◆ Complaints received

17.4.3 Phasing of Investment

Table 120: Project Phasing -Solid Waste Management

Sector/ Component	Investment (Rs. Lakh)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
Solid Waste Mgmt	137.59	25.23	30.49	35.89	9.71	7.82	7.82	7.82
1 Vehicle Capacity Required (Vehicle)	12.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sector/ Component	Investment (Rs. Lakh)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
Carrying Capacity)								
2 Development of Disposal and Landfilsite (2041)	26.37	5.27	7.91	13.18	0.00	0.00	0.00	0.00
3 Provision of push carts (1 push cart for 350 Household)	75.68	15.14	15.14	15.14	7.57	7.57	7.57	7.57
4 Purchase of tractors, compactors, JCB and heavy transport vehicles.	2.50	0.50	0.50	0.50	0.25	0.25	0.25	0.25
5 Development of transfer stations with compactors and recycling units	10.00	3.00	3.00	4.00	0.00	0.00	0.00	0.00
6 Development of new centralized MSW processing facility	8.73	0.87	3.49	2.62	1.75	0.00	0.00	0.00
7 Odor Control of the Compost plants across CCP area	1.50	0.45	0.45	0.45	0.15	0.00	0.00	0.00
8 IT based tracking and monitoring system for value chain of SWM	72	0	36	36	0	0	0	0
9 Training and capacity building of SWM vehicles	50	0	15	15	15	5	0	0

The total investment envisaged for solid waste management system in the Revised CDP for the city is Rs.138.81 crores till 2041. However, under 1st Generation CDP under JNNURM, a DPR on solid waste management improvement project has been proposed for Panaji city by CCP taking into the present gaps and future requirements till design year 2040. The approved project cost of the SWM project for Panaji is Rs. 34.54 crores. The project covers the following components for the design year 2040.

- Collection, Storage & Transportation System - Primary Waste Collection and Storage and Transportation Infrastructure
- Integrated MSW Processing Facility - Civil Works, Development of Landfill Cells, Mechanical, Electrical & Instrumentation Works, Electrical & Instrumentation Works
- IEC and Capacity Building Activities for a Year
- PMC Consultancy

The project is approved and shortly would be taken up for implementation. It covers all the components listed in the Revised CDP for improvement of SWM practices in the city.

17.5 Storm Water Drainage

The water resource department is in charge of the major outfall drains in the city while the construction and laying of new drains is under the PWD department. The CCP is responsible for the maintenance of the existing roadside drains in the city. As discussed in the assessment of storm water drainage sector, the CCP area storm water drainage network has been laid during the time of Portuguese and still not rehabilitated.

The city experience flooding during the monsoons due to the rise in water levels of River Mandovi which is located at same level. Many areas in the core city area get flooded during medium to high intensity rains. The CCP commences regular repairs and cleaning of the storm water drains within the core city but there is no effort yet to assess the carrying capacity of the present storm water drains w.r.t the present outflow and the condition of the storm water drain network. The major reason for flooding in the city is reduced carrying capacity of the storm water drains due to siltation, blockages in the natural drains due to disposal of waste and sewage and degradation of natural barriers like mangroves, water bodies, marshy lands etc. The gap analysis presents the current deficit in the system and future requirement for the design year 2041.

Table 121:Storm Water Drains Sector Plan

Sector Goals							
Sector Goals							
<ul style="list-style-type: none"> ■ 100% Coverage of Storm water drainage in the city ■ Efficient monitoring and maintenance of the storm water drains to avoid water clogging ■ Proper rehabilitation and channelizing of major drains 							
Design Parameters							
<ul style="list-style-type: none"> ■ Run off on all roads and link to major channels. ■ Storm water drains as percentage of road length is considered as 100%. ■ Roads with dividers should have drains on either side of the road. ■ 100% of the storm water drains as pucca closed ■ Size of drains to be designed according to the rainfall and runoff. 							
Demand Gap Assessment							
Demand Gap Assessment	Component	Existing Levels	Gap(2014)	2021(Short Term)		2041(Long Term)	
				Demand	Gap	Demand	Gap
	Road length covered with drains (km)	77.00	71.70	100.01	23.01	173.76	96.76

	Pucca closed drains (km)	77.00	21.51	30.0	70.01	52.13	0.00		
	Pucca open drains (km)	0.00	50.19	70.01	70.01	121.63	121.63		
Desired Outcomes									
Desired Outcomes	Component		2014	2017	2019	2021			
	Storm water drainage network coverage		100%	100%	100%	100%			
	Rehabilitation of existing pucca drains		N.A.	50%	80%	100%			
	Rehabilitation of existing primary nallahs and primary drains		N.A.	40%	60%	80%			
Action Plans									
Storm water drainage rehabilitation plan	<ul style="list-style-type: none"> ■ Assessment of existing roadside surface drains within CCP limits ■ Identification of water logging areas, contour survey of areas ■ Development of pre-monsoon maintenance plan to include cleaning and desilting of the surface drains 								
Rehabilitation and strengthening of nallahs	<ul style="list-style-type: none"> ■ Unregulated constructions and siltation along these channels hamper the drainage system during the monsoon. ■ Study and assessment of the natural drains, rehabilitation measures and proper channelizing of the water to the sea. 								
Up-gradation of roadside storm water drains	<ul style="list-style-type: none"> ■ Mapping of the existing storm water drainage system ■ Assess the present carrying capacity of the drainage network and the condition of the drains. ■ Upgradation of the existing drains to the present requirement w.r.t carrying capacity and surface improvement. 								

17.5.1 Capital Investment Plan

Table 122: Project Identified -Storm Water Drains

Project	Component	Estimated cost in Rs. Crores	Implementing Agency
A. Improvement of major nallahs	<ul style="list-style-type: none"> ■ Surface Improvement of the St. Inez nallah including cleaning, desilting, chaneelizing and conservation of its either sides. 	75.00	WRD
B. Laying of new pucca drains	<ul style="list-style-type: none"> ■ Rehabilitation of the existing strom water drains ■ Provision of pucca open drains for the design year 2041 	60.81	WRD
Total investment (2041)		135.81	
Total investment envisaged for 2021		135.81	

Table 123: Projects Details – Storm Water Drains

Project	Proposed Projects
A. Improvement of major nallahs	<ul style="list-style-type: none"> ■ The city has one major nallah viz. St. Inez, which act as primary drainage system. It is recommended to develop retaining walls along nallahs that are more than 5 m wide.
B. Laying of new pucca drains	<ul style="list-style-type: none"> ■ Considering the norms for the storm water drains 121.63 km of drains are estimated to be provided as pucca open drains for the design year 2041 while 70.01 km of drains by 2021.
C. Other Storm water projects	<ul style="list-style-type: none"> ■ Presently there is lack of proper data on the layout, condition and carrying capacity of the existing storm water drainage system Hence a GIS Mapping has been proposed for covering the same. ■ Similarly a detail assessment of the flooding pattern in the city needs to be assessed to propose prior mitigation measures in the city and design the future storm water drainage system.

17.5.2 Possible intervention through PPP

The following are the tasks which may be taken up for implementation through PPProute in CCP and PHED.

- Design, laying, project management and regular monitoring of storm water drains in the city
- Study Report on the existing storm water drainage system in the city
- GIS Mapping of the present storm water system within the city

17.5.3 Phasing of Investment

Table 124: Project Phasing - Storm Water Drains

Sector/ Component	Investment (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
Storm Water drains	135.81	9.12	16.62	24.12	24.12	24.12	24.12	13.58
1 New Pucca Open Drains	60.81	9.12	9.12	9.12	9.12	9.12	9.12	6.08
2 New Pucca Closed Drains	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3 Improvement of St. Inez Creek	75.00	0.00	7.50	15.00	15.00	15.00	15.00	7.50
4 Re-development of the underground drainage network in the city	10,000	4,000	3,000	3,000	0	0	0	0
5 Provide rain water harvesting measures to restrict the flow of water during monsoons	800	320	240	240	0	0	0	0

The total investment envisaged for storm Water drains in the Revised CDP for the city is 243.81 crores for 2021 and 2041. Under the 1st Generation CDP under JNNURM, there is a proposed project for Development of St. Inez Creek in Panaji and is under the process of review and approval from the MoUD. The estimated project cost of the project is Rs. 19.56 crores. It is observed that the project covers the following components.

- S. Inez Creek Drain starting from mouth of River Mandovi to culvert at Mirmary- Talegaon road.
- Rehabilitation of Branch 1 and Branch 2 of St. Inez drain
- Beautification
- Sewer network along both the sides of the creek
- Service Road

The project is under the process of formulation of DPR and approval. The Revised CDP proposal for improvement of major drains has been considered in this DPR for St. Inez drain.

17.6 Traffic and Transportation

The city of Panaji has only 5.45% of area under traffic and transportation which is highly inadequate as per URDPFI guidelines. However, the present road network system covers entire residential and commercial areas of the city. The city is observing high increase in 2 wheelers and 4 wheelers in absence of proper public transport system. All the major roads have on-street parking, which reduces the effective right of way. This creates high amount of congestion in the core city areas and other major roads in the city. The roads too need to be aligned and designed properly with proper segregation of pedestrian movement and parking areas. Multilevel parking facility is very essential to restrict roadside parking causing hindrance to vehicular and pedestrian traffic.

Improvement of traffic junctions in the city is also estimated to be taken up on immediate basis for better traffic movement within the city. The city's regional connectivity w.r.t the waterways need to be developed considering its huge potential. Considering the the city's importance as tourist destination eco mobility options needs to be developed and implemented for the commuting within the city. The present street lighting system in the city is adequate however improvement projects of LED lights and underground ducting of the electricity cables needs to be taken up in the future years in a phased manner. The gap analysis presents the current deficit in the system and future requirement for the design year 2041.

Table 125: Traffic and Transportation Sector Plan

Sector Goals	
Sector Goals	<ul style="list-style-type: none"> ■ Increase the share of public transport and minimize traffic congestion ■ Minimize road accidents and improve the pedestrian related infrastructure ■ Provide parking facilities across the city ■ 100% coverage of roads through public street lighting. ■ Eco friendly modes of transportation in the city
Design Parameters	
Design Parameters	<ul style="list-style-type: none"> ■ At least 60% of the roads must have footpaths (i.e., roads of 20 feet and above). ■ As per development plan, 12% of land to be under roads. ■ All roads have to be surfaced with about 15% being concrete roads.

	<ul style="list-style-type: none"> ■ All major roads should have utility ducts for laying utility line in future (such as telecom, gas, and electrical infrastructure). ■ Streetlight spacing – should not be more than 30 m between each street light poles 								
Demand Gap Assessment									
Demand Gap Assessment	Component	Existing Levels	Gap(2014)	2021(Short Term)		2041(Long Term)			
				Demand	Gap	Demand	Gap		
	Extension/Up-gradation of road network (km)	71.7	0	88.9	12.8	103	0		
	New Road network (km)	0	0	88.9	12.8	103	26		
	Junction improvements (nos.)	5	5	5	0	0	0		
	Multilevel parking facility	0	0	1	0	0	0		
Street lights									
3462 4191 1572 4589 1942									
Desired Outcomes									
Desired Outcomes	Component			2017	2019	2021			
	% of surfaced roads			100%	100%	100%			
	Reduction in travel time			80%	100%	100%			
	Transport safety			60%	80%	100%			
Action Plans									
Comprehensive mobility plan	<ul style="list-style-type: none"> ■ Comprehensive mobility plan has been prepared for the city which needs to be taken up for implementation in phased manner. ■ The dedicated cell/department for effective implementation of CMP in consultations with various departments concerned in the city ■ Need to create a dedicated fund under the UMT and ensure regular allocation of the funds for urban transport system. 								
Environmental friendly transportation system	Implementation of Public Bicycle Sharing (PBS) System for the entire city.								
Development of Regional transport nodes	<ul style="list-style-type: none"> ■ Upgradation and provision of Ring Roads connecting the city to major urban centres ■ Development of alternate bridge across River Mandovi to ease the traffic on the existing Mandovi Bridge. ■ Improvement of the present KTC bus stand with good quality infrastructure and tourist facilities ■ Improve the existing ferry system and develop the new ferry routes connecting the city to the nearby places which have an advantage of commuting over road connectivity. 								

Provision of efficient public transport system	<ul style="list-style-type: none"> ■ Dedicated bus transport service from major transport nodes viz. Dambolim Airport, Karmali railway station and Madgaon railway station to the city. ■ Development of interchange points at major transport nodes within the city towards provision of interlinked efficient traffic movement pattern in the city ■ Provision of new buses for city transportation ■ Development of tram system with well planned routes/ loops interlinked to the pedestrian zones in the core city area. ■ Improvement of the bus routes and frequency of buses on these routes ■ Provision of new bus stops as per the public requirements.
Traffic Management Plan	<ul style="list-style-type: none"> ■ Junction Improvement at major congestion areas within the city ■ Improvement of the geometry of the roads w.r.t the alignment, ■ Provision of foot over bridges across congested road sections ■ Provision of traffic safety measures like zebra crossings, traffic signals, electronic variable traffic signage etc ■ Propose a proper traffic movement plan in the city demarcating the one way and two ways as well as the pedestrian movement ■ Installation of surveillance and monitoring cameras across all traffic signals as well as busy junctions within the Panaji city and setting up a central traffic monitoring control center. ■ Design, preparation, supply and implementation of the road and pavement management system for roads under CCP area.
Parking facilities	<ul style="list-style-type: none"> ■ Demarcation of on street paid parking zones in the city ■ Propose multilevel parking facilities within the core city area
Improvement of the existing road network	<ul style="list-style-type: none"> ■ Upgradation of the existing BT roads to CC roads within the city.
Energy efficient street lighting system	<ul style="list-style-type: none"> ■ Provision of solar based LED lights within the core city ■ Underground ducting of the electricity cables (core city area) for better maintenance ■ SCADA for street lighting and implementation of day light savings ■ Implementation of proposed solar city Master Plan for Panaji.

17.6.1 Capital Investment Plan

Table 126: Projects Identified -Traffic and Transportation

Project	Component	Estimated cost in Rs. Crores	Implementing Agency
A. Upgradation and provision of Ring Roads	<ul style="list-style-type: none"> ■ Primary Ring Road - Improvement - Within CCP: Stretch of DB road from IFFI Junction through Mira Mar and down till NIO junction ■ Primary Ring Road - Improvement - Outside CCP: Stretch from NIO Junction, via Talegaon church and Bambolim to reach NH-17 ■ Secondary Ring Road - Improvement - Secondary Ring -A Stretch from KTC 	361.38	PWD

Project	Component	Estimated cost in Rs. Crores	Implementing Agency
	<p>Junction to Ourem road as proposed in ODP, around althino hill and reaching DB road</p> <ul style="list-style-type: none"> ▪ Secondary Ring Road - Improvement - Secondary Ring -B Stretch from Raibandar entrance way looping around to reach NH-4A bypass ▪ All Ring Roads should be developed to be compitable as a Light Bus Rapid Transit System. ▪ NH-17 - Upgradation to 6 lane ▪ Bypass to NH-4A upgradation 		
B. New Bridges	<ul style="list-style-type: none"> ▪ New Bridge across rived Mandovi (NH17) and grade ramps for Panaji 	260.00	PWD
C. Junction Improvements	<ul style="list-style-type: none"> ▪ KTC Stand ▪ Domionoz Pizza Junciton ▪ Foot Bridge junction (Patto) ▪ IFFI Junction ▪ NIO Junction ▪ Caculo Junction ▪ St.Inez Junction ▪ Adil Shah Junction ▪ Miramar Junction ▪ Betim Ferry Junction 	15.23	PWD
D. Road Improvements	<ul style="list-style-type: none"> ▪ Rua de Ourem ▪ 18th June Road ▪ Ormus Road as one way towards DB road ▪ AB Road ▪ MG Road ▪ Malaca Road ▪ DP Proara Road ▪ from Adil Shah towards Panjim church ▪ D V Road ▪ Fire Brigade Junction ▪ Avenida Teofila Braga Road 	13.64	PWD
E. Pedestrian Crossings / Table Tops	<ul style="list-style-type: none"> ▪ At don bosco school for children (FOB only) ▪ At Boat cruise point (FOB+Escalator) ▪ At Betim Fery Junction (FOB Only) ▪ At Ourem Creek south side (FOB only) 	9.00	PWD
F. Public Transportation	<ul style="list-style-type: none"> ▪ Upgradation the roads and bus frequency for better connectivity of public transport 	28.00	KTC

Project	Component	Estimated cost in Rs. Crores	Implementing Agency
- Route and bus frequency upgradation	<p>system in the city The major routes proposed are St.Inez, Caranzalem & Miramar, Central Panaji Market, Althino and Bhatlem, Riabander, Dona Paula, Sao Thome, Fountainhas, Portais, Mala and Campal</p> <ul style="list-style-type: none"> ▪ Karmali Station to Panaji (Light BRT) Route & Bus upgradation 		
G. New Bus stops	<ul style="list-style-type: none"> ▪ Provision of new bus stops at Miramar Junction, Parade Ground, NIO and Aiwaho village ▪ Improvement of existing bus stops 	3.70	KTC
H. New Buses for Public Transportation	<ul style="list-style-type: none"> ▪ Procurement of green fuel buses for the city transport 	12.00	KTC
I. Re-development of KTC bus stand area	<ul style="list-style-type: none"> ▪ Re-development of KTC bus stand area by providing parking and ITC systems for better management of incoming and outgoing bus fleets and additional passenger amenities (waiting area, inquiry systems, public announcement systems, commercial areas etc..) ▪ PWD interchange hub design 	150.60	KTC
J. Ferry Routes - Improvement of existing routes	<ul style="list-style-type: none"> ▪ Betim-Panaji ▪ Riabander-Chorao ▪ Riabander-Divar 	3.51	RND
K. Ferry Routes - New routes	<ul style="list-style-type: none"> ▪ Old Goa-Divar-Ribandar-Panaji ▪ Divar-Chorao-Ribandar-Panaji ▪ Divar-Chorao-Brittona-Panaji ▪ Riabandar-Panaji ▪ Brittona-Panaji 	3.66	RND
L. Interchange Points Provision	<ul style="list-style-type: none"> ▪ NIO Junction ▪ Miramar Junction ▪ Kala Academy Junction ▪ Betim Ferry Junction ▪ Boat Cruise Junction ▪ Chorao Jetty ▪ Divar Jetty ▪ Betim Side Jetty ▪ Brittona Side Jetty 	2.64	PWD
M. Parking Facilities – Paid Parking facilities	<ul style="list-style-type: none"> ▪ Near Miramar Beach ▪ Near NIO Junction ▪ New Market Building parking 	354.98	PWD

Project	Component	Estimated cost in Rs. Crores	Implementing Agency
	<ul style="list-style-type: none"> ▪ parking on all perpendicular roads ▪ remove parking from parallel roads ▪ Grain Godown as parking space in Althino ▪ Parking near Riabander entranceway ▪ Developing ODP demarkated parking lots ▪ development of parking facility to reduce the inward movement of vehicles in the city (land based parking till 2021 (Rs.30 Cr) and mechanized parking in for 2041(Rs. 200 Cr) 		
N. Public Bicycle Sharing (PBS) System	<ul style="list-style-type: none"> ▪ DB road to accommodate a 2m bicycle lane along the river edge ▪ Purchase of bicycles for the PBS system (1040) ▪ Purchase of Bicycle docking system (1545) ▪ Installation of stations for PBS in Panaji (66) 	70.63	CCP
O. Development of Pedestrian Plan	<ul style="list-style-type: none"> ▪ Pedestrian Promenade along the DB road ▪ Pedestrian priority areas around historic areas like Panaji Church, Boca Da Vaca, MiraMar Beach 	42.00	CCP
P. Traffic Management Plan	<ul style="list-style-type: none"> ▪ Installation of a traffic signal on foot bridge junction (to Patto) ▪ one and two way systems to be designated by 2015 ▪ Road markings such as zebras at all major junctions ▪ Signage (one ways, no parking, road names, etc.) ▪ Provision of traffic signals on 20 junctions in the city (Only Major junctions) ▪ Installation of surveillance and monitoring cameras across all traffic signals as well as busy junctions within the Panaji city and setting up a central traffic monitoring control center. ▪ Supply and installation of traffic signages across the city including electronic variable sign boards ▪ Design, preparation, supply and implementation of the road and pavement management system for roads under CCP area 	21.20	Traffic Cell
Q. Street lighting	<ul style="list-style-type: none"> ▪ Provision adequate street lighting ▪ Solar based LED Lighting (preference to 	133.36	GSEB

Project	Component	Estimated cost in Rs. Crores	Implementing Agency
	core city and main roads) <ul style="list-style-type: none"> ▪ Underground ducting of the electricity cables (core city area) ▪ SCADA for street lighting and implementation of day light savings ▪ Implementation of Solar City Master Plan for Panaji as prepared in 2014 		
Total investment (2041)	1602.76		
Total investment envisaged for 2021	1121.61		

17.6.2 Possible intervention through PPP

Following are the measures of improvement which may be taken up for implementation through PPP route in CCP.

Parking complex on PPP basis

- Generally only parking towers are commercially not feasible; the feasibility can be improved by introducing a mixed commercial land use – shops and offices
- Land to be provided on lease basis either for 25 – 30 years or for 70 years
- Role of private developer – construct, lease commercial space, collecting parking revenue, operate & maintain the complex
- Bidding parameter – highest upfront premium to CCP (premium can be distributed over a period of two years)
- Qualification criteria – experience in construction of commercial complex

Apart from this the collection of parking fees in the city for the allocated roadside parking areas can be outsourced to private agency on contract basis.

Public Transport

The proposal for operation of battery operated vehicles within the city can be taken up on PPP basis. KTC can be involved as the regulatory body for implementation of such operations. The contractor should be selected on basis of its type of vehicles, routes operated, passenger facilities and revenue generation.

Street- Lighting

- Role of private operator – install and maintain street-lighting
- Revenue to private operator – from advertising
- Incentive to private operator dependent on –
- Savings in energy bills
- No. of hours of operation of streetlights to be specified by Electricity Department
- No. of complaints received

The above models are indicative. Electricity Department would require appointing a transaction advisor to undertake detailed feasibility and preparation of bid documents (request for qualification – RFQ, request for proposal – RFP) and bid process management leading to award of contract to private developer.

17.6.3 Phasing of Investment

Table 127: Project Phasing - Traffic and Transportation

Sector/ Component		Investment (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
Traffic & Transportation		1130.87	21.19	287.22	286.73	202.97	203.30	18.10	19.10
A	Upgradation and provision of Ring Roads	290.28	12.96	66.10	66.10	58.06	58.06	14.51	14.51
1	Primary Ring Road - Improvement - within CCP	72.54	0.00	7.25	7.25	14.51	14.51	14.51	14.51
2	Primary Ring Road - Improvement - Outside CCP	64.80	12.96	12.96	12.96	12.96	12.96	0.00	0.00
3	Secondary Ring Road - Improvement - Secondary Ring -A	48.48	0.00	14.54	14.54	9.70	9.70	0.00	0.00
4	Secondary Ring Road - Improvement - Secondary Ring -B	33.36	0.00	10.01	10.01	6.67	6.67	0.00	0.00
5	NH-17 - Upgradation to 6 lane	45.60	0.00	13.68	13.68	9.12	9.12	0.00	0.00
6	Bypass to NH-4A upgradation	25.50	0.00	7.65	7.65	5.10	5.10	0.00	0.00
B	New Bridges	260.00	0.00	78.00	78.00	52.00	52.00	0.00	0.00
1	New Bridge across river Mandovi (NH17) and grade ramps for Panaji	260.00	0.00	78.00	78.00	52.00	5,200	0.00	0.00
C	Junction Improvements	15.23	0.00	4.57	4.57	3.05	3.05	0.00	0.00
1	KTC Stand	2.70	0.00	0.81	0.81	0.54	0.54	0.00	0.00
2	Domionoz Pizza Junction	0.93	0.00	0.28	0.28	0.19	0.19	0.00	0.00
3	Foot Bridge junction (Patto)	0.37	0.00	0.11	0.11	0.07	0.07	0.00	0.00

Sector/ Component		Investment (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
4	IFFI Junction	2.60	0.00	0.78	0.78	0.52	0.52	0.00	0.00
5	NIO Junction	2.18	0.00	0.66	0.66	0.44	0.44	0.00	0.00
6	Caculo Junction	0.69	0.00	0.21	0.21	0.14	0.14	0.00	0.00
7	St.Inez Junction	0.72	0.00	0.22	0.22	0.14	0.14	0.00	0.00
8	Adil Shah Junction	0.78	0.00	0.23	0.23	0.16	0.16	0.00	0.00
9	Miramar Junction	2.50	0.00	0.75	0.75	0.50	0.50	0.00	0.00
10	Betim Ferry Junction	1.75	0.00	0.53	0.53	0.35	0.35	0.00	0.00
D	Road Improvements	13.64	0.00	4.09	4.09	2.73	2.73	0.00	0.00
1	Rua de Ourem	3.00	0.00	0.90	0.90	0.60	0.60	0.00	0.00
2	18th June Road	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Ormus Road as one way towards DB road	0.52	0.00	0.16	0.16	0.10	0.10	0.00	0.00
4	AB Road	1.80	0.00	0.54	0.54	0.36	0.36	0.00	0.00
5	MG Road	2.40	0.00	0.72	0.72	0.48	0.48	0.00	0.00
6	Malaca Road	0.64	0.00	0.19	0.19	0.13	0.13	0.00	0.00
7	DP Proara Road	0.50	0.00	0.15	0.15	0.10	0.10	0.00	0.00
8	from Adil Shah towards Panjim church	0.58	0.00	0.17	0.17	0.12	0.12	0.00	0.00
9	D V Road	1.60	0.00	0.48	0.48	0.32	0.32	0.00	0.00
10	Fire Brigade Junction	1.60	0.00	0.48	0.48	0.32	0.32	0.00	0.00
11	Avenida Teofila Braga Road	1.00	0.00	0.30	0.30	0.20	0.20	0.00	0.00
E	Foot Over Bridges	5.00	0.00	150	150	100	100	0.00	0.00
1	At don bosco school for children (FOB only)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	At Boat cruise point (FOB+Escalator)	3.00	0.00	0.90	0.90	0.60	0.60	0.00	0.00
3	At Betim Fery Junction (FOB	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00

Sector/ Component		Investment (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
	Only)								
4	At Ourem Creek south side (FOB only)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F	Public Transportation - Route and bus frequency upgradation	25.00	0.00	7.50	7.50	5.00	5.00	0.00	0.00
1	St.Inez	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00
2	Caranzalem & Miramar	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00
3	Central Panaji Market	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00
4	Althino and Bhatlem	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00
5	Riabander	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00
6	Dona Paula	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00
7	Sao Thome	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00
8	Fountainhas	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00
9	Portais	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00
10	Mala	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00
11	Campal	2.00	0.00	0.60	0.60	0.40	0.40	0.00	0.00
12	Karmali Station to Panaji (Light BRT) Route & Bus upgradation	3.00	0.00	0.90	0.90	0.60	0.60	0.00	0.00
G	New Bus stops	3.70	0.00	1.11	1.11	0.74	0.74	0.00	0.00
1	Miramar Junction	0.80	0.00	0.24	0.24	0.16	0.16	0.00	0.00
2	Parade Ground	0.80	0.00	0.24	0.24	0.16	0.16	0.00	0.00
3	NIO	0.80	0.00	0.24	0.24	0.16	0.16	0.00	0.00
4	Aiwhao Village	0.80	0.00	0.24	0.24	0.16	0.16	0.00	0.00
5	Improvement of existing bus stops	0.50	0.00	0.15	0.15	0.10	0.10	0.00	0.00
H	New Buses for Public Transportation	6.00	0.00	1.80	1.80	1.20	1.20	0.00	0.00
J	Re-development of KTC bus	150.60	0.00	45.18	45.18	30.12	30.12	0.00	0.00

Sector/ Component		Investment (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
	stand area								
1	Re-development of KTC bus stand area by providing parking and ITC systems for better management of incoming and outgoing bus fleets and additional passenger amenities (waiting area, inquiry systems, public announcement systems, commercial areas etc..)	150.00	0.00	45.00	45.00	30.00	30.00	0.00	0.00
2	PWD interchange hub design	0.60	0.00	0.18	0.18	0.12	0.12	0.00	0.00
K	Ferry Routes - Improvement of existing routes	3.51	0.00	1.05	105	70	70	0.00	0.00
1	Betim-Panaji	1.17	0.00	0.35	0.35	0.23	0.23	0.00	0.00
2	Riabander-Chorao	1.17	0.00	0.35	0.35	0.23	0.23	0.00	0.00
3	Riabander-Divar	1.17	0.00	0.35	0.35	0.23	0.23	0.00	0.00
L	Ferry Routes - New routes	1.46	0.00	0.44	0.44	0.29	0.29	0.00	0.00
1	Old Goa-Divar-Ribandar-Panaji	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Divar-Chorao-Ribandar-Panaji	0.73	0.00	0.22	0.22	0.15	0.15	0.00	0.00
3	Divar-Chorao-Brittona-Panaji	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Riabandar-Panaji	0.73	0.00	0.22	0.22	0.15	0.15	0.00	0.00
5	Brittona-Panaji	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M	Interchange Points	1.17	0	35	35	23	23	0	0

Sector/ Component		Investment (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
	Provision								
1	NIO Junction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Miramar Junction	0.29	0.00	0.09	0.09	0.06	0.06	0.00	0.00
3	Kala Academy Junction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Betim Ferry Junction	0.29	0.00	0.09	0.09	0.06	0.06	0.00	0.00
5	Boat Cruise Junction	0.29	0.00	0.09	0.09	0.06	0.06	0.00	0.00
6	Chorao Jetty	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Divar Jetty	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Betim Side Jetty	0.29	0.00	0.09	0.09	0.06	0.06	0.00	0.00
9	Brittona Side Jetty	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N	Parking Facilities	109.08	0.00	32.73	32.73	21.82	21.82	0.00	0.00
1	Near Miramar Beach	22.12	0.00	6.64	6.64	4.42	4.42	22.12	0.00
2	Near NIO Junction	6.76	0.00	2.03	2.03	1.35	1.35	6.76	0.00
3	New Market Building parking	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	parking on all perpendicular roads	2.50	0.00	0.75	0.75	0.50	0.50	2.50	0.00
5	Restricting parking on parallel roads	3.00	0.00	0.90	0.90	0.60	0.60	3.00	0.00
6	Grain godown to be developed as parking space in Althino	5.20	0.00	1.56	1.56	1.04	1.04	5.20	0.00
7	Parking near Ribander entrance way	6.11	0.00	1.83	1.83	1.22	1.22	6.11	0.00
8	Developing ODP demarcated parking lots	33.40	0.00	10.02	10.02	6.68	6.68	33.40	0.00
9	Development of parking facility to reduce the inward	30.00	0.00	9.00	9.00	6.00	6.00	30.00	0.00

Sector/ Component		Investment (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
	movement of vehicles in the city								
O	Public Bicycle Sharing (PBS) System	70.63	0.00	21.19	21.19	14.13	14.13	0.00	0.00
1	DB road to accommodate a 2m bicycle lane along the river edge	9.00	0.00	2.70	2.70	1.80	1.80	0.00	0.00
2	Purchase of bicycles for the PBS system (1040)	2.08	0.00	0.62	0.62	0.42	0.42	0.00	0.00
3	Purchase of Bicycle docking system (1545)	46.35	0.00	13.91	13.91	9.27	9.27	0.00	0.00
4	Installation of stations for PBS in Panaji (66)	13.20	0.00	3.96	3.96	2.64	2.64	0.00	0.00
P	Development of Pedestrian Plan and	21.00	0.00	6.30	6.30	4.20	4.20	0.00	0.00
1	Pedestrian Promenade along the DB road	9.00	0.00	2.70	2.70	1.80	1.80	0.00	0.00
2	Pedestrian priority areas around historic areas like Panaji Church, Boca Da Vaca, MiraMar Beach	12.00	0.00	3.60	3.60	2.40	2.40	0.00	0.00
Q	Traffic Management Plan	11.20	0.00	3.36	3.36	2.24	2.24	0.00	0.00
1	Installation of a traffic signal on foot bridge junction (to Patto)	0.35	0.00	0.11	0.11	0.07	0.07	0.00	0.00
2	one and two way systems to be designated by 2015	0.35	0.00	0.11	0.11	0.07	0.07	0.00	0.00
3	Road Markings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sector/ Component		Investment (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
	such as zebras at all major junctions								
4	Signage (one ways, no parking, road names, etc)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Provision of traffic Signals on 20 junctions in the city	5.00	0.00	1.50	1.50	1.00	1.00	0.00	0.00
6	Installation of Surveillance and monitoring cameras across all traffic signals and setting up a central traffic monitoring control center.	2.50	0.00	0.75	0.75	0.50	0.50	0.00	0.00
7	Supply and installation of traffic sinages across the city including electronic variable sign boards	300	0.00	0.90	0.90	0.60	0.60	0.00	0.00
8	Design, preparation, supply and implementation of the road and pavement management system for roads under CCP area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R	Street lighting	133.36	8.96	8.96	8.47	3.47	3.80	3.60	4.60
1	Provision of High power street lights	40.86	10.46	10.46	0.97	0.97	0.00	0.00	0.00
2	Solar based LED Lighting (preference to core city and main roads)	2.00	0.00	0.00	0.00	0.00	0.80	0.60	0.60
3	Underground ducting of the electricity	10.00	0.00	0.00	0.00	0.00	3.00	3.00	4.00

Sector/ Component		Investment (Rs. crores)	2014- 15	2015- 16	2016- 17	2017- 18	2018- 19	2019- 20	2020- 21
	cables (core city area)								
4	SCADA for street lighting and implementation of day light savings	25.00	7.50	7.50	7.50	2.50	0.00	0.00	0.00
5	Implementation of Solar City Master Plan for Panaji	91.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The total investment envisaged for Traffic and Transportation (including the street lighting) in the Revised CDP for the city is Rs.1602.76 Crores for 2041 and Rs. 1121.61 Crores for 2021. The Revised CDP for Panaji has taken into consideration the project components proposed under various study reports conducted viz. the Comprehensive Mobility Plan (CMP) for Panaji, DPR on Public bicycle share for Panaji, Decongestion model for core city of Panaji and Solar city Master Plan for Panaji.

17.7 Basic Services for Urban Poor

With respect to housing and basic services for the urban poor, the key challenges are proper database on the number of urban poor, state of living, access to infrastructure facilities and economic activities. In absence of the same it is very difficult to bring this section of people under the urban renewal programme.

The pucca low cost housing should be provided to the urban poor in the city. Further, the service levels should be improved such that the urban poor section/ localities should have access to water supply, sewerage, door-to-door waste collection, CC roads and street lighting facilities. The gap analysis presents the current deficit in the system and future requirement for the design year 2041.

Table 128: Housing and Urban Poverty Alleviation Sector Plan

Sector Goals	
Sector Goals	<ul style="list-style-type: none"> ▪ Improve the access to physical and social infrastructure to urban poor section ▪ Develop affordable housing for 100% urban poor population in the city ▪ Develop livelihood strategies to improve the work force participation
Design Parameters	
Design parameters	<ul style="list-style-type: none"> ▪ New houses to households living in kutcha houses and dilapidated structures in low lying areas and along water front. ▪ Water Supply –Individual house service connections to all the slum households or group connections ▪ Sewerage - Individual house service connections ▪ Sanitation – Community toilets

	<ul style="list-style-type: none"> ▪ Solid Waste Management- Coverage of all slum households under door-to-door collection and awareness campaigns on source segregation 						
Demand Gap Assessment							
Demand Gap Assessment	Component	Existing Levels	Gap (2014)	2021 (Short Term)		2041 (Long Term)	
				Demand	Gap	Demand	Gap
	Housing for urban poor H/h residing in Kutcha houses	1010	-	200	-	700	-
Desired Outcomes							
Desired Outcomes	Component			2017	2019	2021	
	Housing for the urban poor			60%	100%	100%	
	Adequate access to water supply			80%	100%	100%	
	Access to open drains			80%	100%	100%	
	Access to sanitation			80%	100%	100%	
	% of CC roads			90%	100%	100%	
	Access to UGD			40%	80%	100%	
	Access to health and education facilities			80%	100%	100%	
Action Plans							
Categorization of slums	<ul style="list-style-type: none"> ▪ The urban poor pockets in the CCP are to be surveyed to understand the status of infrastructure and its socio economic profile 						
Rehabilitation of slums	<ul style="list-style-type: none"> ▪ Pucca housing in the feasible location in the city surroundings 						
Construction of housing	<ul style="list-style-type: none"> ▪ The slums in low lying areas and along the natural drains could be proposed for relocation. 						
Access to health and education	<ul style="list-style-type: none"> ▪ Awareness programme to impart information about cleanliness and health safety measures in the urban poor section ▪ Access to primary health services to the BPL population. ▪ Access to educational facilities like primary, secondary schools, adult education for the urban poor section 						
Livelihood restoration	<ul style="list-style-type: none"> ▪ Activity centres to be established for skill development programmes 						

17.7.1 Capital Investment Plan

Table 129: Project Identified -Housing and Urban Poverty Alleviation

Project	Component	Estimated cost in Rs. Crores
A. Study and Analysis of the Urban Poor section in the city	<ul style="list-style-type: none"> ▪ Study and Assessment of the Urban poor section with mapping of all the urban poor pockets, its access to infrastructure, land ownership and socio economic survey 	1.0

Project	Component	Estimated cost in Rs. Crores
B. Housing and infrastructure development	<ul style="list-style-type: none"> ▪ New housing and infrastructure requirement for 200 nos. of households has been projected for the year 2021. 	7.00
C. Livelihood development	<ul style="list-style-type: none"> ▪ Vocational training for employment generation and development of social security mechanisms 	1.5
D. Social infrastructure	<ul style="list-style-type: none"> ▪ Development of primary schools, health care centres, and community halls 	1.5
Total investment (2041)		11.0
Total investment envisaged for 2021		11.0

Table 130: Project Details -Housing and Urban Poverty Alleviation

Project	Proposed Projects
A. Study and Analysis of the Urban Poor section in the city	<ul style="list-style-type: none"> ▪ Presently the city is not having any declared/ undeclared slum pockets. However, in absence of proper updated data of urban poor section it is difficult to scale their extent. Hence, study and assessment of the urban poor section with mapping of all the urban poor pockets, its access to infrastructure, land ownership and socio economic survey should be taken up on priority basis.
B. Housing and infrastructure development	<ul style="list-style-type: none"> ▪ Relocation of the urban poor pockets from the low lying areas of the city should be done in low cost housing system to be proposed in the outgrowth areas of the city. New housing and infrastructure requirement for 200 nos. of households has been projected for the year 2021.
C. Livelihood development	<ul style="list-style-type: none"> ▪ Vocational training for employment generation and development of social security mechanisms for the economic upliftment of the urban poor.
D. Social infrastructure	<ul style="list-style-type: none"> ▪ Development of primary schools, health care centres, and community halls for the urban poor section in the city has been proposed.

17.7.2 Phasing of Investment

Table 131: Project Phasing -Housing and Urban Poverty Alleviation

Sector/ Component		Investment (Rs. crores)	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Urban Poor		11.00	0.50	1.90	2.48	2.93	2.23	0.68	0.30
1	Slum Housing	7.00	0.00	1.40	2.10	2.10	1.40	0.00	0.00
2	Livelihood development	1.50	0.00	0.00	0.38	0.38	0.38	0.38	0.00
3	Social infrastructure for urban Poor	1.50	0.00	0.00	0.00	0.45	0.45	0.30	0.30
4	Study and Assessment of urban poor pockets	1.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00

The total investment envisaged for housing and urban poverty alleviation in the Revised CDP for the city is 11.00 crores for 2021 and 2041. Under JNNURM, DPR for Basic Services for Urban Poor (BSUP) was prepared and sent to MoUD which got approval though detail study report was asked from CCP. But the delay in putting across the details as asked by MoUD the project period lapsed and was cancelled by MoUD. However, the proposal has been reconsidered in the Revised CDP For Panaji so that it can be taken up under the new urban development mission of the central government.

17.8 Urban Environment and Disaster Management

The city of Panaji presently is still under the limits of pollution levels and has adequate number of open spaces within its area. However, growing number of vehicles will contribute considerable noise and air pollution in the coming years. The present city level water bodies are not yet taken up for conservation and preservation. There is no initiative towards eco friendly means of transport within the city. The city is prone to various natural and manmade disasters on account of its geographical location and topographical features. The city has not witnessed any major natural disaster till date however, flooding during monsoon is observed in monsoons. The city is also prone to manmade disasters like fire accidents and road accidents which given the highly dense city pattern can cause heavy damage to human life as well as the structures in the city which mostly possess heritage value. The District Disaster Management Plan has been formulated which covers the city of Panaji. However, the CCP involvement has been limited. The following action plan has been suggested to improve the quality of urban environment and disaster management mitigation within the city limits.

Table 132: Urban Environment and Disaster Management Sector Plan

Sector Goals	
Sector Goals	<ul style="list-style-type: none"> ▪ Conservation and Development of the city level open spaces and water bodies ▪ Increase the green cover of the city with urban forestry ▪ Measures to be implied for reduction in air, water and noise pollution in the city

	<ul style="list-style-type: none"> ◆ Adoption of disaster management measures and climate change resilience actions at city level 			
Desired Outcomes				
Desired Outcomes	Component	2017	2019	2021
	Preservation of water bodies	50%	75%	100%
Action Plans				
Mapping of ecological features	<ul style="list-style-type: none"> ■ Preparation of study report on the ecologically sensitive areas and features in the city and measures to restrict its future degradation 			
Eviction of encroachments	<ul style="list-style-type: none"> ■ Participatory approach for resettlement of encroachments around the Natural drains and other water front low lying areas 			
Pollution mitigation strategies	<ul style="list-style-type: none"> ■ Increasing the green cover and buffer zones in the city to mitigate air pollution in the city 			
Energy conservation	<ul style="list-style-type: none"> ■ CCP in collaboration with Electricity Department should propose energy saving measures like solar signalling and solar street lighting system ■ Promote CNG vehicles and buses by incentivisation and propagating public awareness towards its usage ■ Low emission scooters/ mopeds, bicycles to be introduced to commute within the city for the tourists as nominal rental and hourly basis promoting its usage. 			
Impact assessment and monitoring	<ul style="list-style-type: none"> ■ Regular monitoring of air quality, water quality (surface and ground), and noise pollution ■ Carrying out environmental impact assessment prior to implementation of infrastructure projects 			
Disaster Management	<ul style="list-style-type: none"> ■ Making Panaji city equipped with disaster resilient measures ■ Development of control room or city level service center ■ Development of emergency control responsive system ■ Developing disaster preparedness for the conservation of the heritage sites and structures 			
Climate Change	<ul style="list-style-type: none"> ■ Mapping the climate change activities, the ecological features and the flood prone areas within the city on regular intervals. ■ Introducing low energy consuming options like energy efficient street lighting and low emission options of mobilityto be introduced in CCP limits ■ Creating awareness amongst citizens on suitable renewable energy and energy efficiency technologies ■ Setting up a climate change cell for the city 			
Awareness Programmes	<ul style="list-style-type: none"> ■ Awareness programmes and workshops to make the locals and tourists about the conservation of city environs ■ Initiating people's participation in planting trees within the city area, cleanliness programmes and use of non motorised vehicles 			

17.8.1 Capital Investment Plan

Table 133: Projects Identified - Urban Environment and Disaster Management

Project	Component	Estimated cost in Rs. Crores
A. Rejuvenation of water bodies	<ul style="list-style-type: none"> ▪ Development and beautification of Mala Lake as city level recreational area. 	3.0
B. Mapping of ecological features in the city	<ul style="list-style-type: none"> ▪ Preparation of Study report mapping and assessing the status of existing natural features within the city. ▪ Propose Environmental Conservation Plan for the city. 	2.0
C. Pollution mitigation strategies	<ul style="list-style-type: none"> ▪ Urban forestry measures in order to increase the green cover in the city 	2.0
D. Awareness programmes	<ul style="list-style-type: none"> ▪ Public awareness programme for the public 	1.0
E. Disaster Management Cell	<ul style="list-style-type: none"> ▪ Establishment of Disaster management cell at CCP with emergency response system 	5.0
F. Climate Change Resilience	<ul style="list-style-type: none"> ▪ Setting up a climate change monitoring station for Panaji 	50
Total investment (2041)		63.0
Total investment envisaged for 2021		63.0

Table 134: Projects Details - Urban Environment and Disaster Management

Proposed Projects	Details
A. Rejuvenation of water bodies	<ul style="list-style-type: none"> ▪ Development of Mala lake with proper cleaning, construction of bund wall, landscaped garden area with recreational facilities, fencing, parking etc.
B. Mapping of ecological features in the city	<ul style="list-style-type: none"> ▪ Study report mapping and assessing the present state and future threats of the existing natural features within the city. Environmental Conservation Plan to be proposed on its lines to ensure further degradation of these features and regularly monitored
C. Pollution mitigation strategies	<ul style="list-style-type: none"> ▪ Plantation of trees along major roads and residential areas and landscaping of the traffic islands/ dividers as well as the footpaths.
D. Disaster Management Cell	<ul style="list-style-type: none"> ▪ Disaster management cell to be established at CCP to act as the nodal point for all emergency related activities in the city. ▪ Installation of communication devices to facilitate information dissemination on natural disasters. ▪ Building regulations to be made strict to make fire fighting measures mandatory for commercial and institutional buildings.
E. Awareness programmes	<ul style="list-style-type: none"> ▪ Public awareness programme for preservation of city environment and explaining the threats of pollution in future to be conducted ▪ Awareness among the people of the measures to be followed in

Proposed Projects	Details
	case of disasters like fire accidents, floods and road accidents.
F. Climate Change	<ul style="list-style-type: none"> ▪ Setting up a climate change monitoring station for Panaji

17.8.2 Phasing of Investment

Table 135: Project Phasing - Urban Environment and Disaster Management

Sector/ Component	Investment (Rs. crores)	2014- 15	2015 -16	2016- 17	2017- 18	201 8-19	2019 -20	202 0-21
Urban Environment & Disaster Management	63.00	12.65	15.70	15.70	17.50	1.25	0.10	0.10
1 Rejuvenation of water bodies	3.00	0.00	0.75	0.75	0.75	0.75	0.00	0.00
2 Mapping of ecological features in the city	2.00	0.80	0.60	0.60	0.00	0.00	0.00	0.00
3 Pollution mitigation strategies	2.00	0.40	0.40	0.40	0.40	0.40	0.00	0.00
4 Awareness programmes	1.00	0.20	0.20	0.20	0.10	0.10	0.10	0.10
5 Setting up a disaster management cell at City Level	5.00	1.25	1.25	1.25	1.25	0.00	0.00	0.00
6 Setting up a climate change monitoring station for Panaji	50.00	1.000	12.50	12.50	15.00	0.00	0.00	0.00

The total investment envisaged for urban environment and Disaster Management in the Revised CDP for the city is Rs.63.00 crores for 2021 and 2041.

17.9 Social Infrastructure

As discussed in the assessment chapter, the city is well equipped with social amenities at present. There are adequate number of parks within the city but lack proper infrastructure and recreational facilities to serve as breathing space for the locals. The health and educational facilities in the city are adequate for present need but will be inadequate for the future needs. The city lacks proper market facilities for wholesale commodities traded daily from the neighbouring areas. At present these activities are located within the core city which causes lot of congestion in the city. Moreover, the required infrastructure for such markets like loading unloading area, parking for goods vehicles, storage etc cannot be provided. The following action plan has been suggested to improve the social and cultural infrastructure within the city.

Table 136: Social Infrastructure Sector Plan

Sector Goals	
Sector Goals	<ul style="list-style-type: none"> ▪ Provision of adequate social amenities for the present and future need of the city

Demand Gap analysis	
In order to estimate the demand and gap analysis in the social and cultural infrastructure, the forecast has been carried out as per the URDPFI guidelines. The parameters and demand-gap analysis for social and cultural infrastructure have been presented in section 6 of this report.	
Action Plans	
Augmentation of education infrastructure	<ul style="list-style-type: none"> ▪ Provision of educational facilities lacking at present as well as required for the future demand.
Augmentation of healthcare infrastructure	<ul style="list-style-type: none"> ▪ Mapping of the existing health care facility and development of infrastructure on hierarchical basis for the present as well as future needs.
Development of Open spaces	<ul style="list-style-type: none"> ▪ Improvement of the city parks with good landscaping and developing recreational activities to attract tourists
Redevelopment of old market areas	<ul style="list-style-type: none"> ▪ Development of market area for wholesale goods and godowns located in city core

17.9.1 Capital Investment Plan

Table 137: Projects Identified - Social Infrastructure

Project	Component	Estimated cost in Rs. Crores
A. Education	<ul style="list-style-type: none"> ▪ Development of Educational infrastructure 	5.0
B. Health	<ul style="list-style-type: none"> ▪ Development of Health care infrastructure 	3.0
C. Parks	<ul style="list-style-type: none"> ▪ Improvement of the CCP parks with good landscaping and developing recreational activities to attract tourists 	21.0
D. Markets	<ul style="list-style-type: none"> ▪ Development of market area for wholesale goods and go downs located in city core 	5.0
Total investment (2041)		34.00
Total investment envisaged for 2021		23.50

Table 138: Project Details – Social Infrastructure

Proposed Projects	Details
A. Education	<ul style="list-style-type: none"> ▪ The city is well equipped with good educational facilities. However, for the future needs of the city development of educational facilities have been taken into account for the city
B. Health	<ul style="list-style-type: none"> ▪ The health facilities in the city are good and serve the city as well as the surrounding areas. Considering the increase in demand in future the health care infrastructure has been proposed for the city.
C. Parks	<ul style="list-style-type: none"> ▪ The city has adequate number of parks and playgrounds. However, the city level parks are not well maintained to serve the residents. Hence, it is proposed for improvement of the CCP parks with good landscaping and developing recreational activities to attract locals as well as tourists.

Proposed Projects	Details
D. Markets	<ul style="list-style-type: none"> Development of market area for wholesale goods and godowns located in city core in the city outskirts. Proper commercial and market area with facilities like truck parking, loading and unloading area, market complex etc has been proposed

17.9.2 Possible intervention through PPP

- Improvement of the city parks with good landscaping and developing recreational activities to attract tourists
- Development of market area for wholesale goods and godowns located in city core

17.9.3 Phasing of Investment

Table 139: Project Phasing - Social Infrastructure

Sector/Component		Investment (Rs. crores)	2014 -15	2015 -16	2016 -17	2017 -18	2018 -19	2019 -20	2020 -21
Social Infrastructure		23.50	4.40	4.40	6.00	3.90	1.60	1.60	1.60
1	Development of Educational infrastructure	5.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00
2	Development of Health care infrastructure	3.00	0.00	0.00	0.60	0.60	0.60	0.60	0.60
3	Improvement of the CCP parks	10.50	3.15	3.15	3.15	1.05	0.00	0.00	0.00
4	Development of market area for wholesale goods and godowns	5.00	1.25	1.25	1.25	1.25	0.00	0.00	0.00

The total investment envisaged for Social Infrastructure in the Revised CDP for the city is Rs. 34.00 crores for 2041 and Rs. 23.50 Crores for 2021.

17.10 Tourism and Heritage Development

The city lacks tourist activities highlighting the art, culture and heritage of the city which is one of its most important resources of the state to the tourists which merely look for beach tourism. The city also does not have good quality tourist infrastructure like well designed signages, modernized public toilets, well designed pedestrian walkways, reliable public transport system etc. The city level tourist spots needs to be developed which will enhance the tourist experience within the city.

Table 140:Tourism and Heritage Sector Plan

Sector Goals	
Sector Goals	<ul style="list-style-type: none"> Develop city level spots and locations as recreational and public spaces Conservation and revival of the important heritage areas within the city

	<ul style="list-style-type: none"> ▪ Provision of adequate tourist amenities
Action Plans	
Development of the city level spaces	<ul style="list-style-type: none"> ▪ The city of Panaji is major tourist hub in the state. Large number of tourists halts in the city and commutes daily to the various tourist spots around. However, the city lacks well planned public spots and areas which can offer the tourist an insight into the city life and environs.
Development of Tourist amenities	<ul style="list-style-type: none"> ▪ The city level tourist amenities needs to be made modernised. Provision of signage in the city as well as major tourist spots in the city needs to be done on priority basis.
Development of Heritage areas within the city	<ul style="list-style-type: none"> ▪ Panaji possesses some of the unique heritage character which was developed during the time of Portuguese rule. This heritage of the city needs to be revived to enhance its identity and attract more domestic as well as foreign tourists which come mostly for leisure tourism.

17.10.1 Capital Investment Plan

Table 141: Projects Identified - Tourism and Heritage

Project	Component	Estimated cost in Rs. Crores
A. Recreational	<ul style="list-style-type: none"> ▪ Development of the River side road from Miramar to patto (8 km) 	32.40
B. Heritage	<ul style="list-style-type: none"> ▪ Improvement of hill steps at 14 Locations <ul style="list-style-type: none"> ◆ Panaji Church to Altinho Road (Father Agnelo Road) ◆ St. Inez to Altinho Road via Factories & Boilers ◆ Altinho down below Boca - de - Vaca area ◆ Mala Altinho near Maruti Temple ◆ St. Inez - St. Inez Church - Hindu Crematorium ----- near Ganpathi Temple ◆ Altinho Bhatlem ---- near Government Quarters ◆ Altinho - down below Mala area 8. Behind Panaji Main Church Hall ----- backside area ◆ Cortin Panjai Road ◆ Ribandar Ajuda Church - one way road side ◆ Near Bal Bharathi School Ribandar ◆ Dona Paula Raj Bhavan Road ---- Aivao area ◆ Dona Paula Jetty road ◆ St. Inez behind T.B. Hospital ▪ Development of Mala Heritage Area ▪ Cultural and Heritage centre 	58.00
C. Recreational	<ul style="list-style-type: none"> ▪ Improvement of the Dona Paula area ▪ Development of Oceanarium 	150.0
D. Tourist Amenities	<ul style="list-style-type: none"> ▪ Provision of adequate tourists signage within the city 	2.50

Project	Component	Estimated cost in
Total investment (2041)		242.90
Total investment envisaged for 2021		142.90

Table 142: Projects Details - Tourism and Heritage

Proposed Projects	Details
Recreational	<ul style="list-style-type: none"> ■ Development of the River side road from Miramar to Patto (9 km) - landscaping, , street furniture, sitting areas, open cafeteria, lighting etc
Heritage	<ul style="list-style-type: none"> ■ Improvement of hill steps at Cortini with proper paving, sitting, lighting, landscaping etc. ■ Development of the Mala Heritage Area with proper area planning, conservation policies and measures for improvement of the major features and structures ■ Development of Cultural and Heritage centre showcasing the culture, cuisine, traditions, festivals, lifestyle and local arts of the state.
Recreational	<ul style="list-style-type: none"> ■ Improvement of the Dona Paula area - sound and light show, cultural shows, local cuisine, landscaping and recreational areas. ■ Development of Oceanarium with recreational facilities like water park, food court, water sports facilities etc.
Tourist Amenities	<ul style="list-style-type: none"> ■ Provision of adequate signage indicating the destinations located in the circuit at major traffic junctions and tourist destinations in city

17.10.2 Possible intervention through PPP

- Development of the River side road from Miramar to Patto (8 km) landscaping, sitting areas, open cafeteria, lighting etc.
- Development of Oceanarium with recreational facilities
- Development of Cultural and Heritage centre

17.10.3 Phasing of Investment

Table 143: Project Phasing -Tourism and Heritage

Sector/Component	Investment (Rs. crores)	2014 -15	2015 -16	2016 -17	2017 -18	2018 -19	2019 -20	2020 -21
Tourism and Heritage	147.90	1.00	16.00	20.75	42.96	31.72	22.97	12.50
1 Development of the River side road from Miramar to Patto (8 km)	32.40	0.00	0.00	0.00	12.96	9.72	9.72	0.00
2 Improvement of hill steps at 14 Locations	35.00	0.00	8.75	8.75	8.75	8.75	0.00	0.00
3 Improvement of the Dona Paula area	50.00	0.00	0.00	0.00	12.50	12.50	12.50	12.50
4 Provision of signage	2.50	1.00	0.75	0.75	0.00	0.00	0.00	0.00

Sector/Component		Investment (Rs. crores)	2014 -15	2015 -16	2016 -17	2017 -18	2018 -19	2019 -20	2020 -21
	for tourist circuit								
5	Development of Mala Heritage Area	3.00	0.00	0.00	0.75	0.75	0.75	0.75	0.00
6	Development of Oceanarium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Cultural and Heritage Centre	20.00	0.00	6.00	6.00	8.00	0.00	0.00	0.00
8	Development of Eco-Tourism (Bio-Diversity walk) in CCP area	5.00	0.00	.50	4.50	0.00	0.00	0.00	0.00

The total investment envisaged for Tourism and Heritage in the Revised CDP for the city is Rs.247.90 crores for 2041 and Rs.147.90 crores for 2021. Detail Study report has been prepared for Mala Heritage area which has been included in the Revised CDP proposal under Heritage and Tourism sector.

17.11 Urban Governance

The CCP and state level departments form the urban governance system for the city of Panaji. The CCP role has been limited in the provision of urban infrastructure facilities in the city. However, the CCP is major governing authority for various functions like building approvals, property tax collections, issuing death and birth certificates and O & M of city infrastructure viz. SWM, storm water drains, urban poverty alleviation etc. The CCP has been making efforts towards the improvement of urban governance by adopting new measures and tools like DEAS. However, there is no practice of preparing the outcome of performance budget in the CCP. There is no separate budget prepared for the urban poor in the city. CCP has not carried out any property survey, and even the general assessment has not been done since last 5-6 years. It does not maintain records of properties as per its use viz. residential or commercial. The CCP staff needs substantial capacity building to increase their understanding towards outcome and performance budgeting as well as public financial management.

Table 144: Urban Governance Sector Plan

Urban Governance	
Action Plans	Activities
Property tax survey and reforms implementation	<ul style="list-style-type: none"> ▪ Reassess the property valuation and levy of property tax based on best practices. ▪ Detailed study to be carried on property tax to identify the grey areas and further improve the coverage and collection efficiency
E-Governance reforms implementation	<ul style="list-style-type: none"> ▪ Implementation of the DPR prepared for development of E-Governance in CCP. ▪ Mapping of all infrastructure services on GIS (Water Supply, Sewerage, Storm Water etc.)
Capacity building and	<ul style="list-style-type: none"> ▪ Undertaking business process re-engineering exercises for CCP

Urban Governance	
training	<ul style="list-style-type: none"> ■ Preparation of training needs assessment, training curriculum, identification of training institutions. Support is also required in preparation of IEC material on various subjects. ■ Trainings to both technical and non-technical staff is required on basic accounting principles, DEAS, GIS and other software modules. ■ Trainings to be imparted for preparation of note sheets, measurements book and various business rules.

17.11.1 Capital Investment Plan

Table 145:Projects Identified – Urban Governance

Project	Estimated cost in Rs. Crores
■ Property tax survey and reform implementation	3.50
■ E – Governance system	19.79
■ Capacity building and training programmes for CCP staff	5.00
■ Undertaking business process re-engineering for CCP	1.00
Mapping of all infrastructure services on GIS (Water Supply, Sewerage, Storm Water etc.)	2.50
Total investment (2041)	31.79
Total investment envisaged for 2021	29.29

17.11.2 Phasing of Investment

Table 146: Project Phasing – Urban Governance

Sector/Component	Investment (Rs. crores)	2014 -15	2015 -16	2016 -17	2017 -18	2018 -19	2019 -20	2020 -21
Urban Governance	29.29	5.56	5.76	5.16	4.91	4.91	0.25	0.25
1 Property tax survey and reform implementation	3.50	0.70	0.70	0.70	0.70	0.70	0.00	0.00
2 Implementation of E – Governance system for CCP	19.79	3.96	3.96	3.96	3.96	3.96	0.00	0.00
3 Capacity building and training programmes for CCP staff	2.50	0.50	0.50	0.50	0.25	0.25	0.25	0.25
4 Undertaking business process re-engineering excercises for CCP	1.00	0.40	0.60	0.00	0.00	0.00	0.00	0.00

Sector/Component	Investment (Rs. crores)	2014 -15	2015 -16	2016 -17	2017 -18	2018 -19	2019 -20	2020 -21
5 Mapping of all infrastructure services on GIS (Water Supply, Sewerage, Storm Water etc.)	2.50	0.00	0.75	1.00	0.75	0.00	0.00	0.00

The total investment envisaged for Improvement of Urban Governance system in the Revised CDP for the city is 31.79 crores for 2041 and Rs 29.29 crores for 2021. However, under 1st Generation CDP under JNNURM, DPR for E – Governance had been prepared with estimated cost of 19.79 crores and approved by MoUD in 2013. The DPR has not yet taken up for implementation. Hence, the project has been included in the Revised CDP proposal under Urban Governance sector.

17.12 Summary of Capital Investment

The total estimated capital investment required for providing efficient services to the present population and future population of the city by the year 2041 is **Rs. 2501.52 crores**. A total of **Rs. 1857.46 crores** are proposed for investment by 2020-21 to cater to priority infrastructure requirement. The table below presents the summary of sector-wise total investment need and investments.

Table 147: Summary of capital investment (Rs. Crore)

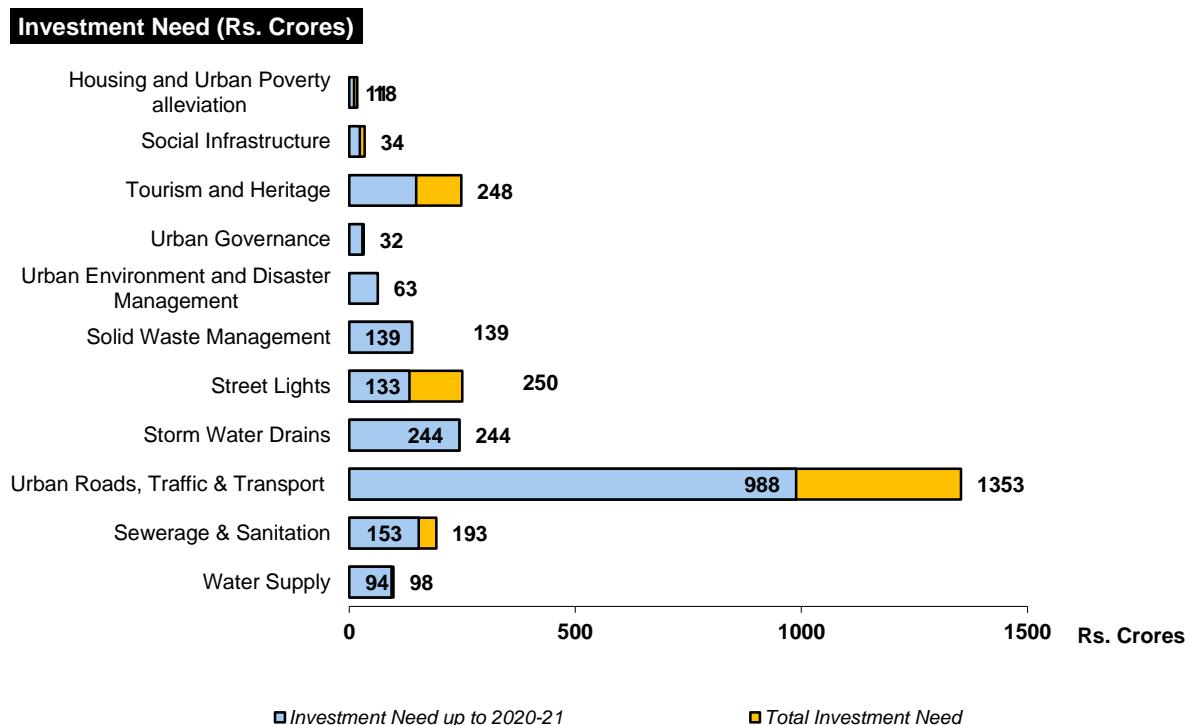
Sr no	Sector	Short Term (Till 2021)	Long Term (2021-41)	Total
1	Water Supply	93.56	4.60	98.16
2	Sewerage & Sanitation	153.47	39.06	192.53
3	Urban Roads, Traffic & Transport	988.24	364.66	1,352.90
4	Storm Water Drains	243.81	-	243.81
5	Street Lights	133.36	116.50	249.86
6	Solid Waste Management	138.81	-	138.81
7	Urban Environment and Disaster Management	63.00	-	63.00
8	Urban Governance	29.29	2.50	31.79
9	Tourism and Heritage	147.90	100.00	247.90
10	Social Infrastructure	23.50	10.50	34.00
11	Housing and Urban Poverty alleviation	11.00	7.00	18.00
	Total	2,025.96	644.82	2,670.77

The sectors of tourism, heritage, traffic and transportation, have been given the highest priority. Hence, 59.94% of the total investment (50.66% for transport and 9.28% for Tourism and Heritage) has been earmarked towards the projects under these sectors. This is followed by the sectors of water supply (3.68%), sewerage and sanitation (7.21%), urban environment and disaster management (2.52%), and solid waste management (5.20%).

As discussed earlier the sector of water supply, sewerage, solid waste management, traffic and transportation and urban poor has been prioritized by CCP in the 1st Generation CDP. The project

reports have been prepared and approved for implementation taking into consideration the city's requirement till 2041. Hence this CDP has taken into consideration projects under other sectors in priority. The sector-wise breakup of investment identified for 2021 is presented in the graph below.

Figure 61: Capital investment for 2021 (figures in Rs. Crores)



17.13 Composition of investment

The following agency would be responsible for implementing the projects identified in the CDP.

City Corporation of Panaji (CCP) – CCP would be responsible for design, construction, operation and maintenance of solid waste management system, development works proposed for urban poor section, enhancement of the urban governance system, conservation of the city level ecologically sensitive areas and provision of city level infrastructures viz. public toilets, commercial markets, parking facilities, improvement of city level parks etc. CCP would be the implementing agency for the Projects identified in the above mentioned sectors. In the overall investment, CCP has to contribute 17.03% of total investment.

Public Health and Engineering Department, Goa (PHED) – It would be responsible for design, construction, operation, and maintenance of water supply and sewerage system. PHED would be the implementing agency for the projects identified in the above mentioned sectors. In the overall investment, PHED has to contribute 12.92% of total investment.

Public Works Department (PWD) / Goa State Infrastructure Development Corporation (GSIDC) – It would be responsible for design, construction, operation, and maintenance of the city roads as well as the design and construction of new strom water drains within the city. PWD/GSIDC will be implementing agency for the proposed projects for provision of new roads, improvement of surface

condition of existing roads and improvement of the SWD system in the city. In the overall investment, PWD has to contribute 38.55% of total investment.

Goa State Electricity Board (GSEB) - It would be responsible for design, construction, operation, and maintenance of street lights within the city. GSEB would be the implementing agency for the projects identified for improvement of street lighting system within the city. In the overall investment, GSEB has to contribute 7.18% of total investment.

Water Resource Department (WRD) / Goa State Infrastructure Development Corporation (GSIDC) - It would be responsible for operation, and maintenance of major drains in the city. WRD /GSIDC would be the implementing agency for the projects identified for improvement of major SWD within the city. In the overall investment, WSD has to contribute 7.74% of total investment.

Kadamaba Transport Corporation (KTC) - KTC would be responsible for procurement, operation and maintenance of public transport system within the city. It would be the implementing agency for the projects identified for improvement of the public transport system and infrastructure within the city. . In the overall investment, WSD has to contribute 10.48% of total investment.

Department of Tourism (DoT), Goa – DoT would be responsible for construction, operation and maintenance of tourist points within the city. Hence DoT has been identified as responsible agency for the tourism development projects identified in the CDP. In the overall investment, DoT has to contribute 4.23% of the total investment.

Department of Health and Education – The state department for education and health would be responsible for development of the education and health facilities identified as per the URDPFI guidelines. In the overall investment, the education department has to contribute 2.80% of the total investment and health department has to contribute 0.43% of the total investment.

River Navigation Department (RND): The river navigation department of the state government as it does would be required to support the stakeholders of the city development through updradation and development of new ferry routes to and fro from the city. The RND would be required to undertake 0.27% of the total identified investments for updgaration of the water ways to and fro from the city.

Goa Traffic Cell: The traffic cell in the state of Goa plays a very critical role in the management of traffic in the city during the peak tourist influx seasons. During the consultations with the traffic cell and other officials involved in traffic and transport management in the city, various projects to be implemented by the Traffic cell emerged and the same has been considered in this CDP. In the overall investments at the city level it is envisaged that the Traffic Cell would need to contribute towards improvement of junctions, traffic calming measures, online traffic management etc. and the cell would need to contribute 0.6% of the total identified investment.

Table 148: Implementing agency wise breakup of investment (Rs. Crores)

Implementing Agency	Till 2021		Total Investment (till 2041)	
	Investment Estimated	% of Total	Investment Estimated	% of Total
PHED	239.95	11.84%	280.61	11%
PWD / GSIDC	716.00	35.34%	1,059.46	40%
CCP	319.82	15.79%	332.32	12%
WRD/ GSIDC	251.81	12.43%	251.81	9%
DoE	5.00	0.25%	5.00	0%

Implementing Agency	Till 2021		Total Investment (till 2041)	
	Investment Estimated	% of Total	Investment Estimated	% of Total
DoH	3.00	0.15%	3.00	0%
DoF	15.50	0.77%	26.00	1%
DoT	139.90	6.91%	239.90	9%
KTC	184.70	9.12%	193.70	7%
GSEB	133.36	6.58%	249.86	9%
RND	5.71	0.28%	7.91	0%
Traffic Cell	11.20	0.55%	21.20	1%
Total	2,025.96	100%	2,670.77	

PHED: Public Health Engineering Department, PWD: Public Works Department, CCP: Corporation of City of Panaji, WRD: Water Resources Department, DoE: Department of Education, DoH: Department of Health, DoT: Department of Tourism, KTC: Kadamba Transport Corporation, GSEB: Goa State Electricity Board, GSIDC – Goa State Infrastructure Development Corporation

Table 149: Phasing of Overall Investment (Rs. Lakhs)

Sector	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Water Supply	17.23	22.27	28.07	20.46	5.52	-	-
Sewerage & Sanitation	8.24	27.51	25.95	31.09	34.62	11.17	14.90
Urban Roads, Traffic & Transport	12.96	275.48	275.48	197.65	197.65	14.51	14.51
Storm Water Drains	52.32	49.02	56.52	24.12	24.12	24.12	13.58
Street Lights	8.96	18.11	26.77	30.92	40.40	3.60	4.60
Solid Waste Management	25.23	32.28	38.96	13.71	10.43	10.38	7.82
Urban Environment and Disaster Management	12.65	15.70	15.70	17.50	1.25	0.10	0.10
Urban Governance	5.56	6.51	6.16	5.66	4.91	0.25	0.25
Tourism and Heritage	1.00	16.00	20.75	42.96	31.72	22.97	12.50
Social Infrastructure	4.40	4.40	6.00	3.90	1.60	1.60	1.60
Housing and Urban Poverty alleviation	0.50	1.90	2.48	2.93	2.23	0.68	0.30
Total	149.05	469.19	502.84	390.90	354.44	89.38	70.16

18. FINANCIAL OPERATING PLAN

The investment capacity of CCP is assessed through a financial operating plan (FOP), which gives a multi-year forecast of finances for the medium term. In line with the phasing of identified in the capital investment (CIP), the FOP has been generated for the same period for CCP. A salient feature of the FOP is that all outstanding dues, including debt and non-debt liabilities if any, are also taken into account.

18.1 Financial Plan for the City

Urban Local Body: CCP is the one of the agency for provision of basic public health services such as solid waste management, social amenities and basic services for urban poor within its jurisdictions. Therefore, CCP accounts for these sectors have been reviewed and furtherthe accounts have been forecasted to prepare the financial plan for the city.

Accordingly, the annual accounts of CCP for the period between the financial years 2007-08 and 2011-12 are used to determine past trends for both revenue and expenditure items and to arrive at appropriate growth assumptions for each of the income and expense items. After forecasting the revenue account, the CIP has been loaded on to cash flow. The FOP is generated to assess the investment sustaining capacity of CCP.

Parastatal Agencies: There are state level departments viz. PWD, PHED, Health Department, Education Department etc. involved in provision of basic services within the CCP jurisdiction. It is to be understood here that all the parastatals / state level agencies are engaged in provision of services at either the state level or the regional level. Also, the CCP is not involved in the Operation and maintenance of these services. Hence, in absence of the city (CCP) specific information from these offices, the financials of these parastatal/ state level agencies are not included in the City Financial Plan (CFP).

18.2 Methodology

For the preparation of FOP for CCP, we have adopted the following methodology as provided in the revised CDP toolkit. The stage wise methodology and the key references has been presented in the below table.

Table 150: Methodology for City Financial Plan

Task	Step	Key Stages	Description	Remarks
Task1	Step 1	Defining Objectives	<p>The key objectives have been defined for following key areas.</p> <ul style="list-style-type: none"> ■ Revenue enhancement initiatives ■ Expenditure management initiatives ■ Asset management initiatives ■ Financial Management initiatives <p>Further, it has been discussed in detailed in the subsequent sections.</p>	<p>The sub sections 18.9 to 18.12 has provided the details</p>

Task	Step	Key Stages	Description	Remarks
Task2	Step 2	Data Collection	The annual accounts, balance sheets, debt schedules, DCB statements for water and sewerage have been collected from CCP for the past five years. The recasting and trend analysis has been carried and the findings have been presented in the financial assessment chapter above.	Chapter 15 has detailed out the recasting and trend analysis.
	Step3	Business-As-Usual scenario -- CFP Version I	As a first step in preparation of FoP for the city, we have prepared the Business-As-Usual scenario and provided the overall capacity of CCP to take-up the infrastructure projects. The scenario has been discussed in the section FOP scenario considered	The sub section 18.6 has provided the details.
	Step 4	Analysis / Interpretation of the results	Post finalization of Business-As-Usual scenario, we have carried out the analysis on the revenue and expenditure to check the performance of key items. The same has been presented in the annexure.	
Task3	Task5	Identification of areas of improvement / reforms	We have identified the property tax and water charges are the key revenue source where the reforms can be explored to improve the coverage and collection efficiency and the same has been detailed out in the Revenue enhancement initiatives	The sub sections 18.7 and 18.8 have provided the details.
	Step6	Select / priorities areas of improvement / reforms	Under the revenue enhancement initiatives, we have identified the key reforms to be implemented in the property tax and user charges.	The sub section 18.9 has provided the details.
Task4	Step7	Finalizing basic assumptions for resource mobilization forecast	Key assumptions for the income and expenditure side have been presented in the key assumptions section.	The sub section 18.4.1 has provided the details.
	Step8	Ascertain investible surplus for ULB / Parastatals / Development authority	Ascertain investible surplus for CCP has been discussed in the investible surplus section.	The sub section 18.5 has provided the details.
Task5	Step9	Ascertain combined investible surplus CFP Version II	Not Applicable	Not Applicable
	Step10	Component-wise allocation of combined investible	Not Applicable	Not Applicable

Task	Step	Key Stages	Description	Remarks
		surplus		
Task6	Step1 1	Listing of Project Proposals – linkage to CDP	The priority project as identified in the CIP section has been linked with the FOP. Further, CCP investment capacity has been tested on various scenarios.	Chapter 17 has detailed out the CIP for CCP.
	Step1 2	Priorities Project Investments	The priority project investment has been finalized in the CIP section further it has been linked with the financial model for the city.	
Task7	Step1 3	Preparation of draft CFP --- CFP Version III & Financial Plan report (prioritized project investment loaded on combined investible surplus)	The current chapter has detailed out the overall financial plan for the city under various scenarios.	Chapter 18 has detailed out the CIP for CCP.
Task8	Step1 4	Ascertain source and amount of funding, external borrowing, debt servicing mechanism, etc.	Under the Improved investment capacity with grant plus debt support, we have tested the capacity of CCP to go for debt and external borrowing.	The sub section 18.8 has provided the details.
Task9	Step1 5	CFP Appraisal and Public Verification	We shall present the findings to the stakeholder during the final city level workshop and accordingly we shall take the suggestions on the overall financial plan for the city.	This section would be presented in the final CDP.
Task10	Step1 6	Finalization of CFP report	Post completion of final city level workshop, we shall discuss with CCP officials and finalize the financial plan for the city	
Task10	Step1 7	Annual revision of CFP (linkage to annual capital investment and improvements achieved)	We will suggest this step in the way forward section in the final CDP.	

18.3 Financing Strategies for CIP

The project funding structure comprises grants under the JNNURM-II framework³⁷(accounting for 70% of the funding as per JNNURM-I structure has been assumed); internal surplus and debt are considered to meet the balance fund requirement. The level of investment that CCP can sustain is determined by studying the overall surpluses/year-to-year opening balance and debt-service coverage ratio (DSCR).

If DSCR (amount of surplus available to pay interest and to repay principal that is due) falls below 1.25 (i.e., less than 25% cushion), then the investments are reduced gradually till DSCR exceeds 1.25 in all the years in the forecast period. The main items of income and expenditure, classified into the revenue account and the capital account, are projected in the FOP under the following categories. Categories of FOP Projections are as follows.

- Revenue Account Receipts:
 - ◆ Taxes, Non-Tax Sources, and
 - ◆ Grants, Contribution, and Subsidies
- Revenue Account Expenditure:
 - ◆ Establishment
 - ◆ Operation and Maintenance
 - ◆ Debt Servicing- Existing and New Loans
 - ◆ Phasing of Non-debt Liabilities, and
 - ◆ Additional O&M for New Assets Created
- Capital Income
 - ◆ JNNURM Capital Grants
 - ◆ Regular State or Central Grants
 - ◆ Debt
- Capital Expenditure

In determining a long-term financial strategy, CCP may plan to raise resources and fund the CIP through:

- Grants available under the new urban development mission framework (as percentage of investment proposed in urban infrastructure sectors – (80% Central Government Grants and 10 % State Governments Grants)
- Available internal resources and improving the same through
 - ◆ Revision of the property taxation at certain levels by CCP and also improving the coverage and collection
 - ◆ Revision of water and sewerage charges at specific defined intervals and also improving the coverage and collection
 - ◆ Maintenance of the collection performance of taxes and charges at certain minimum levels for current and for arrears
 - ◆ External Borrowings

³⁷ Based on the past trends, it is assumed the funding structure would remain same as it was in the JNNURM 1; the revised funding structure is yet to be announced by the ministry.

18.3.1 Financial Projections

Current revenue sources are projected under built-in growth assumptions for income and expenditure items, to assess the impact of each such revenue enhancement measure being suggested. The projections also aim at estimating the surplus that will be available for servicing new debt. Part of the surplus, after meeting the additional O&M expenses on newly created assets and infrastructure, is translated into debt size and project size (grant component plus debt component) based on certain assumptions regarding interest rate, repayment method, and loan-grant mix.

A spread sheet FOP model has been customized to depict the financial position of CCP. The investment sustaining capacity of CCP is assessed based on the FOP assumptions. The model was used to calculate the overall surpluses under various scenarios involving combinations of internal revenue improvement, state support, financing terms, etc.

The standard assumptions under which the projections are carried out and certain expenditure control and revenue augmentation measures proposed in line with the mandatory and optional reforms under the JNNURM framework are presented below.

18.4 Investment Sustenance Capacity

Given the existing financial position of CCP, the revenue and capital accounts of CCP are projected against the growth scenario. The FOP is generated from the sustainable investment point of view in line with the current growth trends against the identified investment. It has been estimated that of the total identified investment CCP would require to undertake an investment to the tune of Rs. 332.32 Crores to improve the infrastructure for meeting the current gap and medium-term requirement. However, the overall city level investment to be undertaken by various departments is Rs. 2025.96 Crores. Of the total investment on medium term, CCP is required to undertake the investment of Rs. 319.82 Crores. Following table and chart presents the medium term investment requirement and the implementing agency responsible of undertaking the investment of the respective sector.

Table 151: Medium term investment requirement and implementing agency

Implementing Agency	Investment Estimated (Rs. Crores)	% of Total
Public Health Engineering Department (PHED)	239.95	11.84%
Public Works Department (PWD) / Goa State Infrastructure Development Corporation (GSIDC)	716.00	35.34%
Corporation of City of Panaji (CCP)	319.82	15.79%
Water Resources Department (WRD) / Goa State Infrastructure Development Corporation (GSIDC)	251.81	12.43%
Department of Education (DoE)	5.00	0.25%
Department of Health (DoH)	3.00	0.15%
Department of Forest (DoF)	15.50	0.77%
Department of Tourism (DoT)	139.90	6.91%
Kadamba Transport Corporation (KTC)	184.70	9.12%

Implementing Agency	Investment Estimated (Rs. Crores)	% of Total
Goa State Electricity Board (GSEB)	133.36	6.58%
River Navigation Department (RND)	5.71	0.28%
Traffic Cell	11.20	0.55%
Total	2,025.96	100%

In order to check the financial capacity of CCP to undertake the investment as identified above, various assumptions made to assess the investment capacity of the CCP. The following section presents the assumptions made to project the income and expenditures of the CCP for the period of 10 years and assess its investment capacity.

18.4.1 Key Assumptions

The following table presents the key assumptions considered while projecting the income sources of the CCP as well as the other components contributing to the income and expenditure of the CCP.

Table 152: Key assumptions

Head	Assumptions
Guiding factor for assessing the sustaining capacity	
Surplus	Positive surplus - year-on-year basis
DSCR	Greater than 1.25
Project Financing – For Admissible Components under JNNURM-II	
Project Costing	Unit Cost, with 7% price contingency and 8% physical contingency
New/Additional O&M	Water Supply
	Sewerage and Sanitation
	Urban Roads, Traffic and Transport
	Storm Water Drains
	Solid Waste Management
	BSUP
	Urban Environment
	Social Infrastructure
For projects to be approved under JNNURM-II	
Grant from GoI	80% of sanctioned cost
Grant from GoG	10% of sanctioned cost
Loan for balance funding	Repayment in 15 years @ 11% interest rate
Regular capital expenditure	Rs. 3 crores per annum (growth rate 5% over current expenditure)
Revenue Expenditure	
Growth in Expenditure	Minimum growth rate: 8%

Head	Assumptions
	Maximum growth rate: 10%
Pay Commission Revision	7th Pay Commission revision from 2016 and 2022 (Currently, in CCP, the salaries are being paid from State treasuries i.e.)
Assumption for assessment of CCP's sustainability	
Income Items	
Growth in revenue income	Minimum growth rate: 8% Maximum growth rate: 10%
Income items - Property tax	
Annual growth in Assessment	1.75% per annum
Revision of Tax	20% every year starting from 2015-16
Collection Performance	90% (Maximum collection performance over the last 5 years)
yearly improvement in arrear collection	7% every year starting from 2015-16
yearly improvement in current collection	7% every year starting from 2015-16
Maximum collection performance (Arrears)	90% (Maximum collection performance over the last 5 years)
Maximum collection performance (Current)	90% (Maximum collection performance over the last 5 years)
Income Items- Water Supply (<i>Not Applicable as service is managed by the PHED of State government</i>)	
Individual Water Connections	
Water Tariff Revision	
Next Revisions	
Collection Performance	
Income Items- Sewerage (<i>Not Applicable as service is managed by the PHED of State government</i>)	
Sewerage Connections	
Sewerage Charge	
Collection Performance	

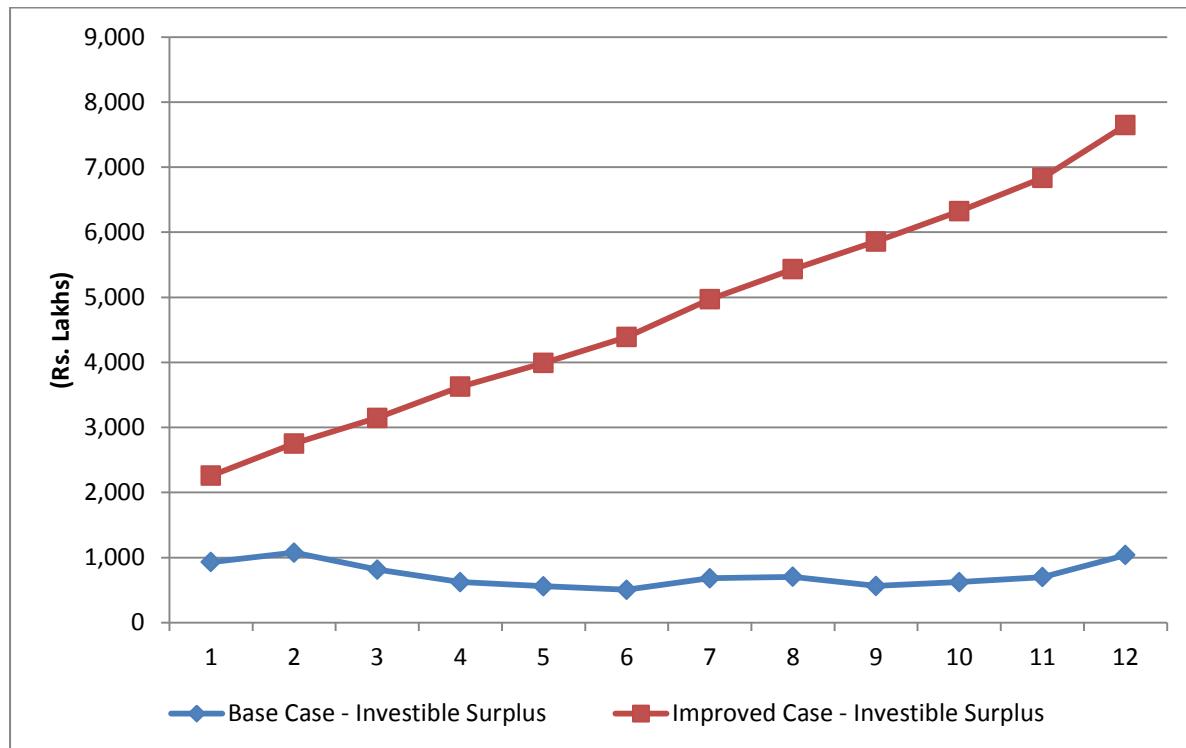
18.5 Investible Surplus

Based on the various assumptions, the investible surplus³⁸ has been estimated for the city in base and improved case scenarios. As per the base case scenario, on an average, CCP will have Rs. 7.17

³⁸Investible surplus = (Revenue (own sources of income) income + Capital (own sources of income income) - Revenue expenditure. And, excluding the revenue and capital grants received for specific purpose

Crores as investible surplus of to differ it to the capital account for the investment in for creation of the capital assets in the city. At the same time, in the improved case scenario too, on an average, CCP will have Rs. 42.81 Crores as investible surplus to be moved to the capital account for leveraging additional funds for capital investments in the city. The following figure represents the scenario of available investible surplus in base case as well as improved scenario.

Figure 62: Investible Surplus - CCP



18.6 Business as Usual Scenario

Business as usual scenario: In this scenario, it is assumed that CCP shall do business as usual and endeavor to implement the capital projects. This scenario will indicate the overall capacity of CCP to take up projects on business as usual basis.

Investment capacity: Rs. **111.51** Crores

The key considerations in this scenario are as follows:

- CCP will not take up any reform measures to improve the revenues.
- The income and expenditure growth would follow the past trends.
- The regular capital expenditure would grow at 5% on year-on-year basis.
- CCP should maintain the minimum closing balance of Rs 5 Crores on regular basis

Figure 63: Base Case Scenario

Financial Projections		2009-10	2010-11	2011-12	2013-14	2014-15	1	2	3	4	5	6	7	8	9	10	11	12	
		Figures in Rs. Lakhs		Actuals		Estimate		Projection											
Summary																			
Opening Balance		1,862	2,018	2,118	3,476	4,744	4,463	3,138	1,196	259	12	709	1,627	3,189	4,664	6,260	7,994		
1 Revenue Income		1,641	1,752	1,816	2,208	2,357	2,720	2,873	3,052	3,264	3,505	3,968	4,302	4,654	5,042	5,470	6,191		
2 Revenue Expenditure		801	1,146	1,139	1,230	1,328	1,513	1,877	2,184	2,423	2,679	2,927	3,198	3,659	3,952	4,268	4,609		
a Surplus/Deficit- Revenue Account		840	606	677	978	1,028	1,207	996	868	841	826	1,040	1,104	995	1,090	1,202	1,582		
b Operating Ratio		0.49	0.65	0.63	0.56	0.56	0.56	0.65	0.72	0.74	0.76	0.74	0.74	0.79	0.78	0.78	0.74		
c Debt Servicing Ratio		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
3 Capital Income		251	445	1,187	1,201	1,307	1,413	1,501	1,616	1,735	1,860	1,998	2,145	2,303	2,474	2,658	2,856		
4 Capital Expenditure		336	283	506	912	2,615	3,945	4,439	3,421	2,823	1,989	2,120	1,688	1,823	1,969	2,126	2,297		
d Surplus/Deficit- Capital Account		-85	162	681	289	-1,309	-2,533	-2,938	-1,805	-1,088	-129	-122	457	480	506	532	560		
e Overall Surplus/Deficit- Municipal Account		755	768	1,358	1,267	-280	-1,326	-1,942	-937	-247	697	918	1,561	1,476	1,596	1,734	2,142		
f Closing Balance		2,617	2,786	3,476	4,744	4,463	3,138	1,196	259	12	709	1,627	3,189	4,664	6,260	7,994	10,135		

18.7 Improved Case Scenario – Reforms Implementation

In this scenario, it is assumed that CCP shall take up revenue improvement measures such as property tax assessment and collection efficiency improvement. Further, it is assumed that CCP shall receive capital grants from the state and central governments (JNNURM-II). CCP shall endeavor to implement the capital projects. This scenario will indicate the overall capacity of CCP to take up projects on improved case scenario with grant support.

Investment Capacity: Rs. 319.82 Crores

The key considerations in this scenario are as follows:

- CCP is going to undertake reforms leading to improved financial sustenance capacity.
- The reforms are especially in the areas of property tax and water charges.
- CCP shall receive grant from the state and central governments for the approved projects (New urban development mission).
- The regular capital expenditure would grow at 5% on year-on-year basis.
- CCP should maintain the minimum closing balance of Rs 5 Crores on regular basis.

Property Tax

- On immediate basis, reforms are to be implemented in property tax to improve the coverage and collection efficiency
- State government should revise the property tax rate
- State government should amend the CCP act incorporating the provisions of stringent actions against defaulters i.e. sealing and auctioning of the property for tax recovery.
- The base rate to assess the property tax should be increased about 20% every three years
- Identified the poor performing zone in term of recovery of arrears
- Restructure the property tax department

Other Sources

- Implement parking charges in all designate parking places in the CCP area
- Develop new pay and park complexes; it could be mechanical parking free of any FSI.

Figure 64: Improved Scenario - Reforms and Grants

Financial Year ----->		2009-10	2010-11	2011-12	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26		
		Figures in Rs. Lakhs		Actuals		Estimate		Projection											
Summary																			
	Opening Balance	1,862	2,018	2,118	3,476	4,798	5,943	5,918	5,937	5,979	6,290	7,420	8,941	10,881	12,979	15,493	18,508		
1	Revenue Income	1,641	1,752	1,816	2,262	2,478	2,925	3,180	3,483	3,846	4,268	4,950	5,547	6,211	6,970	7,841	9,085		
2	Revenue Expenditure	801	1,146	1,139	1,230	1,328	1,603	2,124	2,628	2,978	3,348	3,690	4,064	4,594	4,961	5,358	5,787		
a	Surplus/Deficit- Revenue Account	840	606	677	1,032	1,150	1,322	1,056	854	868	920	1,260	1,483	1,617	2,009	2,482	3,299		
b	Operating Ratio	0.49	0.65	0.63	0.54	0.54	0.55	0.67	0.75	0.77	0.78	0.75	0.73	0.74	0.71	0.68	0.64		
c	Debt Servicing Ratio	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
3	Capital Income	251	445	1,187	1,201	4,026	6,344	7,167	5,103	3,962	2,818	3,018	2,145	2,303	2,474	2,658	2,856		
4	Capital Expenditure	336	283	506	912	4,481	7,241	8,203	5,915	4,519	2,608	2,758	1,688	1,823	1,969	2,126	2,297		
d	Surplus/Deficit- Capital Account	-85	162	681	289	-454	-897	-1,037	-812	-557	209	261	457	480	506	532	560		
e	Overall Surplus/Deficit- Municipal Account	755	768	1,358	1,321	695	425	20	42	311	1,130	1,521	1,940	2,098	2,515	3,014	3,858		
f	Closing Balance	2,617	2,786	3,476	4,798	5,943	5,918	5,937	5,979	6,290	7,420	8,941	10,881	12,979	15,493	18,508	22,366		

18.8 Improved Case Scenario – Debt

In this scenario, it is assumed that CCP shall takeup revenue improvement measures such as property tax and water charge coverage and collection efficiency improvement. Further, it is assumed that CCP shall receive capital grants from the state and central governments (new urban development mission). Further, CCP shall opt for loan to takeup the capital works. This scenario will indicate the overall capacity of CCP to takeup projects on improved case scenario with grant and debt support.

Investment Capacity – Rs. **319.82** crores

- CCPis going to undertake reforms leading to improved financial sustenance capacity.
- The reforms are especially in the areas of property tax.
- CCPshall receive grant from the state and central governments for the approved projects (New Urban Development Mission).
- CCP shall take loan from external sources to implement the investment plan in addition to investment already identified in this CDP
- The regular capital expenditure would grow at 5% on year-on-year basis.
- CCP should maintain the minimum closing balance of Rs.5Crores on regular basis.

Figure 65: Improved Scenario – Reforms, Grants and Debt

Financial Year ----->		2009-10	2010-11	2011-12	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26		
		Figures in Rs. Lakhs		Actuals		Estimate		Projection											
Summary																			
	Opening Balance	1,862	2,018	2,118	3,476	4,798	5,987	7,078	7,647	7,868	8,025	8,365	9,019	9,919	10,949	12,367	14,252		
1	Revenue Income	1,641	1,752	1,816	2,262	2,478	2,925	3,180	3,483	3,846	4,268	4,950	5,547	6,211	6,970	7,841	9,085		
2	Revenue Expenditure	801	1,146	1,139	1,230	1,328	1,730	2,460	3,206	3,738	4,266	4,669	5,104	5,661	6,058	6,487	6,950		
a	Surplus/Deficit- Revenue Account	840	606	677	1,032	1,150	1,195	721	277	107	2	281	443	550	912	1,354	2,135		
b	Operating Ratio	0.49	0.65	0.63	0.54	0.54	0.59	0.77	0.92	0.97	1.00	0.94	0.92	0.91	0.87	0.83	0.76		
c	Debt Servicing Ratio	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	7.5%	11.5%	14.1%	15.3%	13.7%	12.6%	11.2%	10.0%	8.9%	7.7%		
3	Capital Income	251	445	1,187	1,201	5,256	8,438	9,536	6,844	5,238	3,191	3,381	2,145	2,303	2,474	2,658	2,856		
4	Capital Expenditure	336	283	506	912	5,216	8,542	9,688	6,899	5,188	2,853	3,009	1,688	1,823	1,969	2,126	2,297		
d	Surplus/Deficit- Capital Account	-85	162	681	289	40	-104	-152	-56	49	339	372	457	480	506	532	560		
e	Overall Surplus/Deficit- Municipal Account	755	768	1,358	1,321	1,190	1,091	568	221	157	341	653	900	1,030	1,418	1,885	2,695		
f	Closing Balance	2,617	2,786	3,476	4,798	5,987	7,078	7,647	7,868	8,025	8,365	9,019	9,919	10,949	12,367	14,252	16,947		

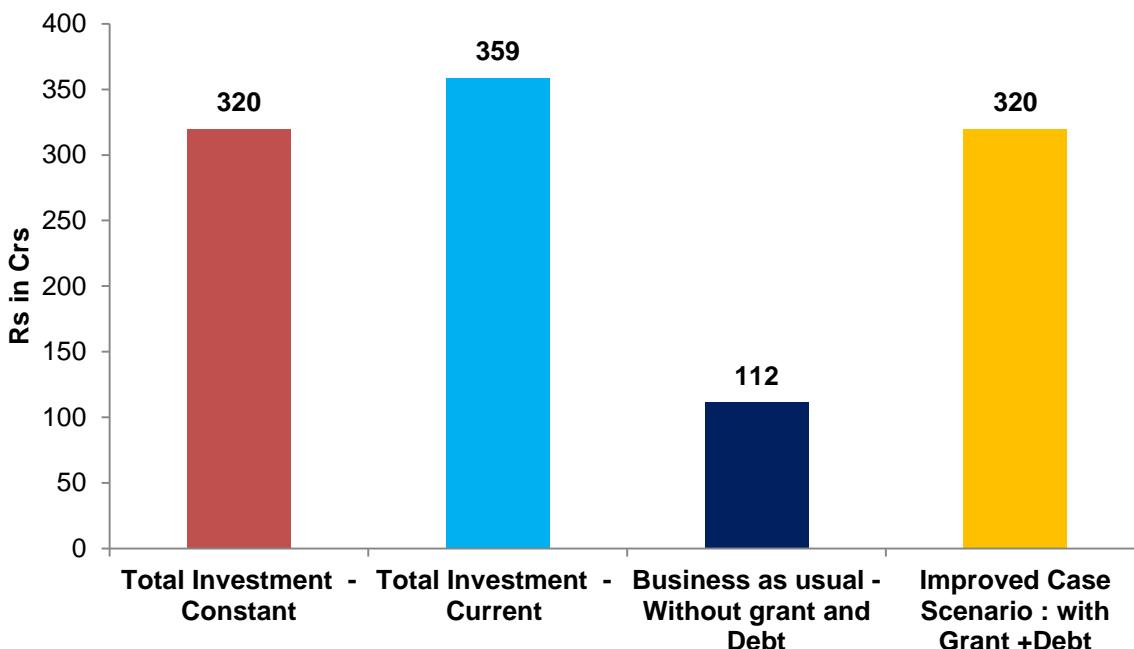
18.8.1 Key Summary

Further, the results of the above scenarios have been presented in the figure below. The overall investment estimated is Rs. 2670.77 crores (on constant prices). However, as per the current prices, the estimated investment would be Rs. 2802.64 Crores (which includes the cost escalation and physical contingencies). Of this investment, the CCP's share would be Rs. 332.32 Crores (12%) and the rest of the investment has to be made by the respective agency delivering the service at the state

level. It is observed that without any grant support, CCP will not be in a position to implement any projects as the investible surplus is in negative. Based on the availability of grants (on 100% basis), CCP may take up priority projects in the area of sanitation, solid waste management, and environment improvement in Panaji.

- Business as usual scenario: Rs. **111.15** crores
- Base case scenario with grant support: Rs. **319.82** crores
- Improved investment capacity with grant support: Rs. **319.82** crores
- Improved investment capacity with grant plus Debt support: Rs **319.82** Crores

Figure 66: Financial capacity – Key scenarios



18.9 Revenue Enhancement Initiatives

Property tax, water charges, sewerage charges, and development charges are the key own sources of revenues of CCP. These revenues are performing within the range and account for 45% of the total revenue income. However, there is scope for further improvement of these revenues in order to enhance the overall sustainability of CCP. Following sections describe the revenue enhancement measures for key revenue sources such as property tax and water charges.

- 1) **Property tax:** The revenue enhancement measures for property tax are categorized into the following four categories:

a) **Policy-level interventions:**

- The property tax rate is revised by the state government every five years. However, the property tax rate was last revised in 2007 and came into force from the year 2010. Hence, it is suggested to change the rate in every three years. Also, the system should be developed in such a way that the changes should be reflected in the demand bills without any human intervention.
- It is also suggested that the property tax rate should be increased about 15-25% every three years.

- In addition to the property rate, as part of the property tax, CCP collects water tax, drainage tax, and sanitation cess. Hence, it is suggested that the state government should amend the municipal laws if required to enhance the percentage of water and other tax rates. For instance, as per the existing municipal laws, CCP can only levy 5% as water charges. However, this can be enhanced to 10% by considering the huge capital works to be taken up by CCP in near future.
- The state government should take appropriate steps for the revision and accordingly implement the same to enhance the revenues.

b) Recovery of arrears

- Identified the poor performing zone in term of recovery of arrears
- Prepared the list of defaulters with outstanding arrears <=Rs 10,000
- Prepared the action plan to issue of warrant notices
- Carried out daily the monitoring of each tasks
- The recovery staff provide the sample warrant notices to defaulters

c) Revision of tax calendar

- Preparation of tax demand bills latest by 30th April 2015
- During 1st to 31st May 2015, all the tax demand bills must be served by using Indian postal service or courier services etc.
- 30 days grace period should be given for demand bills served from 1st to 30th June 2015.
- Necessary changes should be made in tax software and pre-printed stationery to show the per day penal interest.
- The collection counters should be opened at as many places across the city.
- As soon as grace period ends, the ward-wise list of tax defaulter along with the demand notice should be made available.
- With rationalization of the tax calendar, various tax processes and reduction in the work load of tax personnel; it will be possible to do work division of personnel.
- In the light of above, daily targets should be provided to each team working in the tax administration.
- Monitoring of the targets vs. actual should be carried out.

d) Restructuring of Property Tax Department

- The proposed structure is based on a functional-cum-geographical approach.
- The proposed structure clearly identifies four main functions: assessment, billing and collection, appellate, and vigilance.
- The four functions are to be managed independently by different senior officers.

18.10 Expenditure Management Initiatives

Over the review period, the revenue and capital expenditure of CCP has increased. In order to reduce the revenue and capital expenditure at CCP, following key initiatives are to be taken up.

Reduction in establishment expenditure

- Outsourcing of certain functions: CCP should explore outsourcing of some functions in order to reduce the establishment expenditure.
- For instance, CCP can outsource the collection, transportation, and treatment of SWM. In addition, maintenance of public toilets, parks, and other play grounds on outsourcing basis.

- Moreover, CCP can outsource the clerical posts such as data entry operator and clerks to reduce the establishment cost.

Reduction in capital expenditure

- Overall, this would be a burden for CCP. In near future, if CCP wants to take up the projects on JNNURM/Central funding, then it would be difficult to fund the projects.
- Therefore, CCP has to curtail the regular capital expenditure (say 10%); at the same time, CCP should take up priority projects only.
- Also, CCP should focus on projects to be implemented through central/state funding.

18.11 Asset Management Initiatives

The establishment of linkage between the asset creation and asset management should be through a series of reforms for project sustainability. CCP should ensure adequate funds to meet the deficiencies in urban infrastructural services.

In order to maintain the assets over the project cycle, CCP should allocate 5-10% of funds for operation and maintenance of the project components. For water supply projects, the O&M cost would be 3% of the project cost, and this would be on a recurring basis.

Deprecation account/fund

CCP should ideally practice to maintain the depreciation account in order to replace the existing asset with a new asset post its life cycle.

Key steps to be taken by CCP for better management of assets

- CCP should focus on department wise budget and O&M cost for newly created assets,
- Explore the best practice to reduce the O&M cost on sanitation and solid waste management
- Study the existing status of the assets of key sectors, prepare a tangible action plan for the maintenance of assets, provide the replacement list for the assets
- Conduct workshops/trainings for the staff on management of O&M, best practices across the states
- Organize study tours for the staff and elected representatives for effective implementation of reforms for full O&M recovery
- Latest techniques and technology for management (inventory, maintenance cycle, replacement time, etc.) of municipal assets.

18.12 Financial Management Initiatives

In order to implement the identified projects over the project cycle, CCP has to take up the financial management initiatives for smooth implementation of the projects. The key initiatives are as follows.

- First and foremost, the accounts department of CCP should maintain the separate account for the project. The financial transactions such as deposit the grants and release the payments should be carried out thorough the project account.
- Transfer the part of the revenue surplus (own source of revenues) to the project account to implement the project
- Internal audit of the project accounts has to be carried out on quarterly basis
- External audit has to be carried on annual basis

18.13 Projects on PPP basis

CCP may explore the PPP route in the following projects. The details of each component have been provided in the table below.

Table 153: Projects on PPP basis

Sector	Development	Possible PPP interventions	Key Aspects
Solid Waste Management	Improve the waste collection and transportation recovery & scientific landfill	BOT basis	<p>CCP shall procure the vehicles and handover the same to the private operator.</p> <p>The operator would be responsible for collection and transportation of the waste.</p> <p>CCP may allocate the land to develop the SWM treatment plant. The assets would be created and maintained by the operator.</p> <p>Further, the private operator may sell the manure and pallets and further generate revenues.</p> <p>The revenue sharing between CCP and the private operator can be explored.</p>
Parking	Multilevel car parking complex on PPP basis	Land to be provided on lease basis	The feasibility to be improved by introducing a mixed use – shops & offices

18.14 Land Resource Leveraging

CCP should focus on preparing the inventory of available land in the city in order to explore the landbased financing offers to implement the infrastructure projects. Following steps are to be taken up CCP.

- CCP should initiate the inventory of the land parcels available in the city. Further, CCP should create the database of the same.
- CCP should crosscheck the proposed land use as per the zonal development plan. If required, CCP needs to initiate for the land use conversation.
- May explore these land parcels for development affordable housing projects, parking projects, real estate projects and convention centers on PPP basis

18.15 Key Conclusion

Overall, on short-term basis, the city requires around Rs. 604Crores to improve the municipal services in the city. However, as per the business as usual scenario, CCP has no financial capacity to takeup the infrastructure projects.

Given the importance of Panaji in the region, it is very important to improve the basic infrastructure facilities to attract the investment and industries in the city and further to boost the economic development in the region.

Therefore, CCP should aim to implement the revenue enhancement measures as suggested in this CDP to have an improved case investment capacity with grant support for state and central governments. Following key steps to be taken by CCP to achieve the improved case scenario investment:

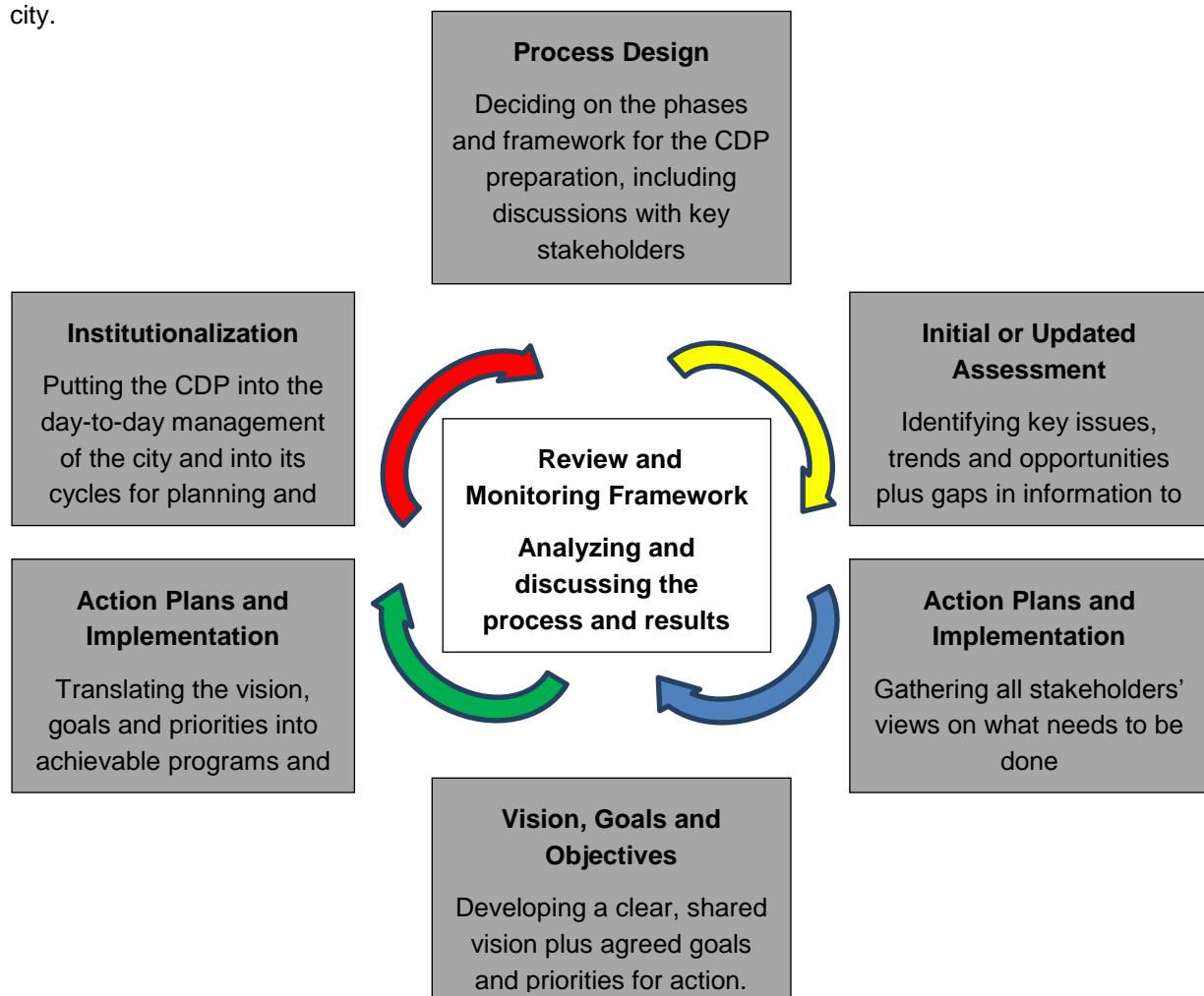
- **Property Tax:** On immediate basis, reforms are to be implemented in property tax to improve the coverage and collection efficiency; the reforms could be policy levels change to streamline the department.
- **SWM Charges:** CCP should levy the user charges on SWM services – CCP may explore this initiative as part of property tax.
- **Establishment Expenditure:** CCP should explore the outsourcing of certain function to reduce establishment expenditure.
- **O&M new assets:** CCP should ensure that the contractor carries out the O&M of the assets for a period of 5-8 years after the completion of test run.
- **Regular Capital works:** CCP should curtail the regular capital expenditure over the next 5-10 years. CCP should takeup only priority works in wards.
- **PPP route:** CCP should explore the PPP route to implement either the projects or project components.
- **Identify new revenue generating areas:** CCP should focus towards identifying new revenue generating areas to strengthen the current income levels which are not even meeting the obligation of its own expenditures.
- **Capacity Building:** It is very important that CCP should keep on imparting training to the staff on various aspects starting from technical to managerial skills.
- **Study Tours:** CCP should organise study tours to know the best practices in the sectors and also to understand the challenges faced by others cities in the implementation of projects and reforms.

19. Review and Monitoring Framework for CDPs

The review and monitoring and framework has been designed to help cities integrate Monitoring mechanisms into their city development plan (CDP) from the initial phases. Monitoring & Review is important tools to enable cities determine whether their CDP is achieving its vision and goals and realizing its intended outcomes or not. It is a tool that shall enable cities to monitor the progress on the plan at regular intervals.

The information generated by Monitoring can be used to provide information and support for the implementation of CDP. It shall help in strengthening the downstream project implementation, undertaking programme and investment activities, and devising strategies for future planning initiatives. A basic principle of the CDP approach is that the way in which the CDP is developed and the development issues that it addresses, are determined by each city and community to meet their own needs. There is no ‘one size fits all’ approach to designing and implementation of CDP.

The framework mentioned below clearly lays down the broad principles that need to be fine-tuned based on the city specific needs and inputs from various officials at the city level to develop for each city.



19.1 Framework for Evaluation

In the context of the ever changing landscape of the developments in the city, the impacts on the growth of the city will have wide ramifications if it is not factored into the City Development Planning process in a dynamic manner. The CDP should have a fixed time frame for its implementation, and shall be followed by a review to study and analyze the impact of the implementation of the plan, in order to make mid-term course corrections, wherever necessary. A monitoring mechanism should also be established for measuring the identifiable indicators provided in the CDP for each sector and thereafter implementation of CDP can be measured.

The table below gives a framework for updating and reviewing CDPs; this needs to be followed as per the revised tool kit.

Table 154: Framework for Monitoring of various components in the CDP

Sr. No.	Framework for Updating and Reviewing City Development Plan (CDP) to make it a living document							
	Activity	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1	Reviewing CDP Document	√					√	
2	Community and Stakeholder Consultation	√		√		√		√
3	Data Update and Mapping the City	√						
4	Capacity Building	√	√	√	√	√		
5	Planning Building Regulations Reforms	√						
6	Property Tax Reforms	√						
7	Institutional Reforms	√	√	√	√	√		
8	Financial Reforms	√	√	√	√	√		
9	Sectoral/Ward Development Plans	√						
10	Review of Project Priorities	√		√		√		
11	Financial Operating Plan	√	√	√	√	√		
12	Capital Investment Plan	√	√	√	√	√		

Source: Revised City Development Plan

19.2 Timeline and Periodicity of Evaluation

To make CDP as a living document, it is essential to understand that the city landscape, growth source as well as direction keep changing with time. Hence, the CDP should have a fixed time frame for its implementation, and shall be followed by a review to study and analyze the impacts of the implementation in order to make mid-course corrections, wherever necessary. The monitoring

mechanism should be on the activities based on the identified indicators in each sectors in the CDP. Some of the identified activities that could be monitored are given below.

19.3 Reviewing of the CDP Document

The foremost thing that comes up is the reviewing of the CDP document. As the city's conditions may change after few years, the CDP needs to be reviewed and evaluated after a particular time before a new development plan is proposed. It is necessary to identify the sectors that are growing and sectors that are lagging, to achieve the vision framed for the city. The CDP is prepared for a long term vision for 30 years and the investment plan is prepared for a time frame for 7 years. Thus it mandatory that review of the City Development Plan is taken up after every five years.

19.3.1 Engaging with Community and Stakeholders' Consultation

CDP focuses on the holistic development and betterment of the city as looked upon by various communities and stakeholders. Therefore, it is very important to keep consulting with them about the process of the work to be undertaken to achieve the framed vision for the city. This could be done by conducting a meeting every alternate year, i.e., once in every two years. The feedback should be incorporated and the shared with citizens through a common platform like website etc.

19.3.2 Data Update and Mapping of the City

In case of any major changes in the city limits/boundaries, a complete data updation exercise should be carried out for effective implementation. Therefore, data updates and mapping of the city become very essential. This should always be done before the preparation of the CDP.

19.3.3 Capacity Building

Capacity building initiatives should focus on understanding the areas where capacity needs to be built in terms of project implementation, reform implementation etc. The regular assessment of the needs can ensure better capacity building measures to be adopted by city.

19.4 Assessment of Reforms and Project Implementation

The CDP Technical and Policy Committee should be involved in the monitoring and evaluation of the CDP across various components.

19.4.1 Assessment of Reforms and Project Implementation

- Regular assessment of reform and project implementation is necessary for the city to achieve its vision.
- Reforms should be framed for all the institution responsible for the development process of any city. These reforms are very important for all the institution to work in a synchronized manner for the development of the city. Hence, they must be monitored every year.

19.4.2 Financial Reforms

- Finance being a most important part for any ULB of the city. The funds are to be utilized according to the kind of development approach adopted to achieve the city vision. Therefore, financial reforms must be monitored and evaluated on yearly basis.

19.4.3 Property Tax Reforms

- All the properties abiding under the ULB should be carefully mapped and marked, as it is an important source of revenue for a city. Hence it should be prepared before the implementation of the CDP and monitored at frequent intervals.

19.4.4 Sector /Ward Development Plans

Vision of the city could only be implemented at a macro level only if there is prominent change at the micro level like at the ward level or the sectoral block level planning. To make a CDP document comprehensive in approach, the M&E of these micro level plans should be evaluated at the very beginning and impact should be reviewed in the very first year.

19.4.5 Review of the Project Priorities

The project prioritized in the CDP to achieve the vision may have to undergo changes in their priority order once the implementation of the CDP starts. The reason may be due to any practical issues that arise during project implementation or any other complication. Hence, it is very important to monitor and evaluate the projects that are underway and projects that need to be taken up for the development of the city. The updating process should be regular, but M&E should be done every alternate year.

19.5 Financial Operating Plan and Capital Investment Plan

A capital investment plan (CIP) provides a detailed understanding of anticipated investments into tangible capital assets. The assets include basic facilities, services, and installations needed for the functioning of the community, such as bridges, roads, water, and wastewater systems. This helps the ULBs to formalize their priority setting and decision making process. Therefore, the M&E of CIP should be done on regular basis every year.

A financial operating plan (FOP) outlines the revenues and expenses over a period of time. An FOP uses past performances, incomes, and expenses to forecast what to expect in the following years. It then incorporates the past and recent trends into the planning so as to most accurately forecast what is to come. Therefore, for city development plan in a proper way, it is necessary to monitor and evaluate the FOP regularly every year.

Annexure – 1: Wardwise Population

Annexure 1: Wardwise Population

Sr No	Ward No	Households	Population
1	Panaji (M Corp.) WARD NO.-0001	319	1266
2	Panaji (M Corp.) WARD NO.-0002	285	1193
3	Panaji (M Corp.) WARD NO.-0003	579	2286
4	Panaji (M Corp.) WARD NO.-0004	329	1190
5	Panaji (M Corp.) WARD NO.-0005	392	1455
6	Panaji (M Corp.) WARD NO.-0006	325	1332
7	Panaji (M Corp.) WARD NO.-0007	306	1323
8	Panaji (M Corp.) WARD NO.-0008	321	1267
9	Panaji (M Corp.) WARD NO.-0009	540	1805
10	Panaji (M Corp.) WARD NO.-0010	333	1191
11	Panaji (M Corp.) WARD NO.-0011	373	1441
12	Panaji (M Corp.) WARD NO.-0012	225	800
13	Panaji (M Corp.) WARD NO.-0013	248	1160
14	Panaji (M Corp.) WARD NO.-0014	331	1311
15	Panaji (M Corp.) WARD NO.-0015	362	1487
16	Panaji (M Corp.) WARD NO.-0016	377	1471
17	Panaji (M Corp.) WARD NO.-0017	313	1170
18	Panaji (M Corp.) WARD NO.-0018	330	1293
19	Panaji (M Corp.) WARD NO.-0019	513	2150
20	Panaji (M Corp.) WARD NO.-0020	309	1360
21	Panaji (M Corp.) WARD NO.-0021	287	1126
22	Panaji (M Corp.) WARD NO.-0022	420	1773
23	Panaji (M Corp.) WARD NO.-0023	229	922
24	Panaji (M Corp.) WARD NO.-0024	167	697
25	Panaji (M Corp.) WARD NO.-0025	287	1129
26	Panaji (M Corp.) WARD NO.-0026	258	994
27	Panaji (M Corp.) WARD NO.-0027	377	1369
28	Panaji (M Corp.) WARD NO.-0028	296	1223
29	Panaji (M Corp.) WARD NO.-0029	349	1483
30	Panaji (M Corp.) WARD NO.-0030	378	1350
	Total	10158	40017

Annexure – 2: Proposed Water Supply components in DPR under JNNURM funding

Annexure 2: Proposed Water Supply components in DPR under JNNURM funding

Scheme Components	Details	Cost (in Rs lakhs)
Construction of WTP at Curti and Intake at Opa as well as rising main	Part A – construction of new 50 MLD WTP including treated water reservoir and electro mechanical equipment for plant	3,976
	Part B – Intake facilities, rising main and all required electromechanical works	3,512
Sub Total		7,488
Distribution system Management	Part A – Providing and laying additional distribution pipeline for uncovered area including rehabilitation of old/damaged lines/ replacement	4,858
	Part B – Construction of 1 nos. 10000 cu. m. M.B.R. at Altinho	348
	Part C – Construction of 1250 cu. m. O.H.R. at Altinho	117
	Part D – Construction of 2 nos. 10000 cu. m. each GLSRs at Talegao	675
	Part E – Construction of 1250 cu. m. O.H.R. at Talegao water tank	117
	Part F – Repairs work to reservoirs at Altinho	109
	Part G – Construction of 1000 cu.m. GLR at Ribandar	81
	Part H – Construction of 1000 cu. m. GLR at Nagali	97
	Part I – Construction of 300 cu. m. GLR and 500 cu. m. OHR at Miramar	120
Sub Total		6,522
NRW Reduction programme and Capacity Building	Part A – Replacement of existing water meters by quality and durable water meters having AMR (Auto meter reading) including booster, solar repeater solar cell fixed rear EMMR PC – IBM and 110 V GPRS + antenna set, including replacement of all service connection pipe line along with accessories including flow control valves.	1,908
	Part B – development of asset management and accounting system including necessary software. Implementation computerized pipeline network hydraulic design/analysis with necessary software/ hardware and training	49.4
	Part C – Supply of equipments such as geophones, corelators, acoustic data logger, ground microphones, ultrasonic flow meters, pressure gauges, pipe locators, sounding rods, tanker and other peripheral equipment	120

Scheme Components	Details	Cost (in Rs lakhs)
	Part D: Services and manpower for leak detection including all activities performed for a period of six months	30
	Sub Total	2107.4
	Creation of GIS Based online consumer grievance redressal module with all the necessary software for development and installation and integration with SCADA	20
	Development of online bill payment systems. Creation of online consumer billing module with bank payment gateways and web hosting	18.5
	Construction and establishment of well equipped quality control laboratory for effective management of consumer water supply	125
	Cost of Project Management Consultancy including tender document preparation for turnkey works, tender evaluation, construction supervision and quality control as well as capacity development for Panaji JNNURM project for a 3 years period including a team of design engineers and construction supervisor totaling 10 nos. and a team leader cum expert of 15 years experience.	1000
	Sub Total	17280.9
	Environmental Compliance Cost	10
	Rehabilitation and Resettlement Cost	0
	Cost of surveys and investigations (lump sum cost)	80
	Cost of shifting utilities	20
	Cost of statutory compliance cost	5.5
	Finance/ Interest cost during construction	0
	Contingency (above estimate cost are inclusive of contingency)	0
	Any other (5% for price escalation)	0
	GRAND TOTAL	17,396

Annexure – 3: Components of DPR for BSUP

Annexure 3: Components of DPR for BSUP

S. No.	Project Components	No of works/ length	Amount in Rs Lakhs
1	Housing	Total units – 226 nos. (BSUP -155 nos. and Municipal/ Govt. employees – 71 nos.)	555.20
2	Roads	Total road length – 1650 m (6 M Cross road – 650 m, 3 M cross roads – 350 m, Jogging track – 650 m)	91.83
3	Drains and Culvert	Total length - 790 m (SSM drain – 125 m, Storm water drain – 665 m, 6m culverts – 6 nos., 12 m culverts – 6 nos.)	24.19
4	Sewerage	Total length -1580 m (UGD -1580 m, 1.20 m Manholes – 25 nos., 3.0 m Manhole – 8 nos.)	12.03
5	Water supply	(Pumping main – 450 m, water supply pipe line – 1000 m, block level UG sump – 3 nos., OHT – 1 no, borewell – 3 nos.)	24.77
6	Electricity	Total length – 2150 m (lines – 2150 m and 3 nos. of transformers)	17.83
7	Rainwater harvesting	19 blocks	4.75
8	Informal Market	1 no.	38.00
9	Livelihood center	1 no.	55.00
10	Animal Pen	1 no.	10.00
11	Building Amenities	19 blocks	59.53
12	Playground	1250 sq .m.	2.44
13	Land development/tree plantation	11615 sq. m.	30.78
14	Compound wall cum fencing	650 sq. m.	2.93
	Project cost	-	929.28
	IEC 5%	-	46.46
	A&OE 5%	-	46.46
	TOTAL PROJECT COST	-	1022.20

Annexure – 4: List of buildings/sites surveyed & spotlisted in Panaji by TCPD, 1999-2000

Annexure 4: List of buildings/sites surveyed & spotlisted in Panaji by TCPD, 1999-2000

S. No	Name of Monument/ site	Village	Taluka	Ownership of Monument/Site	Status as on date protected or not protected
1	Campal residential Precint	Panaji	Tiswadi	Private	Campal Precinct
2	Campal Garden	Panaji	Tiswadi		Campal Precinct
3	House no C-13/151/1	Panaji	Tiswadi	Private	Campal Precinct
4	House no C-13/151/2	Panaji	Tiswadi	Private	Campal Precinct
5	House no C-13/150	Panaji	Tiswadi	Private	Campal Precinct
6	House no C-13/101	Panaji	Tiswadi	Private	Campal Precinct
7	Bridge with seats on St Inez Nallah	Panaji	Tiswadi	Private	Campal Precinct
8	Old GMC Building Complex	Panaji	Tiswadi	Government	Riverfront
9	2 STC HQ Building	Panaji	Tiswadi	Government	Riverfront
10	Collectorate Building	Panaji	Tiswadi	Government	Riverfront
11	Goa Police HQ Building	Panaji	Tiswadi	Government	Riverfront
12	Govt Printing Press Building	Panaji	Tiswadi	Government	Riverfront
13	Garrison Engineers Building	Panaji	Tiswadi	Government	Riverfront
14	Old House of Dempos	Panaji	Tiswadi	Government	Riverfront
15	Land survey Building	Panaji	Tiswadi	Government	Riverfront
16	Panaji PoliceStn Building	Panaji	Tiswadi	Government	Riverfront
17	Azad Maidan	Panaji	Tiswadi	Government	Riverfront
18	Custom House Building*	Panaji	Tiswadi	Government	Riverfront
19	Old High court Building*	Panaji	Tiswadi	Government	Riverfront
20	Old Secretariat Building*	Panaji	Tiswadi	Government	Riverfront
21	VIP Virani Building	Panaji	Tiswadi	Government	Riverfront
22	Madhavashrarm Building	Panaji	Tiswadi	Government	Riverfront
23	Chapel next to Mandovi Hotel	Panaji	Tiswadi	Government	Riverfront
24	JMP Dias Building	Panaji	Tiswadi	Government	Riverfront
25	General Post Office building	Panaji	Tiswadi	Government	Riverfront

S. No	Name of Monument/ site	Village	Taluka	Ownership of Monument/Site	Status as on date protected or not protected
26	Our Lady of Immaculate Conception Church*	Panaji	Tiswadi	Government	Central Panaji
27	Garcia da Horta Garden	Panaji	Tiswadi	Government	Central Panaji
28	Bar George Restaurant building	Panaji	Tiswadi	Private	Central Panaji
29	House no C-12/11	Panaji	Tiswadi	Private	Central Panaji
30	Communidades of Tiswadi Building*	Panaji	Tiswadi	Government	Central Panaji
31	Fazenda building*	Panaji	Tiswadi	Government	Central Panaji
32	House of Mamami Kamat Building	Panaji	Tiswadi	Government	Central Panaji
33	Judicial commissioners Court Building*	Panaji	Tiswadi	Government	Central Panaji
34	Panaji UHC Building	Panaji	Tiswadi	Government	Central Panaji
35	Old Municipal Building Block	Panaji	Tiswadi	Government	Central Panaji
36	AG Vaglo/National Club Building	Panaji	Tiswadi	Private	Central Panaji
37	Building of Goa Lodge opp Old High court	Panaji	Tiswadi	Private	Central Panaji
38	Van Huesen net to Goa Lodge Building	Panaji	Tiswadi	Private	Central Panaji
39	House of Dr Jose Philip Pereira	Panaji	Tiswadi	Private	St Tome Preci
40	Old Mint House	Panaji	Tiswadi	Private	St Tome Preci
41	St Tome Chapel	Panaji	Tiswadi	Private	St Tome Preci
42	GXVerlekar Building	Panaji	Tiswadi	Private	St Tome Preci
43	Misqui Bar Building	Panaji	Tiswadi	Private	St Tome Preci
44	La Vista Lodge Building	Panaji	Tiswadi	Private	St Tome Preci
45	MV Associates Building	Panaji	Tiswadi	Private	St Tome Preci
46	Patto Bridge	Panaji	Tiswadi	Government	St Tome Preci
47	Old PWD Office Complex	Panaji	Tiswadi	Government	St Tome Preci
48	Ghanekar Nursing Home building	Panaji	Tiswadi	Private	St Tome Preci
49	House of Lawande MRSilimkhan	Panaji	Tiswadi	Private	Fontainhas
50	Tarcar Mansion	Panaji	Tiswadi	Private	Fontainhas
51	House of Dr Pinto E-324	Panaji	Tiswadi	Private	Fontainhas

S. No	Name of Monument/ site	Village	Taluka	Ownership of Monument/Site	Status as on date protected or not protected
52	Fundacio Oriente building	Panaji	Tiswadi	Private	Fontainhas
53	Seventh Day Adventist school Building	Panaji	Tiswadi	Private	Fontainhas
54	House of Ida/Jose Machado C-5/192	Panaji	Tiswadi	Private	Fontainhas
55	Panjim Inn Building	Panaji	Tiswadi	Private	Fontainhas
56	House of Albertino Fernandes C-5/155	Panaji	Tiswadi	Private	Fontainhas
57	House of Rego C-5/143	Panaji	Tiswadi	Private	Fontainhas
58	Fontainhas Chapel	Panaji	Tiswadi	Private	Fontainhas
59	House of B Carrasco C-5/162	Panaji	Tiswadi	Private	Fontainhas
60	House of Armenio Riberio Santana C-5/161*	Panaji	Tiswadi	Private	Fontainhas
61	House of Dr Hugo Menezes C-5/166	Panaji	Tiswadi	Private	Fontainhas
62	House of Ivo Andrade C-5/164*	Panaji	Tiswadi	Private	Fontainhas
63	House of Antonio Soares C-5/165	Panaji	Tiswadi	Private	Fontainhas
64	Steps of Fontainhas next to Chapel	Panaji	Tiswadi	Government	Fontainhas
65	Chapel of St Francis	Panaji	Tiswadi	Private	Portais
66	House of Salma Velho E-1	Panaji	Tiswadi	Private	Portais
67	House of Antonio Veira Velho E-2*	Panaji	Tiswadi	Private	Portais
68	House no C-6/10	Panaji	Tiswadi	Private	Portais
69	House of Juleito Soz C-6/11	Panaji	Tiswadi	Private	Portais
70	Fountainhas spring*	Panaji	Tiswadi		Portais
71	House no C-4/78	Panaji	Tiswadi	Private	Portais
72	House of Verlekar C-6/80	Panaji	Tiswadi	Private	Portais
73	House no C-6/93	Panaji	Tiswadi	Private	Portais
74	House no C-6/106	Panaji	Tiswadi	Private	Portais
75	House no C-4/50	Panaji	Tiswadi	Private	Portais
76	House of A Antao C-8/7	Panaji	Tiswadi	Private	Altinho
77	House of Coelho C-8/8	Panaji	Tiswadi	Private	Altinho

S. No	Name of Monument/ site	Village	Taluka	Ownership of Monument/Site	Status as on date protected or not protected
78	House of Jose Lobo C-8/9	Panaji	Tiswadi	Private	Altinho
79	House no C-8/10	Panaji	Tiswadi	Private	Altinho
80	House no C-8/15	Panaji	Tiswadi	Private	Altinho
81	House no C-8/22	Panaji	Tiswadi	Private	Altinho
82	House no C-8/23	Panaji	Tiswadi	Private	Altinho
83	House no C-8/24	Panaji	Tiswadi	Private	Altinho
84	House no C-8/25	Panaji	Tiswadi	Private	Altinho
85	House no C-8/27	Panaji	Tiswadi	Private	Altinho
86	House of Joseph Vaz C-8/29	Panaji	Tiswadi	Private	Altinho
87	House of Fernando Almeida C- 8/30	Panaji	Tiswadi	Private	Altinho
88	House of Dr Adelia Costa C- 8/71	Panaji	Tiswadi	Private	Altinho
89	House of Vasco Alvares C- 8/25	Panaji	Tiswadi	Private	Altinho
90	House of Dr JG Menezes C-8/82	Panaji	Tiswadi	Private	Altinho
91	House opp C-8/82	Panaji	Tiswadi	Private	Altinho
92	Serra Building	Panaji	Tiswadi	Private	Altinho
93	Bishops Palace	Panaji	Tiswadi	Private	Altinho
94	House of Dr J Mascarenhas C- 8/54	Panaji	Tiswadi	Private	Altinho
95	SBI Bank house	Panaji	Tiswadi	Private	Altinho
96	House of Dr B Silverra C- 8/50	Panaji	Tiswadi	Private	Altinho
97	Hon'ble CM's Residence	Panaji	Tiswadi	Government	Altinho
98	State Guest House Building	Panaji	Tiswadi	Private	Altinho
99	House of Costa Pinto	Panaji	Tiswadi	Private	Altinho
100	Way of Cross	Panaji	Tiswadi	Private	Altinho
101	Stairway with 9 crosses	Panaji	Tiswadi	Private	Altinho
102	Army House	Panaji	Tiswadi	Private	Altinho
103	Bertaire C-8/63	Panaji	Tiswadi	Private	Altinho
104	House of Waglo	Panaji	Tiswadi	Private	Altinho
105	House of AC Fernandes C-8/44	Panaji	Tiswadi	Private	Altinho

S. No	Name of Monument/ site	Village	Taluka	Ownership of Monument/Site	Status as on date protected or not protected
106	House of Pascoal Menezes*	Panaji	Tiswadi	Private	Altinho
107	Old Lyceum Complex 6 Building blocks now High Court*	Panaji	Tiswadi	Government	Altinho
108	Escadaria (Lyceum stairway)	Panaji	Tiswadi	Government	Altinho
109	House of Solar dos Colacos	Panaji	Tiswadi	Private	Ribandar
110	Ribandar road	Panaji	Tiswadi	Private	Ribandar
111	House of Dr PP Sinari	Panaji	Tiswadi	Private	Ribandar
112	GIM building(Old GMC)	Panaji	Tiswadi	Government	Ribandar
113	House of Alavaro de Sa	Panaji	Tiswadi	Private	Ribandar
114	House of Numenio Souza C-3/60*	Panaji	Tiswadi	Private	Ribandar
115	Our Lady of Ajuda Church*	Panaji	Tiswadi	Private	Ribandar
116	Old St Mary's OSC Church Bldg	Panaji	Tiswadi	Private	Ribandar
117	House of LLI Gracia E-174	Panaji	Tiswadi	Private	Ribandar
118	Chapel at Ribandar	Panaji	Tiswadi	Private	Ribandar

Factors under consideration to categorise the heritage structures

1. Heritage Precincts
2. Street group
3. Architecture
4. Historical importance
5. Cultural and social personality
6. National Importance

Taking into account these factors the heritage structures have been graded in various categories viz. Grade-I, Grade IIA, Grade IIB, Grade III and Grade IV. The Table below lists the various heritage areas, number of heritage structures assessed in each and in which grade they have been included.

Heritage Areas	Grade I	Grade II	Grade IIIB	Grade III
Sao Tome		39	30	29
Fountainhas		34	45	31
Mala		03	34	44
Port Ais		46	29	46
CBD	02	25	36	17
Altinho		31	70	56

Heritage Areas	Grade I	Grade II	Grade IIIIB	Grade III
Campal		18	08	00
Ribandar		22	57	106
Additional buildings		04	00	00

Source: Listing & Grading – Draft Report of heritage structures in Panaji, Goa, TCPD, 2014

Annexure – 5: Minutes of Meeting for Kick Off Meeting at MoUD

Annexure 5: Minutes of Meeting for Kick Off Meeting at MoUD

Meeting Agenda	Kick Off Meeting
Assignment Title	Preparation and Revision of City Development Plans for 13 Selected Cities Package 1 (13 cities) Preparation and Revision of City Development Plans for 17 Selected Cities Package 2 (17 cities)
Name of Client	Ministry of Urban Development
Date of meeting	8 th August 2013, 4 pm
Place/Location	Ministry of Urban Development, New Delhi
Participants	<p>Ministry of Urban Development Ms. Nisha Singh, IAS, Joint Secretary and Mission Director Mr. Prem Narayan, Director (JnNURM) Mr. Sanjay Kumar, Under Secretary (JnNURM) Officials from TCPO, CPWD, CPHEEO</p> <p>CBUD PMU Team CRISIL Risk and Infrastructure Solutions Limited (CRIS) Mr. Ravi Poddar, Director, Urban Practice Mr. Brijgopal Ladda, Urban Planning Expert Mr. Abhay Kantak, Municipal Finance Expert Mr. K.K Shrivastava, Municipal Engineering Expert Mr. Tapas Ghatak, GIS Expert Mr. Appeeji Parasher, Associate Director Ms. Monika Bahl, Manager</p> <p><i>A list of all participants in the meeting is enclosed as annexure.</i></p>
	<p>CRISIL Risk & Infrastructure Solutions Limited (CRIS) has been appointed by Ministry of Urban Development (MoUD) for the Preparation and Revision of City Development Plans for 13 Selected Cities under Package 1 and 17 selected cities under Package 2. A kick-off meeting was organized by MoUD to review the work plan and approach for the assignment. The meeting was chaired by Ms. Nisha Singh IAS, Joint Secretary and Project Director and was attended by senior officials from MoUD, PMU from CBUD and officials from TCPO, CPWD.</p> <p>CRIS Team made a presentation on the following aspects</p> <ul style="list-style-type: none"> ■ Our Experience in Preparation of CDPs ■ Details of Assignment Coverage ■ Our Approach - Revised CDP toolkit ■ Proposed Teaming ■ Work Plan ■ Support from MoUD <p>Following were the key points suggested by MoUD /CBUD PMU team and other key officials present during the meeting</p> <ol style="list-style-type: none"> 1. Various recommendations were made by the participants for preparation of CDP. The Mission Director however suggested that the CDPs shall be prepared in line with the

revised tool kit issued by MoUD and also mentioned that MoUD has prepared a comparison of variance between the first generation and 2nd generation CDPs and it shall provide a copy of the same.

2. It was also mentioned that an inclusive approach should be adopted as specified in the tool kit and sufficient emphasis should be made on strategies addressing urban poverty issues.
3. It was also suggested that cities have prepared other plans like CSP, CMP, disaster management etc. The interventions, projects, costing etc. suggested in this studies should be incorporated in the CDP. MoUD also suggested for sharing information from ISNA study to consultant for CDP such to synchronize the two reports.
4. The Mission Director also stressed on to focus on efficiency improvement related aspects while identifying projects in cities.
5. It was discussed that the population projection in all the CDPs shall be for a period of 30 years i.e. 2041 whereas the FOPs can be made for a period of 20 years to be realistic. All CDPs should have same time line for projections and should be based on Census 2011.
6. Some other aspects discussed were as follows
 - ◆ 24x7 Water Supply and implementation of SCADA and other new system to bring in efficiency, 100% metering etc.
 - ◆ Linkages with existing Development Plan or Master Plan
 - ◆ CDP should also endeavor to mention of suitable technologies based on the geographical condition of the cities.
 - ◆ Local Economic Development – Enlist the key thrust areas of economic development and broad level strategies
 - ◆ Map preparation
 - ◆ Smart cities concepts should be explored
7. It was suggested that CDPs should be made through rigorous stakeholder consultations and the ownership should be ensured at the city level.
8. It was suggested to have the executive summary to the Final CDP in vernacular language.
9. The timelines proposed for the assignment were found to be in line with that mentioned in the RFP.

During the presentation CRIS suggested the following points for support from MoUD

1. The team would require a letter of Introduction from MoUD to ensure that all the ULBs can assist the team in the following
 - ◆ Designate an “Officer-In charge” responsible for management and coordination of consultants
 - ◆ Constitute multi-stakeholder City Level Steering Committee and working groups.
 - ◆ Nominate officers from relevant sections of ULB to participate in the process of stakeholder consultation and CDP preparation.
 - ◆ Provide the consultant with information, maps and relevant data and documents on ULB.
 - ◆ Provide the consultant with necessary authorization to procure information from the line departments
1. Introducing the consultants to the Urban Local Bodies
2. Facilitate and expedite approvals from ULB

The meeting ended with a vote of thanks to all participants.

Annexure – 6: Minutes of Meeting for Inception Stage

Annexure 6: Minutes of Meeting for Inception Stage

Meeting Agenda	Inception meeting for Revised City Development Plan of Panaji city
Place/ Location/ Date/ Time	Corporation of the city of Panaji Office, Panaji on 24 th October, 2013 at 10.00 am
Participants	<p>Corporation of the City of Panaji</p> <p>Mr Mohan Sakenovar, OSD, JNNURM, CCP Panaji Mr. Sachin Ambe, MEII, CCP Panaji Mr G.C. Arabekar, ATO, CCP Panaji Mr. Laxman Naik, AAO, CCP Panaji Mr Somanth. R.M, Sanitary Inspector, CCP Panaji Ms. Resta S.R., Accountant, CCP Panaji Headclerk, CCP Panaji</p> <p>Public works Department</p> <p>Mr Arun Patil, A.E., S/DII Division, PWD Mr. Pramod S Prabhu, A.E., SDIV/WDII/PWD Mr. Amay Lawnade, WDIII, PWD</p> <p>North Goa Planning & Development Authority</p> <p>Mr Shaikh Ali Ahmed, Dy. Town Planner, NDPDA Mr. Vikram Tengse, J.E., NGPDA</p> <p>Department of Tourism</p> <p>Ms. Pamela Mascarenhas, D.D. DoT, Goa Mr. Ganesh R Teli, A.D. DoT, Goa</p> <p>Kadamba Transport Corporation</p> <p>Mr. G.P Naik, A.E., KTC Mr Sanjay L. Ghati, Estate officer, OSD Traffic, KTC</p> <p>Other Related Departments</p> <p>Ms. Anju S Keskar, Member Secretary, Goa Rehabilitation Board Mr. K.V. Singh, Director, PWD Mr Koti, Dy Education Officer, CEZ, Panaji Mr. Rajendra A Haldankar, Asst. Divisional Officer, DFES Dr Utkarsh Betodkar, State Epidemiologist, DHS, Campal Mr. Antonio A, Junior Engineer, Electricity Board Mr Merino Dias, Consultant (Finance) ECP, Panaji</p>

	<p>CRISIL Risk and Infrastructure Solutions Limited Mr. Brijgopal Ladda, Director, CRISIL Mr. Parthiv Soni, Senior Consultant, CRISIL Ms. Harshana Ghanwat, Project Consultant, CRISIL</p>
Following were the key discussions during the meeting	
<p>The consultants presented the aim objectives and framework for the Revised CDP project to the officials and briefed them the need for Revised CDP for Panaji.</p> <p>The consultants also intimated the CCP to form technical review committee comprising of the representatives of various departments depending upon the important city infrastructure components which needs to be addressed in the Revised CDP exercise.</p> <p>The officials of various departments submitted data pertaining to their respective departments to the consultants after clarification of the data formats from them.</p>	
<p>The major concerns raised by the officials were as follows:</p> <ul style="list-style-type: none"> ■ The Water Supply PWD department official needed clarification on the projects in the DPR prepared under CDP 2006 which has got government approval and sanction. The CRISIL team informed them that the water supply improvement projects for the city will be prepared taking into account the DPR components to avoid overlapping of the projects. ■ The water Supply and sewerage officials has informed that the DPR Report for Water Supply and Sewerage prepared under the CDP 2006 contains all the related data pertaining to existing water supply and sewerage system in the city and proposed projects. Hence the same can be referred for those sectors. ■ The officials informed the consultants to share a copy of CDP 2006 for them to refer as to what were the outcomes and projects proposed sector wise. <p>The data gaps pertaining to various departments were conveyed by the consultants to the respective officials and were requested to provide it to the earliest.</p> <p>The meeting ended with a vote of thanks from the CCP Officials and the CRISIL team</p>	
<p>Attendance Sheet</p>	

**Preparation/Revision of City Development Plan****Name of the ULB: Corporation of City of Panaji****Date: 24th October 2013****Venue: Conference Hall, CCP****Inception Meeting**

S.N o	Name of the officials	Designation /Dept	Contact number /Email address	Signature
1	Mr. Koti S.F.	Dy. Edu officer	9823141743	
2	C.E.O. Panaji		saifkoti@gmail.com	
3	Ganesh R. Mehta	State by Administrator CCP	9422444727	
4	Dr. Utkarsh Betealkar	State Epidemiologist DHS - Campal	9011025092	
5	Antonio Almeida	Junior Engg/Electrical Dept	8380015034	
6	Anju S. Kerkar	Member Secretary Gra. Rehab. Board	9422970867	
7	Premod S. Paabhu	Asst. Sanitarian SDIV/WODI PWD	9370278103	
8	Anuradha Patil	Asst. Engr SDII Dams (P)	8380015033	
9	K.V. Singh	Director PWD	9422694542	
10	Rejendra Athalekar	Asst. Director officer, DPES	9763717051	 24.10.13
11	Ganesh R. Tel	Asst. Director of Tourism	8805250935	 24.10.13
12	Pamela Mascarenhas	Dy. Director Tourism	9822686929	
13	Chaitin Ambe	MEL / CCP	9423687498	
14	G.C. Arabekar	ATO / CCP	9422579095	
15	Laxman Naik	ATO / CCP	9881253241	 24.10.13
16	Resta S.R. Deo	Accountant/CCP	9673014459	
17	Amey Lawande	WODI/Med PWD	9370694413	
18	Bruno Almeida	HC / CCP	2223339	
19	G.P. Neel	AE KTC	9422441418	

Preparation/Revision of City Development Plan

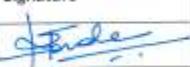
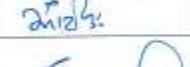
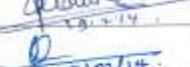
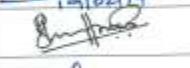
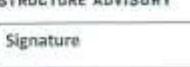
20	Sanjay L. Ghate	OSD - TRAFFIC Estate Officer	9422441061	Sheth
21	Mohan Sakthnarar	BSD - INNDRM COP	9823869497	MS
22	Harshana Ghamrat	Consultant, CRISIL	9945403194	Harshana
23	Manu Doss	Consultant/Project Manager	9822103562	M. Doss
24	Shakthi Al-Ahmed	Project Manager NAPDA	9822082142 shakthi.al.ahmed @yahoo.com	Shakthi
25	Vikram Tengri	Jr. Env. NAPDA	9822082142 vikram.tengri @yahoo.com 7812585796	Tengri
26	Parthiv Soni	SR. CONSULTANT CRISIL Inter.	9980316916	Soni
27	Brijcopal Cabra	DIRECTOR CRISIL		Brijcopal

Annexure – 7: List of attendees for the Stakeholder for Interim Meeting

Annexure 7: List of attendees for the Stakeholder for Interim Meeting

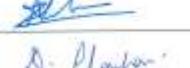
  Name of the ULB: Corporation of the City of Panaji Date: 19 th February 2014 Venue: Conference Hall, CCP Building					
1 st Stakeholder Consultation					
S.No	Name of the officials / Attendant	Designation	Department	Contact number	Signature
1.					
2.	S-T. Patil	Chief Town Planner	T.C.P.D	2437355	
3.	Rajesh Naik	Senior Town Planner	T.C.P. Dept	2437355	
4.	S.P. Suralkar	DM Town Planner	TLP Dept	9822482303	
5.					
6.					
7.	Arun Patil	Asst. Engg.(Civil)	Elect. Dept -	8380015033	
8.	S. D. Naik	SE Met	RD-DPT	8380010035	
9.	Dawn Cavalli	DET MVE	DOT	9822180375	
10.	Fogish Bhandari	AMUL	D.O.T.	9422455232	

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S.No	Name of the officials / Attendant	Designation	Department	Contact number	Signature
11.	Shrikant V. Lawande	ME Gr. II	CCP	9403687475	
12.	John Afreen	M.C.I	C.C.P.	9403687465	
13.	Sudhir S. Leekkar	DY. Commr.	CCP	9422139877	
14.	G. C. Arabdeca	ATO	CLP	9011185453	
15.	Sachin Ambre	ME II	CCP	9403687478	
16.	GALRISH DHOJ	TRAVEL & TOURISM	-	9823015533	
17.	JOE MATHIAS.	CONSTITUENTES		9822157777	
18.	JEROME MARREL	CAMPAL RESIDENTS ASSOCIATION	-	9850398113	
19.	C. RADHAKRISHNAN	ASST. Engineer	S.DIV.II/ ND.II (Civil)	9370294410	
20.	Rayendra Haldankar	Asst. Division Officer	Directorate of Engineering	976371705	
21.	G. R. Tee.	Asst. Asst. of Town	Dept. of Tourism	8805250935	
22.	BHAVANA HAMEED	Ass. Director.	CHARLES CORREA FOUNDATION	099460 88460	
23.	PARTHIV SONI	Senior Consultant	CRISIL	919303 16916	

Capacity Building for Urban Development

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S.No	Name of the officials / Attendant	Designation	Department	Contact number	Signature
24.	T. V. Redkar	Dy. T.P.	T.C.P.D Govt of Goa		
25.	ROHIT A. NADKARNI	ASST. PROF.	GOA COLLEGE OF ARCHITECTURE		
26.	Deepika Chauhan	DY. T.P.	T.C.P.D		
27.	Mackly Aguiar	S.T.	UHC Panaji	9420686016	
28.					
29.					
30.					
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32.					
33.					
34.					
35.					

Capacity Building for Urban Development

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Annexure – 8: Minutes of the Meeting for Draft Stage

Annexure 8: Minutes of the Meeting for Draft Stage

Meeting Agenda	Draft CDP Consultation workshop at Panaji
Assignment Title	Preparation and Revision of City Development Plans for 17 Selected Cities Package 2 (17 cities)
Name of Client	Ministry of Urban Development
Date of meeting	9 th February 2015
Place/Location	Corporation Hall, Corporation of the City of Panaji (CCP)
Participants	<p>CCP Representatives from Various Departments</p> <p>CRISIL Risk and Infrastructure Solutions Limited (CRIS) Mr. Brijgopal Ladda, Director Mr. Parthiv Soni, Senior Consultant</p>
<p>CRIS team made the presentation to the gathering presenting the key issues in various sector assessed under the CDP and proposed strategies and identified investment. The presentation was well received by the gathering however the attendees gave valuable comments and suggestion following the presentation. The comments and suggestions are inscribed below;</p> <ul style="list-style-type: none"> ■ Within the CCP area a project for increasing the coverage for sewage collection is being implemented. The Project report should consider that project and incorporate the same in to it. ■ The presentation covered the proposals in the area for improvement of Traffic and Transportation system and one of the proposals was to create parking facility on the periphery of the city and a hop on-hop off service to be provided. This will free up the road space in the core city area. On this proposal one of the attendee commented that the same need to be cautiously thought of before implementation as the citizen of the city are habituated with one kind of a life style and any change to that life style will have an adverse impacts. ■ During the course of presentation it was suggested by the members that recently many of the developments are given higher FAR and this creates additional burden on the city infrastructure. The permissible FAR within the core city area should be restricted to the level of infrastructure provision. ■ The presentation mentioned that New Year events bring lot of tourists in the city. It was commented by one of the member present during the meeting that there are multiple events in the city which are bringing influx of the tourists in the city. ■ In the traffic and transportation sector, the representative from the traffic police department, suggested that infrastructure should be proposed to stop crossing the roads at locations other than zebra crossings. ■ During the end of the presentation one of the member present during the consultation suggested that the current study covers the aspects of the capital investments in the city. However the burden of the cost of operation and maintenance is missing from the same. It was responded that the same has been considered while assessing the financial capacity of the city. The same can also be viewed in the financial operating plan of the city in the draft report. <p>Apart from the verbal comments and suggestions, the CRIS team suggested providing their comments and suggestions through email or in writing to the team member of CRIS or CCP. Those suggestions would be considered for finalization of the CDP. The consultation ended with vote of thanks from the team of CRIS.</p>	

Annexure – 9: List of Attendees in Draft Meeting

Annexure 9: List of Attendees in Draft Meeting

S.No.	Name of the officials / Attendant	Designation	Department	Contact number	Signature
1.	Mr. Sanjiv Rodrigues	Commissioner - CCP	CCP	9824123718	
2.	Mr. Sudesh Telp	PS T/o Panaji	Traffic Police	7875756070	
3.	Mr. Lubomir Pavlović	Director - Central Power Fund	CPF	9126225458	
4.	Mr. Rajesh Naik	Senior Team Leader	CCP	9820855566	
5.	Mr. Somit Patelkar	E-E-II (roton)		9370278122	
6.	Prajendra D. Naik	AET	DIV. P.W.D Roads	9222488661	
7.	Sherikard v. Lawande	DE-CCP	CCP	9403687475	
8.	Sachin Ambre	MO-II CCP	CCP	9403687475	
9.	John Abreu	DE-E-II C.C.P.	C.C.P.	9403687465	
10.	T. A. Vengatesh	EE-I, Electricity - Electricity		9130015001	

S.No.	Name of the officials / Attendant	Designation	Department	Contact number	Signature
11.	Anuradha Patil	Asst. Engr.	SDO (UD) Panaji	9330015033	
12.	T. L. Shirodkar	Asst. Engr.	SDO, DIV II	9370269449	
13.			PMO, Panaji		
14.	Lewis Carvalho	Motor Vehicle Inspector	Deputy Commr. Transport	9822180375	
15.	C. Radhakrishnan	AET (UD) Panaji	AET (UD) Panaji	9370269449	
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					

Annexure – 10: Staff Details in CCP

Annexure 10: Staff Details in CCP

S. No.	Designation of Post	Sanctioned	Working	Vacant	Daily wages
1	Commissioner	1	1		
2	Dy Commissioner - I	0	0		
3	Dy Commissioner - II	0	0		
4	Municipal Engineer	1	1		
5	Assistant Engineer	1	1		
6	Junior Engineer	4	4		
7	Admin/ Accounts Officer	1	0	1	
8	Accounts/Taxation Officer	1	1		
9	Accountant	1	1		
10	Recovery Officer	1	1		
11	Superintendent	1	0	1	
12	Sr. Steno	1	1		
13	Jr. Steno	2	2		
14	Head Clerk	2	2		
15	Account Clerk	1	1		
16	Cashier	1	1		
17	Store Keeper	1	1		
18	Municipal Inspector	8	8		
19	Sanitary Inspector	1	1		
20	U.D.C.	8	8		
21	L.D.C.	19	19		
22	Asst Librarian	1	1		
23	Data entry operator	2	2		
24	Electrician	1	1		
25	Peon	4	4		
26	Mechanic	1	1		
27	Asst Mechanic	2	2		
28	Plumber	2	2	1	
29	Mason	1	1		
30	Asst Mason	1	1		
31	Carpenter	1	1		1

S. No.	Designation of Post	Sanctioned	Working	Vacant	Daily wages
32	Driver	26	26		
33	Horticulturist	1			
34	Site Supervisor	3	3		
35	Sr. Supervisor	4	4		
36	Supervisor	16	16		
37	Road Worker	75	75		
38	Sweeper	160	160		
39	Trimmers	4	4		
40	Cemetery Workers	2	2		
41	Watchmen	10	3	7	
42	Garden workers	30	30		
43	Scavengers	9	9		
44	Pound Keeper	1	1		
	Total	413	403	10	1

Annexure – 11: Classification of the CRZ

Annexure 11: Classification of the CRZ

Classification of the CRZ as per Coastal Regulation Zone Notification, Ministry Of Environment and Forests

For the purpose of conserving and protecting the coastal areas and marine waters, the CRZ area shall be classified as follows, viz:-

(i) CRZ-I

A. The areas that are ecologically sensitive and the geomorphological features which play a role in the maintaining the integrity of the coast,-

(a) Mangroves, in case mangrove area is more than 1000 sq m, a buffer of 50 meters along the mangroves shall be provided;

(b) Corals and coral reefs and associated biodiversity;

(c) Sand Dunes;

(d) Mudflats which are biologically active;

(e) National parks, marine parks, sanctuaries, reserve forests, wildlife habitats and other protected areas under the provisions of Wild Life (Protection) Act, 1972 (53 of 1972), the Forest (Conservation) Act, 1980 (69 of 1980) or Environment (Protection) Act, 1986 (29 of 1986); including Biosphere Reserves;

(f) Salt Marshes;

(g) Turtle nesting grounds;

(h) Horse shoe crabs habitats;

(i) Sea grass beds;

(j) Nesting grounds of birds;

(k) Areas or structures of archaeological importance and heritage sites.

B. The area between Low Tide Line and High Tide Line;

(ii) CRZ-II

The areas that have been developed up to or close to the shoreline

Explanation - For the purposes of the expression “developed area” is referred to as that area within the existing municipal limits or in other existing legally designated urban areas which are substantially built-up and has been provided with drainage and approach roads and other infrastructural facilities, such as water supply and sewerage mains;

(iii) CRZ-III

Areas that are relatively undisturbed and those do not belong to either CRZ-I or II which include coastal zone in the rural areas (developed and undeveloped) and also areas within municipal limits or in other legally designated urban areas, which are not substantially built up.

(iv.) CRZ-IV

- A. the water area from the Low Tide Line to twelve nautical miles on the seaward side;
- B. shall include the water area of the tidal influenced water body from the mouth of the water body at the sea up to the influence of tide which is measured as five parts per thousand during the driest season of the year.

(v) Areas requiring special consideration for the purpose of protecting the critical coastal environment and difficulties faced by local communities

- A. (i) CRZ area falling within municipal limits of Greater Mumbai; (ii) the CRZ areas of Kerala including the backwaters and backwater islands; (iii) CRZ areas of Goa.
- B. Critically Vulnerable Coastal Areas (CVCA) such as Sunderbans region of West Bengal and other ecologically sensitive areas identified as under Environment (Protection) Act, 1986 and managed with the involvement of coastal communities including fisher folks.

Annexure – 12: TAC Minutes

Annexure 12: TAC Minutes

Date	25 th November, 2014
Place	Nirman Bhavan, MOUD, Delhi
Agenda meeting	Discussion on draft CDP for Panaji with Technical Advisory Committee (TAC) and the City Officials

Discussion points for Panaji

Project Background	<ul style="list-style-type: none"> ■ No comments from the TAC members on the first chapter i.e. the Project Background
Introduction to city	<ul style="list-style-type: none"> ■ <i>Figure – 3 Schematic Map – Regional setting for Panaji should be changed and mapped on the road network map.</i> ■ <i>Section 2.2 Administrative Boundaries – Add a table explaining the administrative boundaries of Goa-North Goa and Panaji</i> ■ <i>Figure – 3 Schematic Map connectivity – make it bigger map</i> ■ <i>Section 2.4 – Defining Study Area – add description of OG in the paragraph</i> ■ <i>Section 2.5.1 – there are only two bullets as per Figure – 6</i> ■ <i>Figure – 6 Schematic Map – Physical Division – bring this map to the beginning of the chapter in th section of administrative boundary\</i>
Demography	<ul style="list-style-type: none"> ■ 3.2.1 – explain north Goa district in the Administrative Boundary first ■ Table 6 : in the last two rows, mention Panaji UA and Panaji for explanation ■ Section 3.4.1 remove composition and distribution of population (religion) ■ Remove the graphs of religions composition ■ 3.7.1 – change the definition of the Child and age dependents as per Guntur report ■ Figure 11 – change the color of graph ■ 3.10 (key observations) remove population composition comment ■ 3.11.1 – 1st generation CDP instead of 1st level CDP ■ Floating population paragraph – move it to the last bullet in basic assumptions of population projection ■ Table 13 – add growth rate
Economic profile of the town	<ul style="list-style-type: none"> ■ 4.2.1 change the numbering to A, B, C ... ■ 4.3 change the numbering 4.3 Economic infrastructure , 4.3.1 industrial and commercial activities 4.3.2 tourism etc... ■ Figure -16 make it a full page map ■ 4.3.2 make a informal commercial activity – make it bullet points and add a picture of markets in Panaji ■ Add description of Water sports, Rent a Bike, Tourist Guides

	<ul style="list-style-type: none"> ■ Add a box highlighting special initiatives by Panaji ■ Table 18 add % ■ Figure-17 – remove the graph ■ 4.6 key issues – expand the key issues and observations
Physical planning and growth management	<ul style="list-style-type: none"> ■ Table 20 – add developed and un-developable % of land ■ Section 5.6.1 change the comparison as per the change in table 20 ■ Building regulations 5.1 – make it 5.2 and change ZDP to ODP ■ 5.2 Critical appraisal of the ODP – make it as 5.1 ■ In the end of the section add key observations based on URDPFI comparison ■ Figure – 19 make a full page A3 map ■ 5.3 – regional plan goa, add a map ■ 5.4 Urban Planning Functions – Add description as per the prevailing Acts... TCP Act, CCP act etc....also add other agencies ■ Footnote – 18, remove the reference to the press note..make it an original reference ■ Add a description of heritage conservation committee as a separate section under 5.4 and highlight the conservation area and add listing of heritage structures
Social environment	<ul style="list-style-type: none"> ■ Chapter Heading – to Social Infrastructure ■ Table – 26 Check the Health Related Data its available with the CCP / directorate of planning and statistics ■ Table 28: Educational Facilities – Change the order as per URDPFI. ■ Key Observations – Last Bullet – Take it to key observations in the economy section ■ Add a bullet point mentioning that the city lacks the soft infrastructure i.e. Software for program management, websites etc..
Infrastructure and services	<ul style="list-style-type: none"> ■ Update the status of water supply project as per the latest information from CCP ■ SLB – Mention as per the regional data ■ Table : 55 Future Solid Waste Generation – change the population base and add a line of population as per the DPR for SWM ■ 7.4.2.1 – Proposed projects – Project for SWM ... it should be mentioned that the DPR should be updated and re-submitted to the Central government ■ Key observations SWD – add issue of silting of river and back flow of the flood water in to drains ■ Add issue of high tide and flood situation in the city ■ Rain water retention – add as an issue in Disaster management chapter
Urban roads, traffic and transportation system	<ul style="list-style-type: none"> ■ 8.1 add a map of major roads in the city ■ Add a map showing roads coming to Panaji - Karamali station to Panaji and Goa Medical College to Panaji ■ Change the colors of Roads Map ■ 8.1.2 – add name of junctions for which projects are proposed ■ 8.1.3 – update the list of bridges in Panaji ■ Add a mention of the proposed pedestrian movement in the city ■ CCP to provide the plan prepared for Public Bicycle Sharing system

	<ul style="list-style-type: none"> ■ 8.1.4.1 - Mention the name of three jetties mentioned in the paragraph ■ In the key observation mention that Panaji should have a multimodal transportation strategy ■ Add a paragraph on entry/access roads to city ■ Add a para on per capita vehicular population ■ Figure – 27 – add a boundary to map and also add a key map for better understanding ■ Issues and challenges – The stress on roads is increasing due to increase in the vehicles and traffic thus water transport should be upgraded ■ Add a requirement of transportation mode from the nearest railway station to the city – Light BRT may be an option ■ Critical review of CMP may be added ■ Propose preparation of a NMT policy ■ Applicability of ToD can be checked
Housing and urban poverty	<ul style="list-style-type: none"> ■ Table 67 – projected housing stock in the city – last two rows ..make it actual number rather than in lakhs ■ 9.2 the para below bullets is actually a bullet ■ Footnote – 30-Remove ■ Table 68 – Fishing Villages – Mention names of the fishing villages ■ •
Climate Change	<ul style="list-style-type: none"> ■ Update the information of Solar city – the Master Plan has been prepared
Cultural resources, heritage and tourism	<ul style="list-style-type: none"> ■ 12.4 – Tourism Scenario – map – make it a full page map ■ Table 83 – add a ratio of hotel room to beds ■ 12.7 fairs and festivals – add list of national and international events being held in Goa
Sector plans	<ul style="list-style-type: none"> ■ Have a re-look at the project costing

Other general comments

1. All pictures and maps should be large enough to read and comprehend.
2. Maps to be readable in A4/A3 size. Google maps in satellite imagery are not preferred.
3. Issues should be written in detail linking with the discussion in the relevant subsection

Projects to be included

1. Light BRT
2. NMT policy

Annexure – 13: CDP Committees

Annexure 13: Details of CDP Committees

CORPORATION OF THE CITY OF PANAJI

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 E.mail: commissioner@ccpgoa.com www.ccpgoa.com



Ref: F4/CCP/PROJECTS/CRISIL/2014-15/ 597

Date:- 04 /02/2015

As per the Revised Toolkit for Preparation of the Revised City Development Plan (CDP) under the Capacity Building for Urban Development Project, the CDP Policy Committee and CDP Technical Committee are constituted which are as below:

CDP Policy Committee

1. Mayor, Corporation of the City of Panaji----- Chairman
2. Dy. Mayor, Corporation of the City of Panaji -----Vice Chairman
3. Commissioner, Corporation of the City of Panaji
4. Head of the Urban Development Authority/ DMA/ADMA
5. Director, Directorate of Transport, Junta House, Panaji Goa
6. Executive Engineer, PWD, W.D.III, St. Inez Panaji (Water Supply & Sewerage)
7. Member Secretary, North Goa Planning Development Authority, Mala, Panaji Goa
8. Municipal Engineer Grade I, Corporation of the City of Panaji, Panaji
9. Municipal Engineer Grade II, Corporation of the City of Panaji, Panaji
10. Director, Charles Correa Foundation, Fontainhas, Panaji Goa

CDP Technical Committee

1. The Member Secretary, Goa State Urban Development Agency (GSUDA), Patto, Panaji Goa
2. Managing Director or his Representative, Kadamba Transport Corporation Limited, Alto-Porvorim Goa
3. Senior Town Planner, Town & Country Planning Department, Panaji
4. Dy. Supt. of Police, Traffic Cell, Goa Police, Panaji Goa
5. The Executive Engineer, Div. I, Vidhut Bhavan, Electricity Department, Panaji Goa.
6. Executive Engineer, W.D. I, (Buildings), PWD, Panaji Goa
7. Executive Engineer, W.D. II, (Roads), PWD, Panaji Goa
8. The Executive Engineer, Div. I, Water Resources Department, Patto Panaji Goa.
9. The Manager (Engineering), Goa State Infrastructure Development Corporation Limited, Panaji Goa
10. Assistant Engineer, S.D. I, W.D. III, PWD, Water Supply, Tonca St. Inez Panaji Goa
11. The Assistant Engineer, Sub Div II, Works Div. III, Sewerage Section, PWD, Tonca Caranzalem Goa
12. Arch. Bryan Soares, Vikash Bldg., Near Pharmacy College, Panaji Goa

Place:- Panaji - Goa




 Commissioner
 Corporation of the City of Panaji

Annexure – 14: Minutes of the Meeting 23rd Jan 2015

Annexure 14: Minutes of the Meeting 23rd Jan 2015

MINUTES OF THE MEETING HELD ON 23.01.2015 IN THE CHAMBER OF COMMISSIONER, CORPORATION OF THE CITY OF PANAJI, PANAJI ON DISCUSSION ON DRAFT CITY DEVELOPMENT PLAN ON PANAJI.

The following Members / Officials were present for the meeting.

1. Shri Sanjit Rodrigues, Commissioner, CCP
2. Shri John Abreu, Municipal Engineer , CCP
3. Shri Shrikant Lawande, Junior Engineer, CCP
4. Shri Brijgopal Ladda, Director, Urban Practice, CRISIL Infrastructure Advisory
5. Shri Parthiv Soni, Senior Consultant, Urban Practice CRISIL Infrastructure Advisory
6. Smt. H. Harshana, Official of CRISIL Infrastructure Advisory

The Commissioner extended a warm welcome to the Officials of the CRISIL

Shri Parthiv Soni of CRISIL gave aboard presentation on Draft City Development Plan (CDP) for Panaji to Commissioner, Municipal Engineer Gr. I and Junior Engineer of the Corporation. During the discussion and presentation Commissioner raised certain issues, points which need to be incorporated in the Draft CDP for Panaji

The details which need to be incorporated in the Draft CDP are as below:

1. Add an observation in the transportation chapter that all the roads being re-surfaced should be made of concrete of appropriate quality
2. In the **transportation projects proposal** Commissioner directed Shri Parthiv Soni and Shri Brijgopal Ladda to:
 - Remove foot Over Bridge and make it pedestrian crossing /table tops
 - All the ring routes suggested in the CDP shall be considered as LBRT
 - Make it to green fuel buses instead of CNG buses
 - Remove feasibility of Tram Loops
 - Also directed to add ferry routes Dona Paula to Vasco
 - Move parking facilities at a peripheral location of the city
 - Suggest traffic junction only at the major junctions
 - In street light directed to use the word as adequate lighting
 - Commissioner also brought to the notice of the CRISIL Team that they have missed out various road junctions in the City and its jurisdiction
 - To also add topic on Pay Parking, Pedestrian Street in the City in the City Development Plan

3. In the **Sewerage Chapter**, Commissioner directed to add a goal i.e. coverage should be 100% and also suggested at add chapter on Bio Toilets and Mobile Toilets in the CDP.
4. **Project Sanitation :**
 - In Sanitation Chapter, Commissioner and Municipal Engineers suggested requirement of new public toilets as 40 nos. instead of 30 nos. and also suggested to add mobile toilets which does not require land
5. **SWM Project.**
 - Suggested to add ITS System for SWM Vehicles as project
 - Incentive scheme for source segregation
6. **Storm Water Project:**
 - Re-development of the storm water Drainage Network
 - De-siltation and up-gradation of water bodies
 - Mention list of all water bodies/lakes and springs
 - Add rain water harvesting measures as a Project
 - Silt arrestation – flood control measures
7. **Biodiversity:**
 - CCP to share the study on biodiversity and base on which the project to be added for Eco Tourism.
 - CCP to share the GIZ study for biodiversity walk
8. **River side promenade**
 - From Miramar to Patto
 - Increase the length from 1 km to 8 km
9. **Heritage Projects**
 - Commissioner directed to take up in detail the improvement of all hill steps within the jurisdiction of CCP Panaji
 - To make a study on development of Dona Paula jetty
10. **Projects Implementing Agencies**
 - Commissioner suggested that instead of mentioning Public Works Department (PWD) as Implementing Agency to make a note as PWD/GSIDC and instead of mentioning Water Resources Department (WRD) as WRD/GSIDC
11. **Regarding (Technical Advisory Committee (TAC) Meeting held on CDP on 25.11.2014 at Nirman Bhavan, Ministry of Urban Development, New Delhi**

- Commissioner strictly directed Shri Ladda and Shri Parthiv Soni to strictly incorporate all the points raised by TAC Members in New Delhi and update the Draft CDP with all above other points before 03.02.2015 and send a copy i.e. hard and soft copy to the Corporation

The tentative date of Draft Stage Meeting with the CDP Policy Committee and CDP Technical Committee of the Corporation and other Stakeholders was fixed on 09.02.2015 at 11.00 a.m.



Sanjit Rodrigues
Commissioner



Annexure – 15: Actions Taken Report – Comments of TAC

Annexure 15: Actions Taken Report – Comments of TAC

Sr No	Chapter	Section No	Comment	Response / Action Taken	Remarks
1.	2	Figure – 3 Schematic Map	Regional setting for Panaji should be changed and mapped on the road network map.	Regional setting Map for Panaji has been changed (Refer Figure 8) and separate map for road network within the city has been prepared (Refer Map)	Comment Addressed
2.	3	Section 2.2 Administrative Boundaries	Add a table explaining the administrative boundaries of Goa-North Goa and Panaji	Table 7 explaining the administrative boundaries of Goa, North Goa and Panaji has been included under 3.2 of Chapter 3	Comment Addressed
3.	3	Figure – 3 Schematic Map connectivity	Make it bigger map	Figure 11 under 3.3 of Chapter 3 has been made bigger in size.	Comment Addressed
4.	3	Section 2.4 – Defining Study Area	Add description of OG in the paragraph	A description on OG has been provided under 3.3 of Chapter 3	Please refer to section 2.2 of the report.
5.	3	Section 2.5.1	There are only two bullets as per Figure – 6	The bullets has been modified under 3.5.1 of Chapter 3	Comment Addressed
6.	3	Figure – 6 Schematic Map Physical Division	Bring this map to the beginning of the chapter in the section of administrative boundary	The Figure 12 explaining the Physical Division of Goa has been shown under 3.5 Physical setting as it shows the physiographic divisions of the region	Comment Addressed
7.	4	3.2.1	Explain north Goa district in the Administrative Boundary first	The North Goa district profile has been explained in the administrative boundary initially under 4.2.1 of Chapter 4	Comment Addressed

Sr No	Chapter	Section No	Comment	Response / Action Taken	Remarks
8.	4	Table 6	In the last two rows, mention Panaji UA and Panaji for explanation	The Table 10 has been modified mentioning Panaji UA and Panaji in last two rows under 4.3 of Chapter 4 .	Update map shall be provided along with the next deliverable.
9.	4	Section 3.4.1	Remove composition and distribution of population (religion)	The Composition and Distribution of population (religion) has been removed from Chapter 4	Comment Addressed
10.	4		Remove the graphs of religions composition	The graphs of religious composition have been removed from Chapter 4 .	All such regional proposals as identified in the final stakeholder consultation will be incorporated in the next deliverable.
11.	3	3.7.1	Change the definition of the Child and age dependents as per Guntur report	The definition of the child and age dependents have been adopted from the Guntur Report as suggested (Refer 4.7.1 of Chapter 4)	Comment Addressed
12.	4	Figure 11	Change the color of graph	The colour of the graph has been changed (Refer Figure 13 –Age-sex Pyramid in Chapter 4)	Comment Addressed
13.	4	3.10 (key observations)	Remove population composition comment	The comment on population composition has been removed from the key observations (Refer 4.10)	Comment Addressed
14.	4	3.11.1	1 st Generation CDP instead of 1st level CDP	The term has been modified in 4.11.1	Comment Addressed
15.	4	Floating population paragraph	Move it to the last bullet in basic assumptions of population projection	Floating population moved to the last bullet. Refer 4.11.2	Comment Addressed
16.	4	Table 13	Add growth rate	Growth rate has been added in Table 17 under 4.11.3	Comment Addressed
17.	5	4.2.1	Change the numbering to A, B, C ...	The numbering has been changed to A, B,C under 5.2.1	Comment Addressed

Sr No	Chapter	Section No	Comment	Response / Action Taken	Remarks
18.	5	4.3	Change the numbering 4.3 Economic infrastructure, 4.3.1 industrial and commercial activities 4.3.2 tourism etc...	The numbering has been modified as suggested. Refer 5.3	Comment Addressed
19.	5	Figure -16	Make it a full page map	The Map has been made bigger. Refer Figure 20	Comment Addressed
20.	5	4.3.2	Make a informal commercial activity – make it bullet points and add a picture of markets in Panaji	The description on informal sector activity has been made in bullet points and photos provided showing various activities prevalent. Refer 5.3.3	Comment Addressed
21.	5		Add description of Water sports, Rent a Bike, Tourist Guides	Description on water sports. Rent a bike, tourist guides has been included under 5.3.3	Comment will be addressed in the next deliverable
22.	5		Add a box highlighting special initiatives by Panaji	Box highlighting special initiatives by Panaji for the informal sectors has been included under 5.3.3	Comment Addressed
23.	5	Table 18	Add %	% has been included in Table 22 under 5.5.3	Comment Addressed
24.	5	Figure-17	Remove the graph	The Graph has been removed	Comment Addressed
25.	5	4.6 Key issues	Expand the key issues and observations	The key issues and observations has been elaborated and explained. Refer 5.6	Comment Addressed
26.	6	Table 20	Add developed and un-developable % of land	The Table 25 under 6.8 has been modified with % under developable and undevelopable land use	Comment Addressed
27.	6	Section 5.6.1	Change the comparison as per the change in table 20	The para on comparison of land use as per the modification in Table 25 has been modified under 6.8.1	Comment Addressed
28.	6	Building regulations 5.1	Make it 5.2 and change ZDP to ODP	The numbering has been revised and ZDP has been changed to ODP. Refer 6.3	Comment addressed
29.	6	5.2 Critical appraisal of	Make it as 5.1	The numbering has been modified in Chapter 6	Comment addressed

Sr No	Chapter	Section No	Comment	Response / Action Taken	Remarks
		the ODP			
30.	6		In the end of the section add key observations based on URDPFI comparison		Comment addressed
31.	6	Figure – 19	Make a full page A3 map	The Figure 22 under 6.8.1.6 has been made full page	Comment addressed
32.	6	5.3 Regional plan goa	Add a map	Map of Regional Plan for Goa has been added. Refer Figure 23 under 6.9	Comment Addressed
33.	6	5.4 Urban Planning Functions	Add description as per the prevailing Acts... TCP Act, CCP act etc....also add other agencies	The description as per the relevant Land use planning Acts in the state has been described under 6.10.1, 6.10.2, 6.10.3 . The roles of other departments has been included under 6.10.4	Comment Addressed
34.	6	Footnote – 18	Remove the reference to the press note..make it an original reference	The Foot note has been modified. Refer Footnote 14	Comment Addressed.
35.	7	Chapter Heading	Change to Social Infrastructure	The Heading for Chapter 7 has been changed to Social Infrastructure	Comment Addressed.
36.	7	Table – 26	Check the Health Related Data its available with the CCP / directorate of planning and statistics	The Table 30- Comparison of Health indicators data has been presented as per the data available	Comment Addressed.
37.	7	Table 28 Educational Facilities	Change the order as per URDPFI.	The Table 33 – Health Facilities under 7.2.4 has been changed as per URDPFI	Comment Addressed.
38.	7	Key Observations – Last Bullet	Take it to key observations in the economy section	The last bullet under Key Observations under Chapter 7 has been included in the Key observations in Chapter 5	Comment Addressed.
39.	7		Add a bullet point mentioning that the city lacks the soft infrastructure i.e. Software for program management, websites etc	It has been included under 7.5.8 – Key concerns	Comment Addressed.

Sr No	Chapter	Section No	Comment	Response / Action Taken	Remarks
40.	8		Update the status of water supply project as per the latest information from CCP	The status of the water supply project has been updated under 8.1 of Chapter 8	Comment Addressed.
41.	8	SLB	Mention as per the regional data	The SLB Table 48 has been modified as per the data available at city as well as regional level provided by PHED department	Comment Addressed.
42.	8	Table : 55 Future Solid Waste Generation	Change the population base and add a line of population as per the DPR for SWM	The population base has been revised and the projected population as per the DPR for SWM has been mentioned under 8.3.2	Comment Addressed.
43.	8	7.4.2.1 Proposed projects – Project for SWM	It should be mentioned that the DPR should be updated and re-submitted to the Central government	It has been mentioned under 8.3.3.1 - Proposed projects – Project for SWM	Comment Addressed.
44.	8	Key observations SWD	Add issue of silting of river and back flow of the flood water in to drains Add issue of high tide and flood situation in the city	The issues suggested have been mentioned under 8.4.3 – Service Adequacies and Key issues	Comment Addressed.
45	11	Rain water retention	Add as an issue in Disaster management chapter	The issue has been included in under the Chapter of Disaster Management	Comment Addressed.
46	9	8.1	Add a map of major roads in the city	The Map showing major regional roads passing through the city has been shown in Figure 29 under 9.1	Comment Addressed.
47	9		Add a map showing roads coming to Panaji - Karamali station to Panaji and Goa Medical College to Panaji	Map showing roads connecting Karmali station to Panaji in the Figure 30 – Rail connectivity and stations in the state	Comment Addressed.
48	9		Change the colors of Roads Map	The Map has been modified as suggested	Comment Addressed.

Sr No	Chapter	Section No	Comment	Response / Action Taken	Remarks
49	9	8.1.2	Add name of junctions for which projects are proposed	The name of the junctions for which projects have been proposed has been mentioned in 9.1.5	Comment Addressed.
50	9	8.1.3	Update the list of bridges in Panaji	The list of bridges in Panaji has been updated as per the existing situation under 9.1.6	Comment Addressed.
51	9		Add a mention of the proposed pedestrian movement in the city	The proposed projects by CCP for pedestrian movement and Public Bicycle Sharing system has been included under 9.3.7 – Proposed Projects	Comment Addressed.
52	9		CCP to provide the plan prepared for Public Bicycle Sharing system	The PBS plan prepared by CCP has been shared and incorporated in the Report under 9.3.7	Comment Addressed.
53	9	8.1.4.1	Mention the name of three jetties mentioned in the paragraph	The names of the three jetties has been mentioned in the Table 62- Ferry routes in Panaji	Comment Addressed.
54	9		In the key observation mention that Panaji should have a multimodal transportation strategy	The same has been included in the Key observations under 9.2	Comment Addressed.
55	9		Add a paragraph on entry/access roads to city	The para on entry/ access roads to city has been included in 9.3.1.1	Comment Addressed.
56	9		Add a para on per capita vehicular population	The para on per capita vehicular population has been included under 9.3.2.2 – Public transportation	Comment Addressed.
57	9	Figure – 27	add a boundary to map and also add a key map for better understanding	The figure has been modified as suggested. Refer Figure 40 – Allocated parking areas in core city	Comment Addressed.
58	9	Issues and challenges	The stress on roads is increasing due to increase in the vehicles and traffic thus water transport should be upgraded	This issue has been discussed and mentioned under 9.2	Comment Addressed.
59	9		Add a requirement of transportation mode from the nearest railway station	It has been highlighted under 9.2 and taken up as a project proposal in CIP for Panaji	Comment Addressed.

Sr No	Chapter	Section No	Comment	Response / Action Taken	Remarks
			to the city – Light BRT may be an option		
60	9		Critical review of CMP may be added	The critical review on CMP has been added under 9.3.7 – Proposed Projects	Comment Addressed.
61	9		Propose preparation of a NMT policy	The proposal for preparation of NMT policy has been included in 9.1.7 and 9.2 – Issues and key challenges	Comment Addressed.
62	9		Applicability of ToD can be checked	It has been checked and incorporated.	Comment Addressed.
63	10	Table 67 - projected housing stock in the city	Last two rows...make it actual number rather than in lakhs	The Table 70 - Projected housing stock in the city has been modified as suggested	Comment Addressed.
64	10	9.2	The para below bullets is actually a bullet	The formatting has been done. Refer 10.2	Comment Addressed.
65	10	Footnote – 30	Remove	The footnote has been removed	Comment Addressed.
66	10	Table 68 – Fishing Villages	Mention names of the fishing villages	The names of the fishing villages has been mentioned in Table- 71 - Location of Slum like pockets in Panaji under 10.2.1	Comment Addressed.
67	12	Climate Change	Update the information of Solar city – the Master Plan has been prepared	The Solar city Master Plan proposal prepared by the CCP has been included under 12.11	Comment Addressed.
68	13	12.4 Tourism Scenario map –	Make it a full page map	The Figure 51 – Heritage and Tourist locations in the state has been made a full page map	Comment Addressed.
69	13	Table 83	Add a ratio of hotel room to beds	The Table 88 – Number of hotels registered in Panaji has been modified with details of ratio of hotel rooms to beds	Comment Addressed.

Sr No	Chapter	Section No	Comment	Response / Action Taken	Remarks
70	13	12.7 fairs and festivals	Add list of national and international events being held in Goa	The list and description of national and international events being held in Goa/ Panaji has been included. Refer 13.7	Comment Addressed.
71		Sector Plans	Have a re-look at the project costing	The project costs have been modified and updated in the CIP for Panaji	Comment Addressed.
72		General comments	All pictures and maps should be large enough to read and comprehend.	All the pictures and maps are made visible to read and comprehend.	Comment Addressed.
73		General comments	Maps to be readable in A4/A3 size. Google maps in satellite imagery are not preferred.	Maps made readable in A4/A3. No Google maps included.	Comment Addressed.
74		General comments	Issues should be written in detail linking with the discussion in the relevant subsection	All the infrastructure issues has been discussed and explained in detail as required.	Comment Addressed.

Annexure – 16: Actions Taken Report – CCP Comments

Annexure 16: Actions Taken Report – CCP Comments

SI No	Chapters/Contents	CDP Analysis	CCP Comments	Response / Action Taken
1	8. Traffic and Transportation System.	CDP has broadly discussed about existing road infrastructure, existing traffic and transportation system review of institutional system, transit oriented development and street lighting.	<p>Transport Project Proposals -</p> <ul style="list-style-type: none"> ▪ Remove Foot over bridges and make in Pedestrian Crossings / Table tops ▪ All the ring routes suggested in the CDP shall be considered as LRT ▪ Make it to green fuel buses instead of CNG Buses ▪ Remove Feasibility of tram loops ▪ Add Ferry routes – Dona Paula to Vasco ▪ Move parking facilities at peripheral locations of the city. ▪ Traffic Junctions only at major junctions 	<ul style="list-style-type: none"> ▪ Proposal for foot over bridges is removed and pedestrian crossings/ table tops included. (Refer 17.6.1 – Table 126) ▪ All the ring routes suggested in CDP have been considered as LRT. (Refer 17.6.1 – Table 126) ▪ The term CNG buses has been changed to green fuel buses (Refer 17.6.1 – Table 126) ▪ Feasibility of tram loops has been removed from the project list (Refer 17.6.1 – Table 126) ▪ Additional route from Dona Paula to Vasco is included (Refer 17.6.1 – Table 126) ▪ Parking facilities has been proposed in the peripheral locations of the city (Refer 17.6.1 – Table 126) ▪ Traffic junctions have been proposed only at major junctions (Refer 17.6.1 – Table 126)

SI No	Chapters/Contents	CDP Analysis	CCP Comments	Response / Action Taken
			<ul style="list-style-type: none"> ■ Riverside promenade from to be proposed Miramar to Patto with a total length of 8 km. ■ Street Lights – use the word as adequate lighting 	<ul style="list-style-type: none"> ■ The Riverside promenade has been proposed from Miramar to Patto for a total length of 8 km. (Refer 17.6.1 – Table 126) ■ The term adequate lighting is mentioned as suggested (Refer 17.6.1–Table 126)
2	15. City Vision, Development Goals and Strategies	The Chapter includes stakeholder consultations, organization of workshops, suggestions of stakeholders, SWOT analysis, vision statement, milestones and development goals.	<p>Sewerage - Add a goal - Coverage should be 100%</p> <p>Sanitation Projects –</p> <ul style="list-style-type: none"> ■ New public toilets make the requirement as 40 instead of 30 ■ Add Mobile toilets / toilets which does not require land <p>SWM Projects</p> <ul style="list-style-type: none"> ■ Add ITS systems for SWM vehicles as project ■ Incentive scheme for source segregation <p>Storm Water – Projects</p> <ul style="list-style-type: none"> ■ Re-development of the storm water drainage network ■ De-siltation and up gradation of water bodies 	<ul style="list-style-type: none"> ■ The Goal for 100% coverage of sewerage system has been included (Refer 17.3 – Table 113) ■ The proposed new public toilets numbers has been increased from 30 to 40 as suggested. (Refer 17.3.1 – Table 114) ■ The proposal for mobile toilets/ toilets which do not require land has been included in CIP (Refer 17.3.1 – Table 114) ■ The system of ATS has been proposed for the SWM vehicles (Refer 17.4.1 – Table 118) ■ Incentive scheme proposed for source segregation for the public. (Refer 17.4 – Table 117 (Action Plans)) ■ The proposal for redevelopment of the storm water drainage network has been included. (Refer 17.5.1 – Table 122)

SI No	Chapters/Contents	CDP Analysis	CCP Comments	Response / Action Taken
			<ul style="list-style-type: none"> ■ Mention list of water bodies / lakes and springs ■ Add rain water harvesting measures as project ■ Siltation – flood control measures <p>Urban Environment</p> <ul style="list-style-type: none"> ■ CCP to share the study on bio-diversity and based on which a project to be added for Eco-Tourism ■ CCP to share the GIZ study for bio-diversity walk which needs to be included. <p>Tourism and Heritage</p> <ul style="list-style-type: none"> ■ Improvement of all Hill Steps in the city ■ CCP to provide the list of hill steps to be mentioned in the CDP report ■ Development of Dona Paula Jetty 	<ul style="list-style-type: none"> ■ Desilting and up gradation of water bodies has been proposed. (Refer 17.5.1–Table 122) ■ The list of water bodies/ lakes and springs has been mentioned in the Report. (Refer 11.2.1 – Table 76) ■ Rain water harvesting measures has been proposed in the CIP proposal (Refer ■ The issue of siltation has been mentioned in the situation analysis under storm water drains sector and flood control measures have been proposed in the sector level strategies. ■ A project on Eco Tourism has been included in the Report (Refer ■ The study for bio diversity by GIZ has been included in the Report (Refer ■ The improvement of all hill steps in the city has been included as suggested by CCP in the Report (Refer Table 141) ■ The proposal for development of Dona Paula jetty has been included in the project proposals (Refer Table 141)

SI No	Chapters/Contents	CDP Analysis	CCP Comments	Response / Action Taken
16	16. Sector Plan, Strategies and Investment Plan	The Chapter has discussed institutionalising Capital Investment Plan by including Sector Plans - water supply, sewerage, solid waste management, storm water drains, traffic and transportation, urban poor, urban environment and social infrastructure and strategies for economic up-liftment of the city.	<p>Project Implementing Agencies</p> <ul style="list-style-type: none"> ■ Instead of PWD mention PWD/ GSIDC ■ Instead of WRD mention WRD/GSIDC 	The implementing agencies for projects under storm water drains has been updated across the report as suggested.
17	General	-	Incorporate all the points raised by the TAC members in the New Delhi and update the Draft CDP with all above points and send a Hard copy and a soft copy to the Corporation	The comments raised by the TAC in Delhi are already addressed. The Action Taken Report for the same has been provided in the Annexure-15 of this report.

Bibliography

- Census of India. (n.d.). 2001 Census data - A Census of India Website. Retrieved May 2014, from Census of India Web site.
- Directorate of Economics and Statistics, Planning Department, Government of Goa. (2012-13). Economic Survey of Goa.
- Corporation of City of Panaji (2006). City Development Plan for Panaji.
- City Corporation of Panaji, (2009), Comprehensive Mobility Plan (CMP) for Panaji Volume -1 under JnNURM
- Goa Institute of Management Ribandar, Goa (2012), District Disaster Management Plan (North Goa), Final Report
- Times of India, Panaji, Goa, (May 2011), "Housing prices touch sky in Goa"
- Deccan Herald, Goa, (June 2014), "Panjim, one of least polluting cities in Goa"
- TERI, (2014), Climate Resilient infrastructure services, Case study brief: Panaji
- State Level Committee For Regional Plan For Goa -2021 , (2012-13), Final Report on Regional Plan for Goa -2021, Release 3
- Department Of Marine Sciences Goa University, (March 2008), Integrated Coastal Zone Management – A Case Study from Goa
- MSME - Development Institute, Government of India, (2010), Brief Industrial Profile of North Goa District
- Equations, (2012), Women street vendors & tourism - Negotiating Lives and Spaces
- Government of Goa, Town & Country Planning Act & Rules, Manual of Goa Laws (Vol. IV)
- Government Of India Ministry Of Water Resources Central Ground Water Board, (March 2013), Ground Water Information Booklet North Goa District, Goa State
- Town and Country Planning, Goa, (2010), Provisional List Of Heritage Buildings/Sites in State of Goa
- Public Works Department, GoG, (2013), Water Supply Project of the Corporation of the City of Panaji under JnNURM
- City Corporation of Panaji, (2008-09), DPR on Heritage Conservation, Volume -1
- City Corporation of Panaji , (2013), Detailed Project Report for Solid waste management in Panaji – Volume 1
- City Corporation of Panaji, (2013), DPR for Basic Services to Urban Poor for the City of Panaji under JNNURM
- North Goa Planning and Development Authority, Outline Development Plan for Panaji
- Official Gazette – Government of Goa, 2010, The Goa Land Development And Building Construction Regulations
- DPR on "Public Bicycle share system – Panaji", 2014, Embark
- Report on "Urban Vulnerability Assessment", 2014, ICLEI
- "Proposed Decongestion Model for Panjim City Centre", 2013, Charles Correa Foundation, Panaji
- "Development of Solar Cities", February 2008, Ministry of New and Renewable Energy (MNRE)

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