सत्यमेव जयते
राजस्थान सरकार

Draft Master Plan-2042

For Jodhpur-Pali-Marwar Industrial Area, Rajasthan Sub Region of DMIC







Delhi Mumbai Industrial Corridor Department,
Govt. of Rajasthan, Jaipur

Delhi Mumbai Industrial Corridor Department,

Govt. of Rajasthan

Jodhpur-Pali-Marwar Industrial Area

Rajasthan, Sub-Region of DMIC

Draft Master Plan-2042

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Contents

List of Annexure

List of Tables

List of Figures

Glossary of Terms

Delhi Mumbai Industrial Corridor (DMIC)	Industrial Corridor being established between Delhi and Mumbai covering an overall length of 1,483 km and comprised of major infrastructure projects, Industrial Areas and Investment Regions strategically located along a Dedicated Freight Corridor, which is currently under construction. The Corridor encompasses 6 States and over 84 districts.
Industrial Area (IA) :	Areas identified by DMICDC, with a minimum area of 100sqkm (10,000ha). A total of 13 IA's are proposed within the DMIC (DMICDC, 2012, p.130). Within Rajasthan there are three IA's: Jaipur-Dausa IA, Rajasmand-Bhilwara IA and the Jodhpur-Pali-Marawar IA. May also be referred to as a node.
Influence Area:	A 150 -200km band on both sides of DFC alignment.
Integrated Industrial Township:	A state of the art planned township incorporating, primary, secondary and tertiary industrial uses with residential, institutional, commercial and leisure/recreation uses. It will be developed with first class physical and social infrastructure at the city and regional levels.
Investment Region (IR) :	Areas identified by DMICDC, with a minimum area of 200sqkm (20,000ha). A total of 11 IR's are proposed within the DMIC (DMICDC, 2012, p.130). Within Rajasthan there are two IR's: Khushkhera-Bhiwadi-Neemrana IR and the Ajmer-Kishangarh IR. May also be referred to as an Industrial Investment node.
Western Freight Corridor (DFC) :	Part of the Multi-modal High Axle Load Dedicated Freight Corridor linking Delhi to Mumbai, forming the spine of DMIC.

List of Abbreviations

AACGR	Average Annualised Compound Growth Rate
ACSR	Aluminum Conductor Steel Reinforced
ADT	Average Daily Traffic
AHP	Analytical Hierarchy Process
AIIMS	All-India Institute of Medical Sciences
ASP	Activated Sludge Process
ATDC	After Top Dead Center
BOT	Build-Operate-Transfer
BPCL	Bharat Petroleum Corporation Limited
BPIR	Bureau of Investment Promotion Rajasthan
BPP	Beawar -Pali- Pindwara
C.A.	Civil Airport
CAGR	Compounded Annual Growth rate
CAZRI	Central Arid Zone Research Institute
CDP	City Development Plan
CETP	Common Effluent Treatment Plant
CMPJ	Comprehensive Mobility Plan for Jodhpur
CONCOR	Container Corporation of India
Cum	Cubic Meter
CWR	Chilled(Cooling) Water Return
D.L.F	DanskeLandboforeningersFrøforsyning
DBFO	Design Build Finance & Operate
DBFOT	Jodhpur- Pali Road on Design- Build-Finance-Operate-Transfer
DFC	Dedicated Freight Corridor
DIC	Density Indicating Controller
DIP&P	Department of Industrial Policy & Promotion
DISCOM	Digital Selective Communications
DMIC	Delhi Mumbai Industrial Corridor
DMICDC	Delhi Mumbai Industrial Corridor Development Corporation Limited
DS	Data Source
FSL	Food Science Laboratory
EBP	Early Bird Project
FTL	Federal Telecommunications Laboratory
GAIL	Gas Authority of India Ltd
GEF	Global Environment Facility
GI	Green Infrastructure
GIS	Geographic Information System
GOI	Government of India
GSS	Grid Sub-Station
GW	gigawatt
ha	Hectare
HBJ	Hazira- Bijaipur - Jagdishpur
HPCL	Hindustan Petroleum Corporation Limited
HSC	Health and Safety Commission
IA	Industrial Area
ICD	Inland Container Depot
IDPL	Infrastructure Development Projects Limited
IGNP	Indira Gandhi NaharPariyojna
IIHT	Indian Institute of Hardware Technology
IIT	Indian Institute Of Technology
IL&FS	Indian Leasing & Financial Services
ILO	International Labour Organization
IOCL	Indian Oil Corporation Limited
ISCC	Integrated Solar Combined Cycle
IT	Information Technology
ITC	Industrial Training Center
ITES	Information Technology Enabled Services

ITI	Industrial Training Institute
JLM Railway	Jodhpur-Luni-Marwar Junction Railway
JPM	Jodhpur-Pali-Marwar
KL	Kilolitre
KLD	Kilolitre Per Day
km	Kilometer
km/h	Kilometer Per Hour
KMS	Knowledgebase Management System
KV	Kilovolt
KW	Kilo Watt
L&TIDPL	L&T Infrastructure Development Projects Limited
LNG	Liquefied Natural Gas
lpcd	Litre Per Capita Per Day
LPG	Liquefied Petroleum Gas
LSA	Land Suitability Analysis
LSIS	Land Suitability Index System
LU	Land Use
mcft	Modified Compression Field Theory
MCM	Million Cubic Meter
MLD	Million Litre Per Day
mm	Millimetre
MMLH	Multi-modal Logistics Hub
MMSCMD	Million Metric Standard Cubic Meter Per Day
MMTPA	Million Metric Tonnes Per Annum
MRTS	Mass Rapid Transit System
MSW	Solid Waste Management
MT	Million Tonne
MVA	Management of Variable Activity
MW	Million Watt
N/A	Not Available
NDDP	Net District Domestic Product
NDP	Net Domestic Product
NEERI	National Environmental Engineering Research Institute
NH	National Highway
NHAI	National Highways Authority Of India
NHPWD	National Highways Public Works Department
NIC	National Informatics Centre
NIFT	National Institutional Facilitation Technologies
NMIZ	National Manufacturing & Investment Zone
NMP	National Manufacturing Policy
NSS	National Sample Survey
NTPC	National Thermal Power Corporation
NTPL	Next Gen Textile Park Pvt. Ltd
O.D.	Origin and Destination
OHSR	Overhead Service Reservoir
OIL	Oil India
ONGC	Oil and Natural Gas Corporation
OW	One Way
p/a	Per Annum
P/kWh	Per Kilo Watt Hour
PCC	Program-Controlled Computer
PCB	Peripheral Control Belt
PCU	Passenger Car Unit
PDCOR	Project Development Company of Rajasthan
PHC	Prim. Health Centre
PHED	Public Health Engineering Department
PWD	Public Works Department
RAJSICO	The Rajasthan Small Industries Corporation Ltd
RD	Rural Delivery
RFWC	Rural Family Welfare Centre

RGLC	Rajeev Gandhi Lift Canal
RIICO	Rajasthan State Industrial Development & Investment Corporation Ltd
RL	Radio Location
RLNG	Regasified Liquefied Natural Gas
ROW	Right of Way
Rs INR	Indian Rupee
RUIDP	Rajasthan Urban Infrastructure Development Project
RVPNL	Rajasthan VidyutPrasaran Nigam Limited
SEA	State Environmental Atlas
SEZ	Special Economic Zone
SH	State Highway
SPV	Special Purpose Vehicle
sqkm	Square Kilometer
SR	Surface Reservoir
SRSAC	Rajasthan State Remote Sensing Application Centre
SSI	Small Scale Industries
STP	Sewage Treatment Plant
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TETV	Totally Enclosed Tube Ventilated
TKD	Taekwondo
TOD	Transit Oriented Development
TEFR	Techo-economic Feasibility Report
TW	Tube Well
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
UNDP	United Nations Development Programme
W.S.S.	Water Supply System
WTP	Water Treatment Plant

Preface

This Draft Master Plan (DMP) Report forms part of the overall deliverables for the Preparation of the **Development Plan for Jodhpur-Pali-Marwar Industrial Area(JPM IA) in Rajasthan Sub-Region of DMIC.**

The project has been initially mooted by the Government of India's Delhi Mumbai Industrial Development Corporation. The mandate from DMICDC was to assess the economic, social, physical and environmental parameters in the region in order to locate and develop a new industrial city that would aim to enhance the economic activities in the region and lead to a balanced regional development. The entire development process and its implementation in future is planned with a priority for social benefits to local population while serving State Government's aspirations to exponential economic growth and regional development. Some of the social benefits for the local populace are the umpteen employment creation, provision of world class social and physical infrastructure, value addition to traditional occupations in handicrafts, textiles and agro industries, skill development, better regional linkages, promotion to tourism and business opportunities as well as trade.

As part of the assignment, a comprehensive study of the region has been undertaken wherein a number of reports and studies have been prepared as a precursor to the Master Plan report. These are as follows:

1. *Market Analysis Gap Assessment*
2. *Site Selection, Area Delineation*
3. *Concept Master Plan*

These reports and studies have exhaustively analyzed and assessed the existing social, economic, physical, infrastructural, environmental and ecological parameters in the region. A six Tehsil study area was studied to identify and delineate the site for Jodhpur-Pali-Marwar-Industrial Area. Based on above-mentioned studies, recommendations on various aspects have been put forth to Government of Rajasthan for its approval and acceptance. Government of Rajasthan confirmed the site in the 9th State High Level Steering Committee Meeting held on 25th July 2013, according to which nine revenue villages were to constitute the Urban Area-2042 for the proposed JPMIA.

The Master Plan for JPMIA covers all aspects of development including transportation, social and physical infrastructure (sewer, drainage, water and electricity), social and environmental protection, and land uses distribution (residential, commercial, industrial, recreational, etc.). The Master Plan analyzes current demographic statistics and economic issues, factors to project

growth scenarios, propose traffic and transportation plan, assess infrastructure capacity, and public service needs, and allocate land as needed to ensure adequate land availability and to be able to utilize them for both present and future needs of the residents.

The aim of the JPM IA MasterPlan is to put in place a framework for the roll-out of key infrastructure till the year 2042 that will serve as the generator of a self-sustaining industrial township. The MasterPlan for JPM will thus serve as a model of **sustainable industrial township development.** Draft Master Plan for JPMIA shall assist the State Government to notify the development controls and regulations, strategies for land use allocation, urban design traffic and transportation plan, real estate and phasing plan apart from measures for safeguarding environmental and social concerns, for the common public.

Based on the suggestions and observations received from public, necessary modifications to the Draft Master Plan would be carried out and presented as Final Master Plan to the State Government of Rajasthan for further legalities.

Chapter 1

Introduction and Overview of DMIC and JPM IA

1.1 Project Overview

Delhi-Mumbai Industrial Corridor (DMIC) – India's most ambitious infrastructure programme since Independence - is conceived to be developed as 'Global Manufacturing and Trading Hub" supported by world class infrastructure and an enabling policy framework. It aims to develop new industrial cities as "Smart Cities" and integrate next generation technologies across infrastructure sectors with the objective to expand India's manufacturing and services base.The vision is to develop various nodes or growth centers of industrial production wherein the synergies between the node and the region can act as catalysts for the equitable regional development. These working relationships are guided by the potential of the area, existing infrastructural linkages and the requirements of concerned stakeholders.

The programme will provide a major impetus to planned urbanisation in India with manufacturing as the key driver. In addition to new Industrial Cities, the programme envisages development of infrastructure linkages like pioneer industrial plants, assured water supply, high capacity transportation and logistics facilities as well as softer interventions such as skill development programmes for employment of the local populace.

The DMIC Project Influence Area extends between 150 km to 200 km on both the sides of the Dedicated Freight Corridor (DFC) and includes parts of Uttar Pradesh, Haryana, Rajasthan, Gujarat, Maharashtra and Madhya Pradesh. In addition, the master plan for DMIC also includes requisite feeder rail/road connectivity to hinterland/markets and select ports along the western coast of India.

The DMIC corridor is proposed to include 24 industrial nodes: 13 investment regions of ~ 200 sq.km area and 11 Industrial areas of ~100 sq.km area. One such Industrial Area is the Jodhpur-Pali-Marwar Industrial Area (JPM IA) proposed in Jodhpur Division of Rajasthan. The DFC connectivity of the JPM IA is proposed to be provided at MarwarJn which is about 100kms from Jodhpur City. The JPM IA Master Plan assignment has undertaken a comprehensive study of the region wherein a number of reports and studies have been prepared as a precursor to this report.

The purpose of this study is to present a structuring framework and land use plan based on the recommendations of the preceding studies. This includes proposed industrial activities, product mix, economic output forecast, associated land requirement, as well as population and employment projections put forth in the comprehensive *JPM IA Market Analysis Gap Assessment Report*, notified area boundary and preferred spatial development strategy put forth in the comprehensive *JPM IA Site Selection, Area Delineation Report* and *Note on*

Conceptual Masterplan Alternatives and Area Delineation. All of these reports have been approved by the DMIC Rajasthan State Steering Committee.

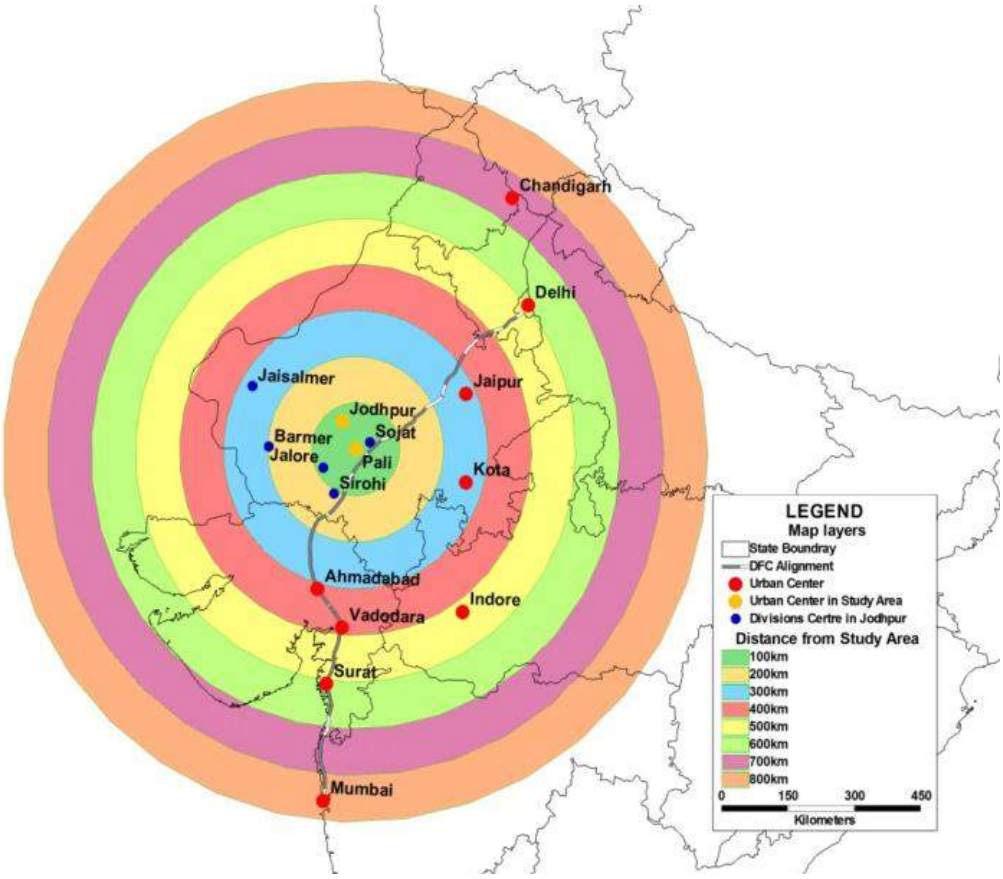

Figure 1-1: Geographic Position of Jodhpur-Pali-Marwar in India

The research and projections cover the time period from 2012 to 2042; where the report refers to 'the short term', this refers to the period from 2012-2027.

The concept masterplan will form part of the Master planfor JPM IA. Apart from the master planof the Industrial Area, the current assignment also includes preparation of techno-economic feasibility of five early bird projects which include a logistics hub, airport, MRTS, bypass road and water supply which are all key to the IA's achievement of critical mass.

1.2 DMIC Perspective Planand DFC Corridor Plan

The DMIC Perspective Plan is the primary statutory document guiding the development along the Delhi-Mumbai Industrial Corridor and will further provide the basic legislative framework to which the JPM IAMaster plan will adhere. Wherever appropriate, this report also integrates the aims and objectivesof the IL&FS Concept Paper on DMIC.

Vision for DMIC

The vision for DMIC [1] is to create a**strong economic base** in a globally competitive environment and **state-of-the-art infrastructure** to **activate local commerce, enhance foreign investments** and **attain sustainable development**.

Delhi-Mumbai Industrial Corridor is to be conceived as a Model Industrial Corridor of international standards with emphasis on expanding the manufacturing and services base and develop DMIC as a **'Global Manufacturing and Trading Hub'.**

The following are key objectives of the DMIC project:[2]

- ***Double employment potential in seven years***
- ***Triple industrial output in nine years***
- ***Quadruple exports from the region in eight-nine years***

The DMIC Concept Plan delineates a new, 1483 km DFC between Delhi & Mumbai that is mostly aligned parallel to existing tracks. 39% of its length (i.e. roughly 580km) passes through Rajasthan. The DMIC Concept Plan suggests that a band 150km either side of the railway alignment will be highly influenced by the establishment of the DFC. This band will cover 198,849sqkm of Rajasthan's total area of 342,236 sqkm: 58% of the State.

The DMIC Concept Plan sets out the goal to provide "quality industrial investments and world-class infrastructure facilities". The list of these includes the following:

Industrial Infrastructure

- Upgrading existing industrial clusters/industrial estates with requisite facilities;
- Developing new industrial clusters or townships and export-oriented manufacturing zones;
- Development of 'Skill Development Centres (or) Knowledge Hubs' consisting of schools, colleges, vocational institutes, engineering/technical institutes, agricultural colleges with state-of-the-art research and development facilities with integrated residential, health/recreational facilities;
- Developing agro-processing hubs with cold storage, packaging and distribution and other allied infrastructure; and

[1] *Paraphrased from: http://delhimumbaiindustrialcorridor.com/*
[2] *http://delhimumbaiindustrialcorridor.com/*

- Developing IT/ITES hubsand other service oriented facilities.

Physical and Social Infrastructure

- Efficient logistics chain with multi-modal trans-shipment zones and logistic hubs;
- Provision of feeder road and rail connectivity to ports, hinterlands and markets;
- Augmentation of existing port infrastructure and developing greenfield ports;
- Upgrading/modernisation of airports;
- Captive Power Generation Plants with power transmission facilities;
- Ensuring effective environment protection mechanism for sustainable long-term development; and
- Dovetailed residential, commercial, institutional, leisure/recreational infrastructure to ensure attractive investment climate.

Dedicated Freight Corridor (DFC)

DMIC is being driven by the substantial investment in world class rail infrastructure, namely the Western DFC. Currently, it takes a freight train about 50 hours to cover the 1400 km Delhi to Mumbai stretch. Once the freight corridor is complete, it will take approx. 17 hours to travel the same distance. The creation of rail infrastructure on such a scale - unprecedented in independent India – shall be the catalyst in driving the establishment of industrial corridors and logistic parks and ultimately cities along its alignment at strategically designated nodal points. The key design features and the alignment of DFC are shown in the figures below:

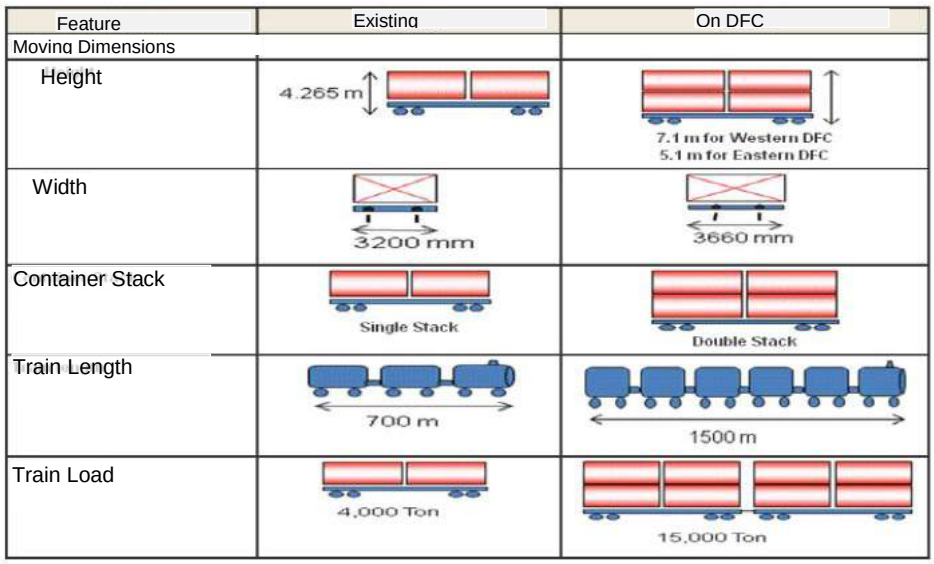

Figure 1-2: Comparison of existing and proposed DFC-enabled freight trains.

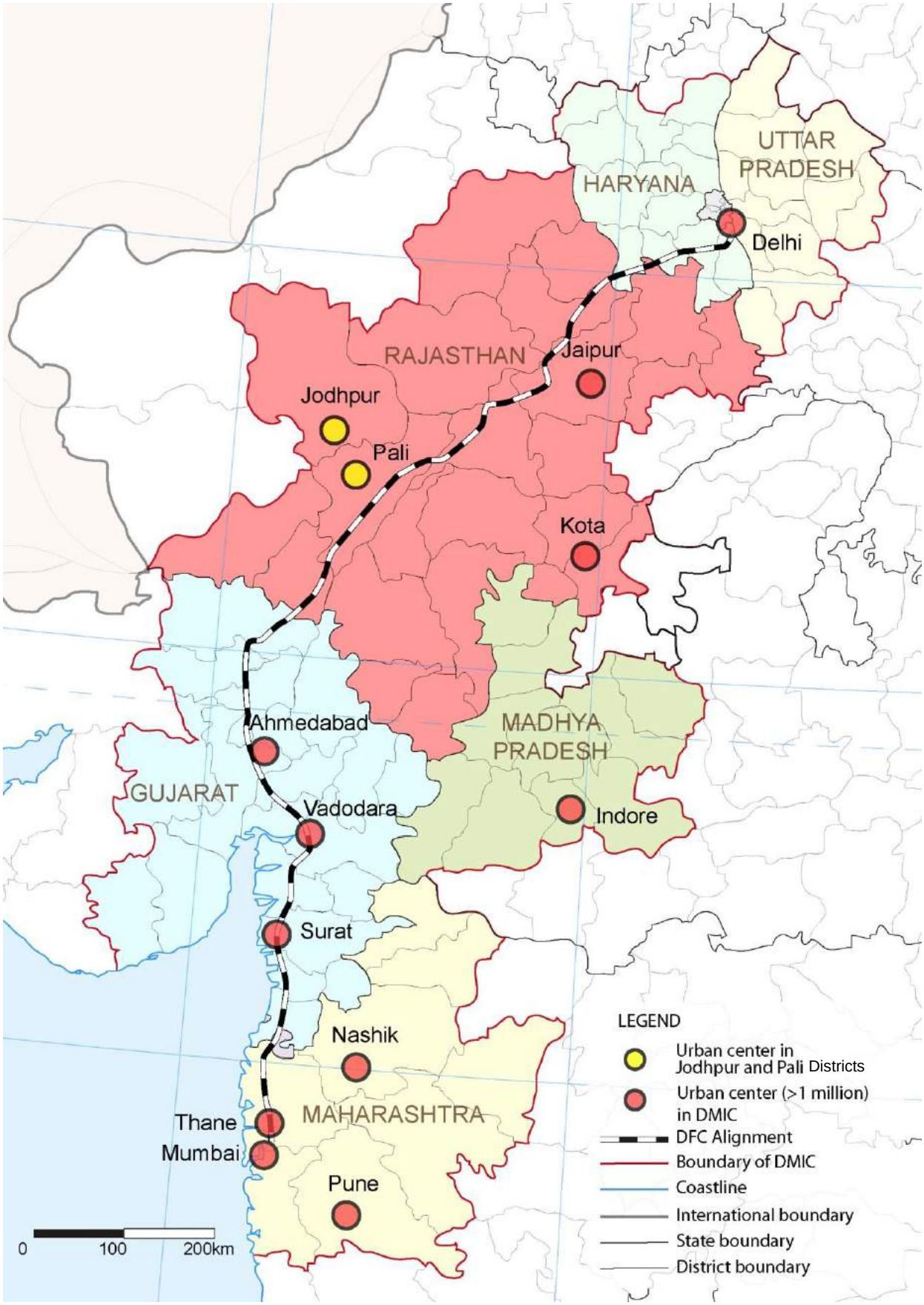

Figure 1-3:DFC Alignment within DMIC Area, including major existing urban centres

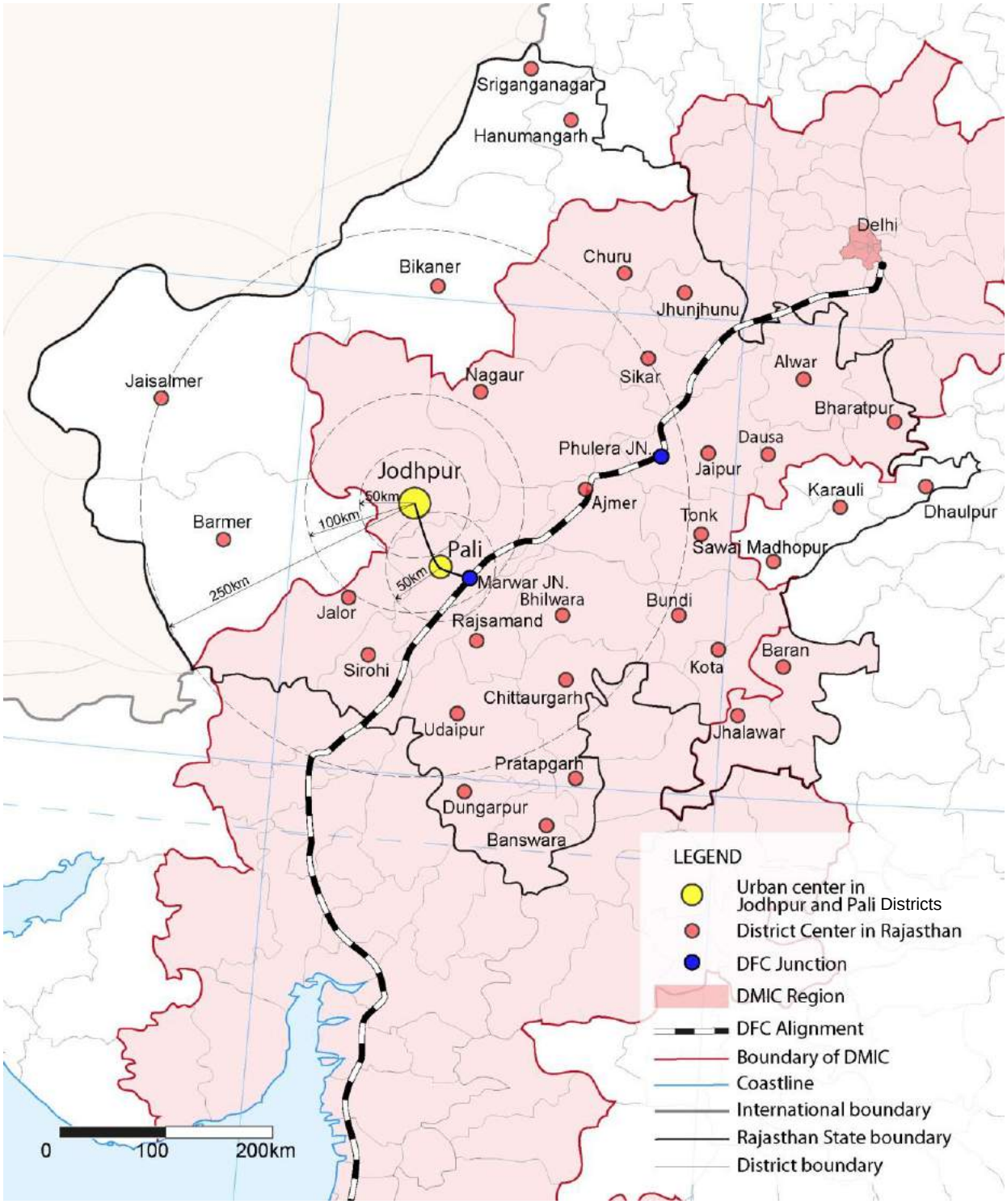

Figure 1-4:Regional setting of Jodhpur and Pali Districts within Rajasthan along the alignment of the proposed Western Dedicated Freight Corridor (DFC)

Source: Map adapted from DMIC Perspective Plan (2009)

1.3 Rajasthan and JPMIA in context of DMIC

The JPM IA is the only node west of the DFC in Rajasthan. The JPM IA was selected for development due to several major advantages, according to the Concept Paper 2nd draft (IL&FS, 2007, p49-50):

- Potentially excellent connectivity
  - A station on the DFC will be sited at Marwar Junction, which already offers good connectivity to other parts of India;
  - The National Highways NH-14, NH-65, NH-8 and NH-76 pass through the area; and
  - Potential to expand both Jodhpur Airport for civilian passenger and freight usage.
- Existing industrial base, e.g. textile industry and marble cutting/ finishing, leather, agriculture instruments, chemicals, cement and mineral based units;
- Existing agricultural base

In addition to the above, the region also boasts the following advantages:

- Abundance of Unexploited Resources, including solar and minerals
- Easy Market Access
- Conducive Environment for Industrial Growth
- Pro-Business Governance
- Large potential low-cost labour force
- Availability & Access to competent Talent Pool through the resources of Jodhpur City
- Substantial Tourism Potential with many established regional cultural attractions and sites of outstanding natural beauty
- Well Developed Social, Physical & Industrial Infrastructure
- Proximity to the Dedicated Freight Corridor Junction Station at Marwar Junction

Rajasthan Industrial Scenario

Within Rajasthan the main government-backed industries include IT and ITeS, Mineral-Based, Healthcare, Non-Conventional Energy and Agro-Processing. Keeping in view the natural and the human resource base the Engineering Goods, Textiles, Agro Food Products, Gems and Jewellery, Handicrafts, Chemical and Allied industries, Marble, Granites and Dimensional

Stones, Readymade Garments, Mineral Fuel, Mineral Oils and Products have a significant potential of growth in the region.

The key industries currently present in the state include handicrafts with Jodhpur as a prominent centre. Handicraft exports from the state during 2006-07 stand at nearly 2,000 crore, accounting for 20% of India's export. The state stands second in India's handicraft exports, next only to Uttar Pradesh. There are significant numbers of mining and mineral based industries including cement, limestone, marble etc which provide substantial employment.

Textiles are a key industry and Rajasthan is nation’s second largest producer of polyester fiber. Other textile production items are polyester viscose yarn and synthetic suiting, processing, printing and dyeing, low weight fabric. Rajasthan also produces huge quantities of spun yarn and hence is the fourth largest producer in India. Availability of trained labour and raw material has prompted key industry setups in the state.

Availability of low cost well trained professionals through a vast institutional network and low cost operations even in the key cities of the state has really provided a boost to the IT/ITeS industry, especially over the last couple of years.

The industries in the State primarily developed in the economic corridor along the Delhi - Mumbai railway and National Highway 8. However, Jodhpur region is an exception as a traditional centre. Jaipur and Alwar both have basically formed relatively modern industrial system. Jaipur is the produce and trade centre of the region with the main industries including handicrafts, textiles and apparel. Alwar accepted the first round industrial transfer in this region with the main industries including electronics, machinery, chemicals and building materials. Bhiwadi, Neemrana and Pathredi in Alwar district are developing into a key automotive hub with being host to over 100 automotive and auto parts manufacturing companies.

The majority of the industrial activity in the state is concentrated in only eight districts which include Jodhpur and Pali. These eight districts which together account for 84% of the total industrial production of the state and provide employment to 79% of the total labour force in this sector.

Through a robust administrative framework comprising mainly of RIICO the government has strived to provide quality infrastructure, policy and financial support for the growth of industries.

1.4 JPM IA Context with other nodes in Rajasthan

The JPM Regionis located in western Rajasthan, a state in the Northwest of India, along the alignment of the proposed DFC. It is roughly halfway between Delhi and Mumbai, approximately 300km west of the Rajasthan State capital Jaipur, 500km from Delhi, 800km from Mumbai and 300km from Ahmedabad.The proposed Industrial Area is in the west of the Aravalli mountain range, within the Districts of Jodhpur and Pali. The region is named after the two districts and the characteristic and traditional name of the region being Marwar. It is noted that JPM IA is also situatedat a highly strategic position in the middle of the six districts of the Jodhpur Division: 60% of the Division is within a radius of 150km, and 90% is within a 300km radius.

Proposed Industrial Nodes in Rajasthan

There are five nodes proposed for development in the DMIC Influence Area in Rajasthan. These include:

- Node No.1: Khushkhera-Bhiwadi-Neemrana Investment Region
- Node No.2: Jaipur-Dausa Industrial Area
- Node No.3: Ajmer-Kishangarh Investment Region
- Node No.4: Rajsamand-Bhilwara Industrial Area
- Node No.5: Jodhpur-Pali-Marwar Industrial Area (subject of this report)

1.5 DMIC Project Development Strategy

The DMIC is poised to be the driver of industrial growth and regional development in the entire catchment region. The objective is to create strong economic base with globally competitive environment and state-of-the-art infrastructure to activate local commerce, enhance foreign investments and attain sustainable development.

Although DMIC passes through a combination of well developed, moderately developed and under developed industrial areas with varying natural resources, human skills and with or without quality physical and social infrastructure, the development is concentrated on the transport corridors be it road or rail. The current development is in a linear fashion, the objective of the DMIC is to expand this development into the region, thereby spreading the development across into the region.

Another deficiency in the development currently is the infrastructure: logistics, industrial, and social, which is incapable of handling the envisaged industrial output and exports. The DMIC

envisages addressing this bottleneck through a holistic approach while benefiting from the inherentstrengths and competitiveness of each of the DMIC states.

DMIC has proposed high impact/ market driven nodes along the corridor to provide transparent and investment friendly policy/facility regimes under which integrated Investment Regions (IRs) and Industrial Areas (IAs) would be set up. These regions are proposed to be self-sustained industrial townships with world-class infrastructure, road and rail connectivity to and from ports and logistics hubs, assured physical infrastructure, quality social infrastructure, and provide a globally competitive environment conducive for setting up businesses and for living.

Dholera in Gujarat has already been initiated with a SIR Act, master plan is place and detailed planning and design being undertaken currently. Shendra Bhidkin in Maharashtra also has a master plan in place with detailed planning to be initiated shortly. Other Nodes in Rajasthan, Uttar Pradesh and Haryana are also progressing in the Planning stage.

The DMIC Project requires significant investment for infrastructure development. For attracting and mobilizing this investment the project components have been divided into two main groups. It is envisaged that there will be primarily two categories of projects as:

Category-1:

Projects that can be implemented through Public Private Partnership (PPP Viable Projects) and these include mainly Logistics Infrastructure, Power Plants, Ports and Airports;, Special Economic Zones, Industrial Parks, IT/ITES/Biotech Hubs and Agro-Processing Hubs, Knowledge Cities, Integrated Townships; Improvement of selected National and State Highways.

Category-2:

Other Projects (Non- PPP Projects) which includes Augmentation of rail linkages and development of connectivity to the identified investment regions/ industrial areas, Provision of requisite urban infrastructure like water supply, sewerage etc, Augmentation of industrial areas, Provision of missing links and improvement of state highways.

For mobilization of the investment required will be done by the various stakeholders viz. state, central government agencies and private investors (domestic and overseas). Funding for the Non-PPP projects for the physical and social infrastructure and capacity enhancement/ up gradation measures for various infrastructures can be mobilized from various multi-lateral (World Bank, ADB) and bilateral agencies besides availing the existing funding mechanisms of Government of India. This can come through Viability Gap Funding/Long term soft loans

extended to the Project SPVs. Moreover, the SPVs could also borrow on their own balance sheets or project recourse basis. VGF is a special facility to support the financial viability of those infrastructure projects, which are economically justifiable but not viable commercially in the immediate future. It involves upfront grant assistance of up to 20% of the project cost for state or central PPP projects implemented by the private sector developer who is selected through competitive bidding. Sectors short- listed for availing Viability Gap Funding Assistance include Roads and bridges, railways, seaports, airports, inland waterways; Power; Urban transport, water supply, sewerage, solid waste management and other physical infrastructure in urban areas.

Originally it was envisaged that the physical development for DMIC would be achieved in three phases and over a time frame of 9 years starting from January 2008. A time frame of five years is envisaged for Phase-1 (i.e. by December, 2012), followed by four years for Phase-2 and Phase-3. The implementation of identified nodes was expected to be completed by December 2016. This is behind schedule especially in the state of Rajasthan mainly due to the State and the General elections, but things are being mobilized on rapid pace and the finalization of legal and planning documents is expected shortly.

As described above the Implementation of the Delhi Mumbai Industrial Corridor Project will require investment on infrastructure development / augmentation, besides investments in the Dedicated Rail Freight Corridor and Industrial Investments in various nodes.

It is proposed to implement the DMIC using the Project Development Approach. In this process, the phasing of implementation and the integration of the various project components will need to be achieved in a very comprehensive manner.

In the implementation mechanism, each facet of the project will be rigorously developed from an engineering, financial, contractual, environmental and social perspective, along with inter-linkages, on prioritization and selective basis and prior to commencement of implementation. This exercise would also include the acquisition of all lands required for the implementation of each project[3]. Moreover, the involvement of multiple Ministries of the Government of India and the participation of several State Governments with their respective agencies need to be mapped and integrated.

The implementation of DMIC project will be through a four-tier institutional framework that would constitute:

[3] DMIC Concept Paper

a) An Apex Authority at national level, that will be headed by Union Finance Minister with the concerned Central Ministers and Chief Ministers, as members, to oversight the entire program and to ensure that the necessary policy and administrative issues are tackled appropriately within the defined framework.

b) A Dedicated Corporate entity, DMICDC (Delhi Mumbai Industrial Corridor Development Corporation) that functions as a servicing agency for the Apex Committee

c) And coordinates execution of various tasks under the guidance of empowered group arrange financing, and provide advisory services for successful project implementation.

d) A State-level Coordination Entity/ Nodal Agency responsible for coordination between the DMICDC and various state government entities and the project implementing agencies/ special purpose vehicles.

e) Project Specific Entities, such as Special Purpose Vehicles, for individual projects viz. airport, port, industrial area, road, power etc, to mobilize financial resources through appropriate consortia and undertake actual implementation, operation and maintenance.

In the last year's budget, the government has approved an outlay of Rs 18,500 crore for creation of trunk infrastructure. Lands are being provided by the state governments. The Japanese government has approved $4.5 billion for non-commercial projects through Japan International Cooperation Agency (JICA) and commercial lending through JBIC.

1.4.1 Gujarat DMIC Development Strategy

Gujarat covers about 38% of the total length of DFC i.e. 565 kms and about 62% of the total area of the state is part of the DMIC influence region. This region included 18 districts with 15.7 million workers of the state. The investment in Rupee term would be equivalent to 30 billion US$ amounting to almost one third of the total investment envisaged for the entire corridor. It also covers major cities like Ahmedabad, Vadodara, Surat and Bhavnagar. The state has been identified for six development nodes, two of which are Investment Regions (Ahmedabad-Dholera and Bharuch-Dahej-PCPIR) and four are Industrial Areas (Palanpur-Mehsana, Vadodara-Ankleshwar, Surat-Navsari and Valsad-Umergaon). In the first phase (2008-12) one investment region with Dholera as the node is being developed.

The government of Gujarat is quite pro-active to the development of DMIC and GIDB as the nodal agency for infrastructure development work pertaining to DMIC. It has also replicated the two fold administrative mechanism set up by central govt. by notifying GIDB as the apex body for DMIC related work and already formed an SPV, called, Gujarat Industrial Corridor

Corporation Limited. This would serve as a state level administrative body for the development and implementation of various projects within DMIC influence area. This will effectively function on the similar line of DMICDC at the centre and would also work in close co-ordination with state govt., local authorities, GIDB and DMICDC and related govt. departments besides various agencies involved in the process of the development across corridor. Gujarat Industrial Corridor Corporation has been formed initially as wholly owned Government of GujaratCompany and the major functions of the company include, detailing of the projects, techno-commercial and financial structuring, environmental studies and solutions, bidding, global marketing, raising finances, promoting private funding and exploring multilateral funding among others. It has also been decided to structure Regional Development Authorities (RDAs), for which the notification is being issued shortly by the State Govt.

The Master plan for Dholera has been approved and notified and Dholera Special Investment regional Development Authority has been constituted in 2010. The Plan envisages special projects to be developed on PPP basis by SPVs and these include

- Central Spine for Dholera SIR – Ahmedabad-Vataman-Pipli- Dholera-Bhavnagar 6lane Road International Airport to serve Ahmedabad-Dholera SIR
- Metro rail Project: Metro/High Speed rail Project to facilitate movement between Gandhinagar-Ahmedabad
- Mega Industrial Park at Dholera SIR
- Rail Based Multi Modal Freight Logistics Park

Gujarat is using extremely innovative processes for land pooling and procurement. In Dholera, almost 920 km is being taken through a process of town planning with town planning schemes and a major component being the participation of the local community. Gujarat has put in a lot of hard work at the grassroots level by interacting with the local communities. The new Land Acquisition Act has also laid down a vast number of processes for social impact including clearances by several committees.

1.4.2 Maharashtra DMIC Strategy

The DMIC project in Maharashtra would cover 29% area of state and 18% project influence area. About 26% of the Maharashtra's population would fall under DMIC. The total area under DMIC project is would bearound 55,000 hectares covering 8 districts i.e. Thane, Raigad, Pune, Dhule, Nandurbar, Nashik, Ahmednagar, Aurangabad.

The Maharashtra government has taken up the development of Shendra-Bidkin Industrial City at Aurangabad in the first leg with a projected investment of INR 17,319 crore.The Shendra-

Bidkin project will be developed in two phases. The first phase, in addition to Shendra-Bidkin industrial city, includes an exhibition and convention centre in Aurangabad, and a multi-modal logistics park at Karmad and water supply scheme for Shendra.

Planning for the detailed engineeringof the project site is being done and the DMIC will be engaging professional Programme Managers to manage the overall development of the DMIC Region in Maharashtra.

At Shendra Bidkin Industrial Area, a total of 84 sq.kmarea will be developed out of which 32 sqkm will be developed as Phase I. There will be four major industrial clusters—the Engineering Cluster, Food Park, Textile/Printing, and Construction clusters—for a total industrial land demand of 5,310 hectares (ha). Approximately 52% of the total land demand of 8,400 ha has been estimated as industrial land. The other components are

- Multi Modal Logistics at Hubat Karmad (Shendra) is proposed on 100 hectares land area.
- Exhibition and Convention Centre(ECC)in Aurangabad is proposed on 20 hectares area. This facility will be the world class expo center with hotel & entertainment facilities.
- The water supply scheme for the DMIC project in Shendra-Bidkin is being planned for the supply of 335 MLD.

The state government and the DMICDC have formed a joint venture for developing these projects wherein the state will have 51 per cent stake, while the rest will be held by DMIC. The State government contribution will be in the form of providing land, while the Centre's contribution would be to the tune of INR. 3,000 crore for each township project including Shendra Bidkin. This budgetary provision has already been made in the 2013 Union budget. The Plan has been notified and the land acquisition for the same is under process.

1.4.3 Rajasthan Industrial Development Strategy

The industrial policy of Rajasthan aims at enhancing the competitiveness of enterprises by providing quality infrastructure which is very much in consonance with the vision of the DMIC project.

Rajasthan is now among the six fastest growing States of the country. Its Eighth Plan Outlay constituted an increase of 283% over that of the Seventh Plan. During the past five years the average growth rate of investment in the large and medium sector has been 33% and in the SSI sector over 15%. Over the same period, exports from the State have grown at an annual average rate of 53%.

To take this growth to the next higher level the state government has been formulating policies which are infrastructure specific taking cognisance of its importance in order to develop on all fronts. Currently the industry sectors with specific policies include healthcare, biotechnology and IT/ITeS. A few key policies the State has implemented are elaborated below:

- Rajasthan Investment Promotion Scheme (RIPS) 2010: RIPS has been announced for setting up of new enterprise, or the expansion/ modernization and diversification of existing projects. It covers a wide range of industrial investments and simplifies the procedure for the granting and disbursement of subsidy through online channels and promotes increased transparency.

- IT and ITeSPolicy 2007: This policy is aimed at attracting IT investments through the provision of incentives and concessions to IT/ITeS industries including land rebates, stamp duty exemptions, simplified labour laws and enhancing employment opportunities.

- District BPO Scheme: This scheme encourages private players to establish BPO centres in Tier 3 towns like Ajmer, Jodhpur, Kota, Bikaner, Udaipur etc. through provision of financial benefits such as capital investment subsidies etc.

- Rajasthan Mineral Policy, 2011: The aim of this policy is to promote proper use of the huge mineral resources of the State for sustainable economic development. Under this policy the rules and procedures are so to ensure scientific, safe and eco-friendly mining, productivity, conservation and cost-effectiveness, social commitment, zero waste mining, health and welfare of people

- Rajasthan State Environment Policy, 2010: This policy has been implemented to conserve and enhance the state's environmental resources, ensure environmental sustainability of key economic sectors, improve environmental governance and build capacity.

- The Rajasthan Micro, Small and Medium Enterprises Development Assistance Scheme, 2008: This policy was developed with the view of making the state's Micro, Small and Medium Enterprises globally competitive. The subsidies include lesser priced land allotments, capital cost funding, tax and duty exemptions etc.

- Rajasthan Solar Energy Policy, 2011: The aim of this policy is to provide an attractive environment for the promotion of solar power generation in the state by harnessing the significant solar energy potential of the state.

- Non-Conventional Energy Policy 2004: This policy was implemented with a view to promote power generation through non-conventional energy sources. A separate policy was earlier issued in 2000; 'Policy for Promotion of Electricity Generation from Wind'; however this policy ended in March 2004.

- Policy for Promotion of Agro-Processing and Agri-Business, 2010: With agriculture being a significant sector in the state economy overall, particularly the state's rural economy, the state government has implemented this policy to make this sector more remunerative and sustainable. The policy aims to encourage value addition in agriculture produce and increase the income of farmers. The aim is to modernise agro-processing and marketing, attract private investment in agro-processing and create new employment opportunities on a large scale through incentives, concessions, R&D, infrastructure development and funding support.

- Rajasthan Township Policy, 2010 (above 10 Hectares) andpolicy for residential, group housing andother schemes in the private sector, 2010(up to 10 hectares):The main aim of this policy is to promote planned / integrated development of various towns by providing the basic infrastructure facilities and to safeguard the interest of the public at large by ensuring availability of residential plots/houses at affordable prices

The government of Rajasthan has setup the Bureau of Investment Promotion (BIP) which is in charge ofinvestment promotionand single window clearances. BIP also plays a significant role in developing investment policies for the State. The BIP provides an interface between investors and concerned departments, acting as a single point of contact for the investor, the overall aim being to foster invest in Rajasthan.

Other State bodies like RIICO (Rajasthan State Industrial Development and Industrial Cooperation Ltd.), Rajasthan Financial Corporation (RFC) and Project Development Corporation have also been working towards facilitating better industrial and investment climate for the state. The Rural Non-Farm Development Agency (RUDA) is also an organisation creating avenues of employment in the rural non-farm sector through its activities in leather, wool, textiles, stone ceramic, potteries, handicrafts, handloom and khadi and village industries sectors. This has also been supplemented by the various sector specific policies, industry specific infrastructure, specific tax sops and schemes introduced by the state government from time to time along with development of basic infrastructure throughout the state.

The government of Rajasthan is adopting a proactive role in industrial development byadopting a strategy which enables focussed growth. The new strategy envisages development of clusters offering economies of agglomeration and thrust sectors.

The task of improving infrastructure is being given the highest priority and takes into account the resource endowment and the growth potential of each area. Special emphasis will be given to the development of Thrust sectors, which have been identified keeping in view their infrastructural requirements, growth potential and the capacity to generate employment.

To cut down on time taken for establishing an industrial unit and streamlining the process, simplification of rules and procedures is being done. The SIR act has been almost finalised and is being tabled in the Legislative assembly shortly.

Special efforts will be made for developing Government - Industry partnership in the implementation of the new industrial Policy. Greater emphasis will be laid on development of human resources for emerging requirements of industry by partnerships with technical institutions. The basic approach of all the initiatives is to encourage increasingly greater participation of private enterprise in the State's economic growth.

1.6 SIR Act and other legislation

The Rajasthan state Special Investment region bill is under consideration in the Government. It is titled as Rajasthan Special Investment Region Bill, 2013. The act is aimed to streamline and synergise the investment and development of industrial areas in the state. The act conceptualises the provision of essential infrastructure and give impetus to all sectors of the economy. The bill seeks to provide the organisational structure for planning, establishment, development, operation, maintenance, management and regulation of the Special Investment Regions proposed in the State and to enable their development as global economic hubs. It also aims to “provide for planning, establishment, development, operation, maintenance, management and regulation of Special Investment Regions in the State and to provide for matters connected therewith or incidental thereto[4]”.

As per the act the State Government shall declare an area of land, including an existing or proposed industrial area, to be a Special Investment Region and declare the geographical area of the Special Investment Region for the purposes of this Act.

Since the Regional Development Authority is a statutory body setup by the government under the auspices of the Rajasthan Special Investment Region, the Regional Development Authority may, with the approval of the Board and the State Government, provide incentives in form of

[4] *Rajasthan Special Investment Region Bill, 2013 Draft*

exemptions from State taxes, duties, cess, etc. levied by the State Government under any Rajasthan law for any economic activity in the SIR or for any infrastructure project as per the existing policy of the State Government.

This is very important for attracting investment to the region. Further in order to make any infrastructure project sustainable or commercially viable, the Regional Development Authority may, with the prior approval of the Board and the State Government provide state support which may include equity participation, financial assistance, incentives, guarantees etc which are the key for attraction of investment to the SIR and allow the SIR to develop and flourish as an investment destination.

1.7 Objectives and purpose of the Master plan

Under the perview of DMIC objectives, a new industrial city Jodhpur Pali Marwar Industrial area has been proposed as an initiative by Centre and State Governments to provide a fillip to the regional development by way of large scale manufacturing and creating employment opportunities. The JPMIA is set to be developed as a SMART city taking cues from the international best practices in Urban Infrastructure and economic development. Apart from these, ensuring synergies with existing Urban centers in the region such as Jodhpur and Pali as well as resource optimization have been considered at the core of entire planning initiative.

The objective of preparing a Master plan for JPMIA is to formulate a strategy for spatial development over a development period of 30 years until 2042, supported by necessary development and institutional framework.

JPMIA Master planis a document with broad framework and guidelines for multiple stakeholders, investors and public interested in residing, working, investing, developing of the city. The stakeholders here are Central Government, State Government, Public and Private agencies/ corporations, Nodal agency, funding agencies and local inhabitants of the designated area.

The Master plan comprises a spatial plan showing landuse and infrastructure proposals for the whole of the JPMIA. It has been supported by detailed guidelines under the heading ‘Landuse and Urban Structure plan’ for each landuse category, together with sub division regulations and development control for each landuse type, strategy and recommendations for the implementation and phasing of the plan, Social impact assessment and environmental risk management plan. Transportation Network Plan provides detailed strategy for internal and regional linkages and circulation of various modes of traffics across different nodes in the area.

Master plan is essentially a strategic document suggesting the development and landuse structure until 2042, the horizon year. It outlines the Plan provisionsover 30 year development period, planned residential densities and the development regulations to achieve these Development objectives. Master plan shall be further assisted by more detailed physical plans for each zone or sector through detailed zoning plans/ sector plans, industrial area plans, individual infrastructure/ utility plans, etc.

Master plan is substantially a long term plan and for which it shall be monitored, updated, and amended on a regular basis as circumstances change/ situation arises for it to remain valid for its horizon. It is proposed that the DP shall be reviewed in the penultimate year of each Development phase suggested i.e 2022, 2032 and 2042.

1.8 Methodology of the Preparation of the Master plan

The approach towards the preparation of Master plan for JPMIA has been extremely methodological as the need to locate an appropriate site, its area delineation, identification of target industries and manufacturing activities, demographic forecasts and projections, availability and provision of social and physical infrastructure, assessment of necessary infrastructure up gradations, etc were realized at the inception stage. A number of tasks including detailed assessment and intermittent recommendations to State Government have been the stepping stone towards the ultimate aim of preparing a Master Plan for JPMIA.

The Master Plan has been prepared after analysing the results and findings of a number of studies conducted under the following reports:

- Site Assessment and Area Delineation of JPMIA,
- Market Analysis and Gap Assessment for Development of JPMIA (target industries, industry sizing & potential, population and employment projections and alternative scenarios),
- Concept Master Plan Report for JPMIA

Table 1-1 summaries the objectives of various studies conducted so far and their relevance towards preparation of Master Plan:

Table 1-1: Studies towards preparation of Master Plan for or JPMIA

Sl. No.	Report/ Study	Objective	Relevance to Master Plan
1.	Site Assessment and Area Delineation of JPMIA	Scientifically carve out the most suitable area for development of MBIR through GIS based Land Suitability Analysis as well as Township Positioning Study.	The study was a thorough assessment of suitable sites in terms of social, physical, economic and environmental aspects. Most suitable site was recommended and findings of Market study were used for Area Delineation i.e the actual site area required for development of JPMIA.
2.	Market Analysis and Gap Assessment for Development of JPMIA	Assessment of Market Potential of JPMIA in terms of Industrial Demand, Target industries, forecasting manufacturing output, land requirement for industrial and non-industrial uses, direct and indirect employment, population forecasts. Infrastructure Gap Assessment to assess existing shortfalls and bottlenecks as well as forecasting the requirement of social and physical infrastructure over the Development period.	The study help assess Industrial Land demand and population projections. The projections helped estimate residential areas, social & physical infrastructure requirements and other land uses for JPMIA. Critical inputs towards providing urban infrastructure (water & waste water, power, SWM, social infrastructure, facilities, amenities, and recreational & other facilities.
3.	Concept Master Plan for JPMIA	Alternative concepts for spatial planning at JPMIA based on international best practices and Indian standards. Design for land use, transportation plan, phasing plan, positioning & quantum estimations of various land uses, social and physical infrastructure plan and broad cost estimates for development of JPMIA.	The land use plan as per CMP is to be refined based on actual ground verification through DGPS surveys, revenue map digitisation and superimposition, etc. Further the development strategy for the landuse plan need to be provided as statutory framework of Master Plan, for it to be notified by state Government.
4.	Draft EIA Report for JPMIA	Initial Environmental Impact Assessment following Environment baseline surveys and suggesting Environmental Risk Management Plan. This also incorporates the Social Impact Assessment for the selected site.	Public hearing needs to be conducted along with the Draft Master Plan publication to the local population. Objections/ suggestions would be invited from the local population based on which the Final Master Plan would be notified by State Government

The aim of the Master Plan for JPMIAis to put in place a framework for the roll-out of key infrastructure over the coming 30+ years that will serve as the generator of a self-sustaining industrial township. The JPMIA Master Plan will thus serve as a model of **sustainable industrial township development.**

Chapter 2

Vision, Development Principles and Sustainability Goals

2.1 Vision and Objectives for Proposed JPM IA-2042

The vision for DMIC [1] is to create a**strong economic base** in a globally competitive environment and **state-of-the-art infrastructure** to **activate local commerce, enhance foreign investments** and **attain sustainable development**.

Delhi-Mumbai Industrial Corridor is to be conceived as a Model Industrial Corridor of international standards with emphasis on expanding the manufacturing and services base and develop DMIC as a **'Global Manufacturing and Trading Hub'.**

The following are key objectives of the DMIC project:[2]

- ***Double employment potential in seven years***
- ***Triple industrial output in nine years***
- ***Quadruple exports from the region in eight-nine years***

2.1.1 Vision for JPM IA

The ambition of JPM IA as a harbinger of change can be put forth as follows:

*"A **sustainable manufacturing region** with world-class infrastructure and potential to grow in consonance with future requirements"*

[1] *Paraphrased from: http://delhimumbaiindustrialcorridor.com/*
[2] *http://delhimumbaiindustrialcorridor.com/*

In terms of its role in Rajasthan, the JPM IA will serve as a cradle for emerging industries, attract industries from other regions, establish itself as a regional industrial technology centre, supply R&D services to the region's traditional industries and serve as a talent incubation centre by supplying entrepreneurial opportunities and developing talents.

2.1.2 Key Objectives for JPM IA

The following ten objectives underpin the vision for the development of JPM IA. As a model industrial township development will:

1. Be an **engine of growth** for DMIC in general and the JPM region in particular with the highly accessible **mega logistics facility at Rohat acting as the driving force and gateway** between the JPM Region and Dedicated Freight Corridor at Marwar Junction;

2. Be based on a **sustainable, compact urban development model** that utilizes best practice trends and technology and harnesses local knowledge to create an attractive place to live and work. As such JPM IA will be an exemplary model of **low carbon development** that incorporates the combined principles and development philosophies of **industrial ecology and transit oriented development (TOD)**;

3. Grow and be sustained by a **much lowerreliance on conventional water supply** for both industrial and residential use. Demand shall be reduced through secondary and tertiary treatment and taking maximum advantage of **rainwater harvesting techniques**, combining the wealth of traditional knowledge with national and international best practice design and development tools;

4. **Exploit the benefits of solar energy** to the maximum for domestic hot water and other energy requirements, whilst facilitating the development of affordable, inexhaustible and clean solar energy technologies that will have huge longer-term benefits for the development of the wider region. The IA will also serve as an incubator for Solar Energy equipment manufacturing in the Region,

5. Benefit from the **design heritage of the Region** and its famous entrepreneurial culture. Rajasthan is world-famous for its manufactured handicrafts, and is the second-largest handicraft production centre in India. Through supporting design and creativity, JPM IA will be a centre for an upgraded handicrafts industry better able to compete on a sustainable basis and this will have spin-offs for other industries including textiles.

6. Provide **dedicated training facilities** in a timely manner at strategic locations. These facilities will be aligned to specific industry clusters in order to take maximum advantage of the existing abundant low-cost labour force of the region;

7. **Exploit existing natural resources** such as minerals and crops during the early phase in order to help consolidate and reinforce existing industries, especially in building materials and food processing;

8. **Address the spatial disadvantages of the region**, increasing the number of opportunities due to the economic vitality, economies of scale and regional synergies provided by the IA. The quality of opportunities will increase due to a more equitable distribution of investment and migration relieving stress on Jodhpur's social, physical and economic infrastructure;

9. **Enhance the strategic positioning of Pali** with respect to existing regional routes and proximity to the proposed DFC station and Marwar, whilst helping to counteract the isolation of Jodhpur from the main trade routes;

10. Ensure **maximum benefit to the regional tourism** industry and the latent potential of other existing natural and cultural sites of attraction. Traditional handicrafts industries like textile printing, embroidery, leather work, wood-work & metal work can benefit greatly from the growth of the tourism industry. JPM IA will be planned so as to ensure maximum benefit to the tourism industry exploring the latent potential of other existing natural and cultural sites of attraction.

These objectives are further elaborated in the following sections.

2.2 Development Principles

2.2.1 Introduction

This section sets out some of the fundamental guiding principles that will serve for all aspects of the development. The development strategy of the Development Plan will be determined by the objectives set out here. Detailed principles for land use, transport, urban design utilities infrastructure are presented in follow-up chapters.

In summary, this section sets out the following fundamental principles:

- Sustainable Industrial Township Development as the core underlying principle;
- Water Resource Management as the starting point;

- Respecting and safeguarding existing local culture and traditions
- Ensuring a sense of place and attachment and promoting healthy communities.
- Prioritisation of low cost solar energy over conventional power supply;

2.2.2 Sustainable Development as the core underlying principle

A sustainable settlement is one that is thriving socially, economically and environmentally and achieves these goals by means that do not deplete the ability of future generations to attain and surpass its current levels. In order to achieve a lasting legacy and have maximum strategic value during implementation stage, the master plan should always consider the longer term, be flexible and adaptable to changing circumstances.

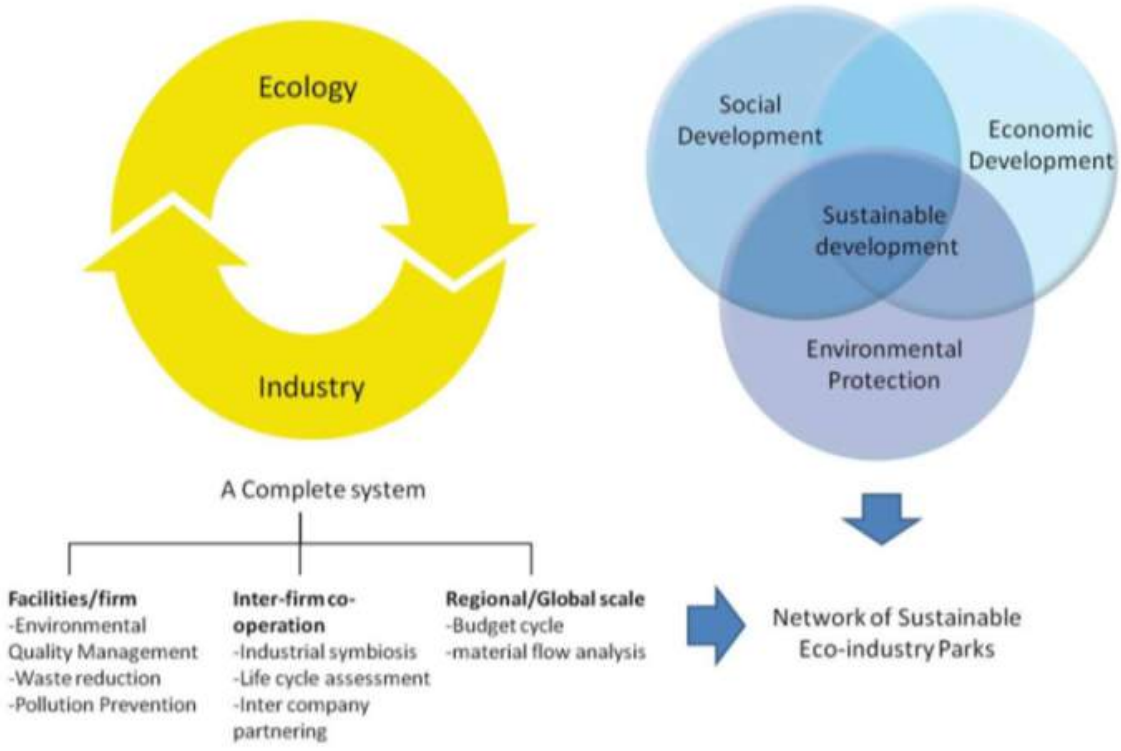

Figure 2- 1: Concept of 'Industrial Ecology' and the three pillars of sustainability applied to a large-scale industrial area

In order to achieve sustainability targets put forth as part of the development plan, an industrial ecology strategy should be developed to guide the design, development and management of industry parks within JPM IA. The concept of "Industrial ecology" is an emerging trend wherein the design and operation of industrial activity is carried out according to a set of rules where industries are linked to mimic ecological systems. By linking industries, energy, water use and carbon emissions are minimised. By-products from one industry become the inputs for another, thereby increasing efficiency and reducing waste. Industrial activities are integrated into the

surrounding natural ecosystems and have appropriate transport linkages to, and spatial relationships with, the surrounding human communities. This shall be manifested as a series of inter-connected eco-industry parks at JPM IA, strategically located to take advantage of cooperation to minimise, energy, waste and pollution and maximise reuse and recycling. The diagram below explains the concept in relation to how the strategy would play out at the scale of an industrial township.

2.2.3 Water Resource Management as the starting point

The primary objective of the strategy for water supply and waste water is to develop a world-class comprehensive water storage and recycling system in compliance to regional ecological status, urbanization progress and economic development. The figure below summarises the key considerations and principles for the holistic and sustainable water supply and wastewater management system.

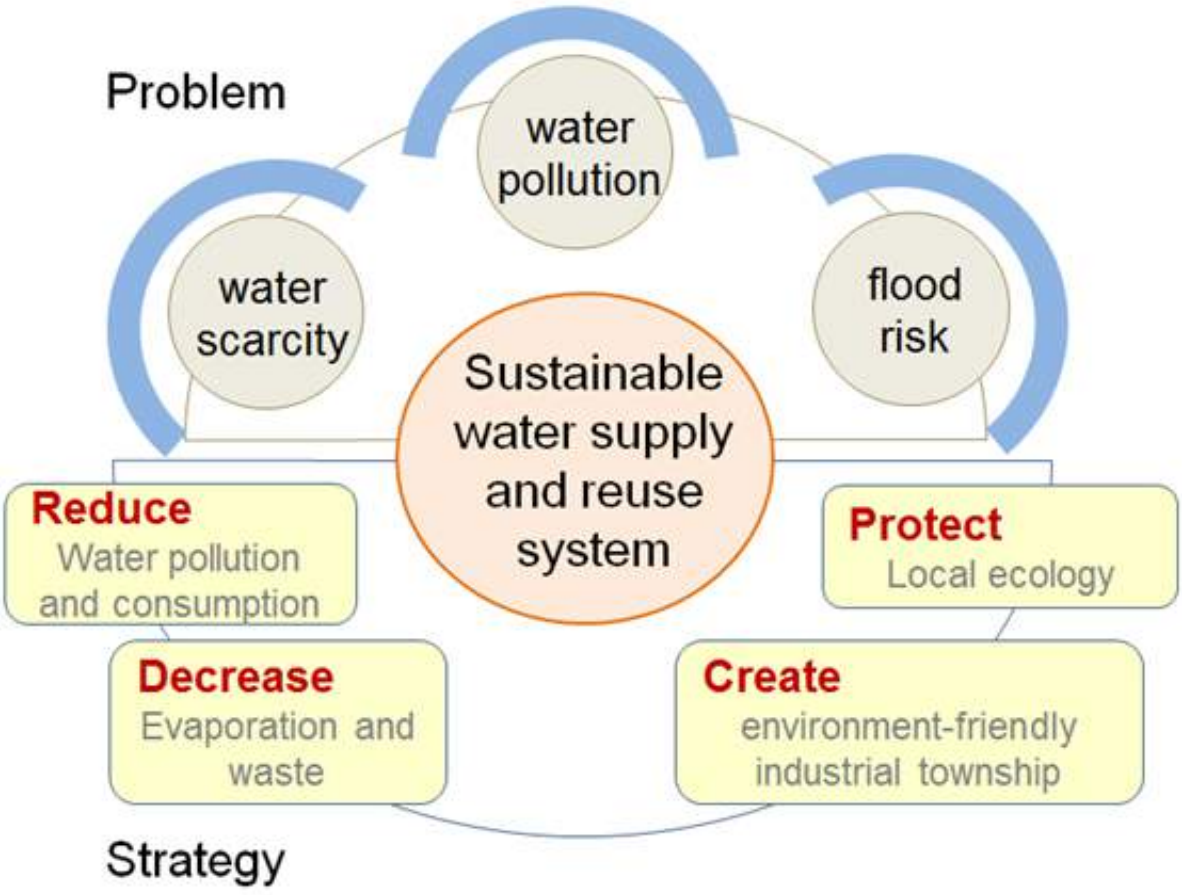

Figure 2- 2: Summary of key issues of water and proposed response

With respect to the careful use of water, the scarcest yet most vital resource of the region, the following principles shall be strictly adhered to:

- **Reduce wastewater** and effluents from industrial, commercial and residential activities, and process such waste and effluents as are generated in order to minimise the effects upon the environment.
- No mains water supply shall be used for general industrial activities. **Industrial water supply will come from 100% treated water**. This can be secondary or even tertiary. During early phases the feasibility of re-directing domestic treated sewage from Pali Town shall be investigated.
- A comprehensive and **integrated rainwater harvesting system** shall be incorporated into the proposed urban areas utilitising the latest international best practice techniques for hot, arid climates. At the same time local knowledge and resourcefulness shall be exploited in maximising the potential for rainwater harvesting techniques;
- There will be **zero discharge** of untreated industrial wastewater into storm drainage;
- The Water and Wastewater Management Strategy shall **ensure a regular and adequate supply**. This will be achieved by allowing water to be provided from multiple sources to meet the needs of commercial and domestic users;
- A **dual pipeline system** shall be incorporated into domestic homes throughout the township with only secondary (treated) water used for flushing, irrigation.
- Provision of facilities to ensure adequate provision of secondary and tertiary treatment will be a top priority

Figure 2- 3: Left: Vernacular domestic rooftop water capture system (observed at Chotila village in March 2013); Right: Construction of a Check Dam in Jodhpur District (photo taken 2012)

A Techno-Economic Feasibility Study for water supply and waste water system has been undertaken concurrently with the Development Plan preparation process. Both the feasibility

study and strategies prepared as part of the Development Plan will adhere to the principles set out here for water supply and wastewater.

2.2.4 Respecting existing local culture and traditions

Developing a new city in India provides the opportunity to incorporate modern engineering solutions to deal with the challenges of developing and managing transport, drainage, water and power infrastructure. The plan for JPM IA shall be based on a sophisticated layering of modern infrastructure. This is a fundamental aspect of the design of the new township and industrial areas.

It is also recognized that the fast pace of development in India has not resulted in the loss of spiritual and cultural traditions and modes, as it has in other developing countries. The goal is thus not only to encourage society to fit in a new industrialised model, but to think about how a new town can grow with the traditional ways of life[3].

Figure 2- 4: "Om Bannah Samadhi" area of cultural significance along NH-65

Newly urbanised people bring with them rural social norms and remain connected to the life of the village, as can be seen in the existing small towns of the region and even Jodhpur City.

[3] World Wildlife Fund - India and Mirabilas: *"The Alternative Urban Futures Report: Urbanisation & Sustainability in India: An Interdependent Agenda*" downloaded from www.wwfindia.org, accessed 2012.12.12

The goal is therefore to increase the level of life of the inhabitants in a sustainable and equitable way and to recognise these social structures as a positive factor in the design of the new city.

2.2.5 Promoting healthy communities

The long-term success of JPM IA is contingent on the ability of its promoters (ie the State and future investors) to commit to the delivery of urban infrastructure in tandem with (not following) the development of industry parks (further explained in Chapter 9). In this sense it is imperative that the township is perceived as such and not as an Industrial Area per se. With this in mind it is vitally important to be aware of the need to create a sense of place and attachment to be enjoyed by residents, employees and visitors alike, and to ensure that all development proposals contribute to this fundamental objective.

Good places strike a balance between the natural and man-made environment and utilise intrinsic resources such as climate, landform, landscape and ecology to conserve energy and maximise amenity. Meeting a variety of demands from the widest possible range of users, amenities and social groups will help to promote vibrant, stimulating, and distinctive places that will make up the township and industrial areas.

Figure 2- 5: Highly compact urban fabric as existing within the Region (taken from the towns of Samdari, left, and Phalodi, right)

At the same time different building forms, uses, tenures and densities can help foster cultural variety that can be harnessed through the creative spirit of the community. To achieve this, a critical mass of new residential and employment populations at an appropriate density will be fundamental to support the widest possible range of services at the local level that will offer people choice, convenience and above all, quality of life.

Compact, dense network of narrow streets is characteristic of the regional vernacular urban settlement patterns. Minimum building set-back provides a clear distinction between public and private spaces and most importantly, comfort and convenience for people.

The use of narrow shaded streets in urban areas will thus be employed in the urban design of the township, with generous planting / tree canopies; orientation of buildings to maximise ventilation; etc. This is in keeping with the urbanistic tradition of towns in the region.

JPM IA will be the most ambitious and large-scale development initiative in the region, if not in Rajasthan itself. The transition from an agrarian to an industrialising economy will present huge challenges to local and regional stakeholders, as well as the State and national Government. Perhaps one of the greatest challenges will be to foster healthy communities that will feel a sense of attachment and pride for the locality. The following principles shall be adhered to in order to attain the goal of sustainable long term development:

1) Encourage **Inclusive planning** and respect for local culture and tradition; this includes consideration of the existing 9 villages within the Notified Area, A consultation process involving each village shall be undertaken to ensure transparency and local participation in the decision-making process;
2) Provide for **multi-generational planning,** not only employees but their families as well;
3) Incorporate **disaster resilience and mitigation planning** into the design and development framework to limit damage and ensure that in the event of a natural disaster the area can return to normalcy as quickly as possible. Given the unpredictable nature of future weather patterns as a result of climate change, the threat of severe flooding should not be underestimated. At the same time, periods of severe drought should equally be expected and plans should be in place to deal with related emergencies.

2.2.6 Facilitating a Low Carbon Economy

Following on from the principles at the regional level shall be the commitment at the site level to realising and maintaining a **low carbon economy**. A holistic approach is envisaged which follows from the **strategy of networked eco-industry parks**. The integrated nature of waste, energy, transport and water elements through cyclical flows through the built environment is illustrated in the diagram below.

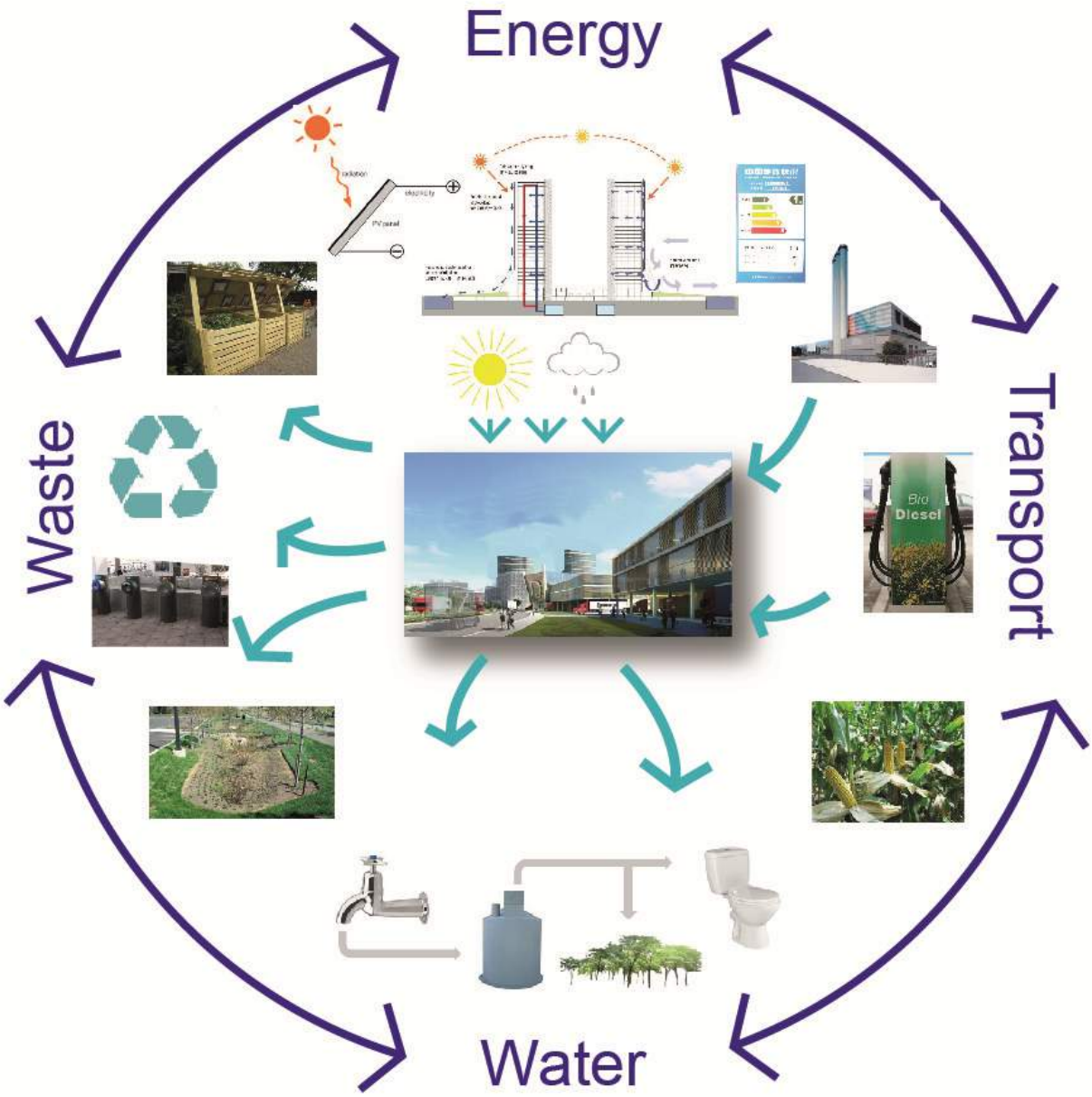

Figure 2- 6: A holistic approach to managing energy and water inputs and outputs at the scale of the site and/or building

The extremely hot arid climate of the region is as much an opportunity as it is a constraint. The JPM Region benefits from having the highest solar radiance in the country. With the right approach and understanding of appropriate devices and solutions, the abundant sunlight hours can give JPM IA the edge over other industrial nodes in reducing energy costs for lighting, water heating etc. The figures below illustrate some common applications for low cost solar energy.

Figure 2- 7: Solar powered public street lighting in low density commercial and industrial areas

Figure 2- 8: Solar water heaters used in high density residential and commercial area

2.3 Sustainability Goals for JPM IA

In consonance with the development principles set out above, the sustainability objectives for JPM IA are listed as follows:

1. Developing an "**industrial ecology**" strategy and framework, characterised by environmental quality management, waste reduction, pollution prevention and inter-firm co-operation at local, regional and global scales to achieve this;

2. The establishment of a **holistic low carbon development model** for JPM IA, integrating strategies for minimising emissions from the energy, transport, water and waste sectors;

3. Combining and integrating **traditional water management know-how** with modern technology and systems;

4. The widespread use of **passive design techniques** wherever possible to achieve results without requiring expensive maintenance;

5. Harnessing the potential of **renewable energy sources;**

6. Developing a mechanism and targets for the delivery of **zero/minimum waste**, including waste-water treatment.

7. Developing a mechanism and targets for a **sustainable integrated transport system** with minimum carbon emissions that prioritises non-motorised transport, encourages public transport and appropriately segregates heavy freight movement from other types of traffic;

8. Providing detailed design guidance for land use and community development to ensure **flexibility, adaptability and choice for diverse communities**.

To this end, achieving international recognition in green, low carbon development, such as becoming LEED certified and/or Indian Green Building Council certified, shall be a major goal. Participation in such a programme shall greatly enhance the marketing potential of JPM IA both nationally and globally.

Figure 2- 9: National and International Institutes and programmes that recognise green, low carbon developments

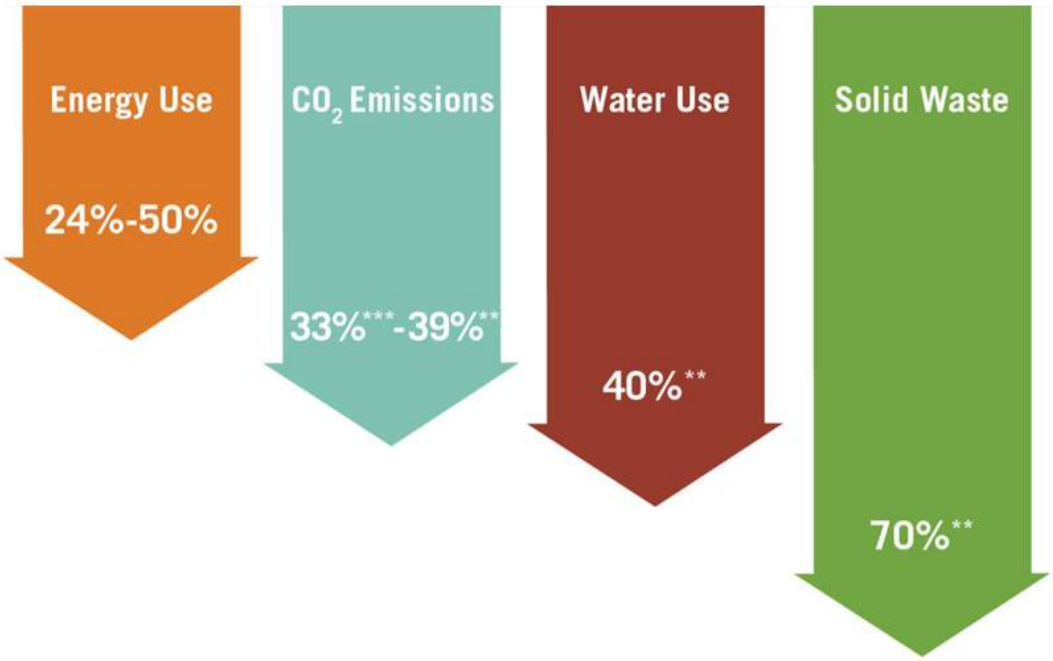

Figure 2- 10: Demonstration of possible energy reduction through Green Building Design (taken from LEED[4] guidelines)

[4] *LEED stands for Leadership in Energy and Environmental Design. It is a pioneering Green Building and Township rating system, developed in the US but with certified projects worldwide.*

Chapter 3

Demography, Activity and Land Use Projections

3.1 Introduction

As part of the Delhi-Mumbai Industrial Corridor project, a series of major initiatives have been undertaken taken by the central government through the DMICDC, for the development of industrial areas and investment regions to enhance the industrial output of various regions identified along the DMIC corridor. The vision is to develop various nodes or growth centres of industrial production wherein the synergies between the node and the region can act as catalysts for the equitable regional development. These working relationships are guided by the potential of the area, existing infrastructural linkages and the requirements of concerned stakeholders. A detailed vision for the IA will be greatly affected by the precise location and delineation of the site. The first step to plan such a large scale development was to delineate and locate the IA within the region.

As a part of the consultancy assignment for the Preparation of Master Plan for JPM IA, a detailed and strenuous exercise was conducted wherein the consultant aimed at researching the existing strengths and weaknesses of the region, identify the possible locations of the Industrial Area based on selected attributes for factors of production, study the market potential of the region to identify the target group of industries and finally delineate an optimum size of the industrial area. These studies based on scientific methodologies, stakeholder interactions and international best practices have been completed and the recommendations were provided to the State Government of Rajasthan for necessary approvals.

Based on the findings of the Market Analysis and Gap Assessment Report, the proposed industrial area will total area in the range of 45-85 sqkms, with about 0.39 million inhabitants and an employment potential of about 3.0 lakhs. With a targeted output of about Rs327,025crores, the proposed JPM IA has the potential to act as a harbinger of change in the entire Jodhpur division in general and the two districts of Pali and Jodhpur in particular.

3.2 Economic and Industrial Activity Mix

Based on a comprehensive market analysis study including various internal and external factors, 12 industries have been targeted as well as their ideal subdivisions and proper categories, each of which is suitable and feasible to be developed in JPM IA.

Each industry was intensively analyzed using the PESTEL model. This model includes political, economic (especially market size and potential), social, technical, environmental

and legal factors as well as internal factors including resources, culture and policy. Industries are then further grouped into pros and cons and their attractiveness is comprehensively evaluated to suggest their ideal subdivisions.

Within the ideal subdivisions, all the external factors were vetted under the adjusted Michael Porter's *Five Forces Model* including supply, demand, barriers to entry, complements & substitutions, existing & potential competitors. Internal factors were also investigated looking at constraints (e.g. labour) and opportunities (e.g. natural resources).

The region's largest limiting factor is water shortage; accordingly, highly water-intensive industries are discarded. It is worth considering, however, that with technological development such industries may regain feasibility as their water dependency reduces.

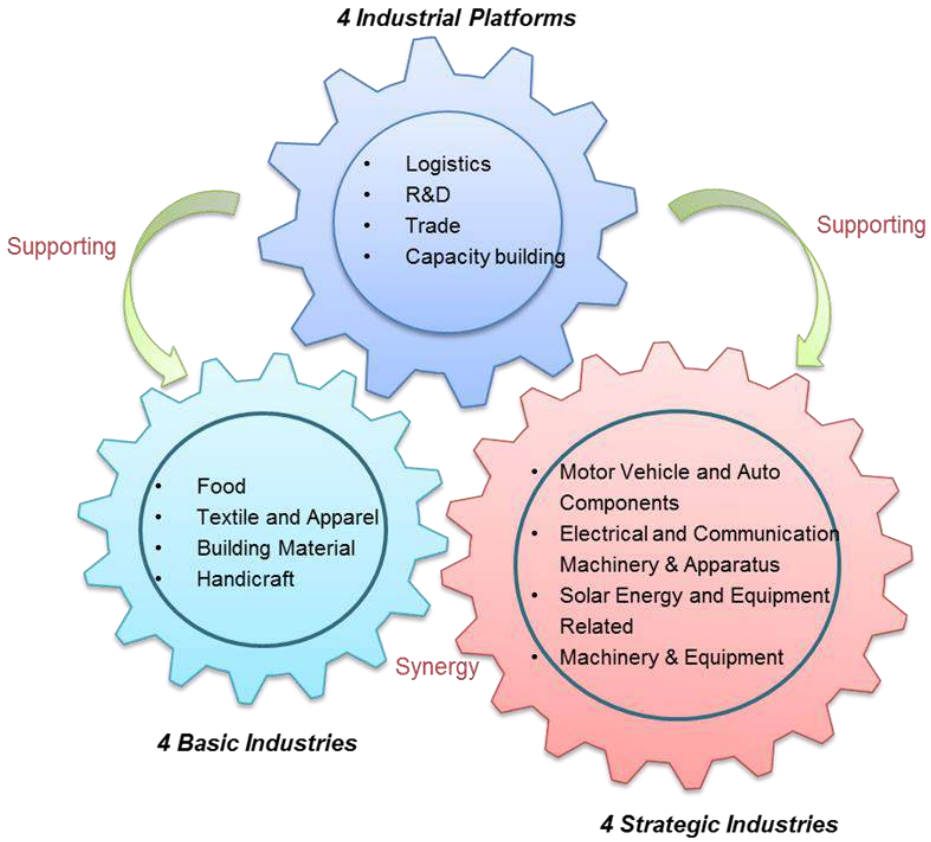

Figure 3- 1: Proposed '4+4+4' Industrial Development Mode

Target Industries and Activities

Based on a detailed analysis of potential and the status of the sector including the target industries, the following industry categories, sub-divisions and typical products have been targeted:

Table 3- 1: Suggested Subdivisions and Target Industries

Industry	Suggest subdivision	Short-term	Medium and long term
Food	Vegetable and animal oils and fats	Canola, flax-Linseed Oil, Soybeans oil	Canola, flax-Linseed Oil, Soybeans oil
	Manufacture of prepared animal feeds	Farm animal feed	Farm animal feed Pet food
	Dairy products	UHT milk Milk powder	UHT milk Milk powder Typical Indian dairy products Cheese, butter and dairy spreads
	Processing and preserving of meat	Packaged cooked meat	Packaged cooked meat Refrigeration and frozen meat
Textile and apparel	Apparel products	Mass and standard products e.g. T-shirt underwear and uniforms	Brand products High-end products e.g. niche fashion
	Textile products	Garment textiles Household textiles	Technical textiles
Building material	Clay, porcelain and other ceramic building materials	Ceramic tiles	Refined ceramic tile products
	Cement, lime and plaster building materials	(Blended) cement, drywall	Ready Mix Concrete (RMC), drywall
	Other non-metallic mineral products		Refractory products, concrete block & panel, coating
Handicraft	Artistic Metalwork Woodwork Embroidered& crocheted goods Artistic shawls Zari material &zari goods Imitation jewelry Marble & Soft Stone Crafts Terracotta	Handicraft design	Handicraft design High-end product by modern enterprises
Motor vehicle & auto component	Parts and accessories of motor vehicles	Stereo systems, anti-theft system, power windows, automotive plastic components	Cockpit module, components of heavy vehicles, automotive plastic components, all possible automotive electronic products & modules
	Motorcycles& their components	Under 150cc ICE motorcycles	Electronic two-wheelers, ICE motorcycles (expand the market for over 150cc)
Computer, electronic and optical products	Computers and peripheral equipment	Integrated circuits, desktop computers, printers, monitors	Laptop computers hand-held computers
	Consumer electronics	Televisions, television monitors and displays, CD and DVD players	Consumer video cameras
	Communication equipment	Telephone and facsimile equipment	Cellular phones
Solar energy	Photovoltaic cells	Crystalline modules and thin-film modules	Crystalline cells and manufacturing wafers
	Solar Heating & Cooling	Solar Water Heating	Solar Water Heating
Machinery	General-purpose	Gears, bearings, and	Gears, bearings, and hydraulic

Industry	Suggest subdivision	Short-term	Medium and long term
&equipment	machinery	hydraulic parts	parts
	Machinery for mining, quarrying and construction	Excavators	Excavators, concrete machinery
	Machinery for food, beverage and tobacco processing	-	Packaging machinery, flour processing machinery, meat processing machinery, dairy processing machinery, plant processing machinery
	Other special-purpose machinery	-	Building material machinery, healthcare machinery & equipment.

In the Concept Master plan, these industries have been designated as either heavy or light, depending on the specific activity. Guidelines are also set out for the locational preference of these industries within the IA with respect to social, environmental and economic parameters.

Economic Output Forecast

A quantitative study based on econometrics was adopted to generate projections for IA's scale of economic activities and its resource requirements. The major objectives of the quantitative analysis were to estimate manufacturing output, export and domestic sales, population and employee projection, land &resource requirement.

In order to estimate the potential manufacturing output of the JPM IA, a scenario-based study approach has been adopted, which focuses on the comparison between two scenarios: one is the 'business as usual' regional development trend in which the JPM IA has not been proposed and would not have materialized; the other is the regional development trend including the IA, in which the JPM IA has been proposed and will materialize.

Furthermore, three scenarios have been considered. One is termed 'DMIC induced' and the other two are 'optimistic' and 'pessimistic' scenarios. Based on this analysis, the possible manufacturing CAGR of Jodhpur and Pali with IA should range between the most optimistic 14.2% to the most pessimistic 11.6%. A target growth ratio of Regional Industrial Output including JPM IA is recommended as 12.9%, which is a composite average rate of three the three forecasts.

Table 3- 2: Forecasted Economic Output for each Phase

Scenarios	Industrial Output (Crore Rupees)			
	2012	2022	2032	2042
1. Average Scenario (CAGR 12.9%)	-	13,789.22	77,003.08	327,025.49
Rounding Numbers	-	13,700	77,000	327,000
2. Scenario based on optimistic projection (CAGR 14.2%)		18,665	11,1784	513,326
3. Scenario based on pessimistic projection (CAGR 11.6%)		9,390	49,008	193,258

3.3 Population Estimation

Based on the manufacturing output forecast, it is possible to estimate the proposed population and employment forecast for the JPM IA. A scientific methodology has been incorporated based upon academic literature reviews, previous empirical experiences and various professional opinions which integrate a variety of complex variables, inputs and formulas. Whilst it is obvious that the arrival of the DMIC will generate a significant shift of population to the area, it is necessary to incorporate a variety of assumptions into the study to consider all potential factors into the calculation. Thus, it is imperative that the following study should only be used as an estimate for the JPM IA and it must be borne in mind that the results may differ according to changing conditions over time.

In this regard, for the IA population prediction all possible factors have been considered, in order to make the calculation in the most scientific way. In the meantime, a validity analysis was made to secure the validity of the forecast.

Basic assumption & principle of the parameter selection

Priority: Jodhpur/Pali => Rajasthan => India => world

Overview of Model

As the figure below demonstrates, four detailed estimations have been prepared to determine the total the resident population for the JPM IA. These include the sum of the Natural Population (P_1), Resident Labour Population for Manufacturing Industries (P_2), and Resident Labour Population for Supporting Industries (P_3) as well as the Dependent Population (P_4) for the IA.

Figure 3- 2: Population Structure Model

The formula for calculating the population is as follows:

- **P_1** is the natural population (pre-existing population with natural growth, i.e. local people living in JPM IA. These people may live on the income from farming, house renting, etc. instead of from working in the industrial zone.

$$P_1 = P_0 \times (1 + \lambda)^i$$

*where P_0*is the current population, *λ* indicates the natural population growth rate*, i* refers to the number of years.

- **P_2** is the resident workers for manufacturing industries who live within the IA, which is calculated using the formular below:

$$P_2 = \frac{\text{Manufacturing output of our site}}{\text{per capita manufacturing output of our site}} \times (1 - \text{commuting ratio})$$

(Note: for an explanation of commuting ratio, see Table7 - 1)

- **P_3** is the resident workers for supporting industries who live within the IA, which is calculated as:

$$P_3 = P_2 \times \rho$$

where ρ is the proportion coefficient of the workers for supporting industries over that for manufacturing industries, normally 1~1.4 for mature industrial cities.

- **P_4**is the dependent population (families of the resident workers), which is calculated as:

$$P_4 = (P_2 + P_3) \times \delta$$

where δ is the dependency coefficient.

Table 3- 3: Population Projection for JPM IA-The calculation process and the result (thousand people)

Category	Key	Items	2012	2022	2032	2042	Assumption Notes
Total IA Population	A	Base jobs	3	30	75	143	
	B=1.2×A	Support Jobs	0	36	90	172	Support jobs/base jobs = 1.2
	C=A+B	Total Jobs	3	66	165	315	
	D=0.5434×C	Total Dependents of Workers	13	36	90	171	Dependency ratio = 0.5434 (India average)[1]
	E	Pre-existing Population with Natural Growth	16	20	26	32	Current population density and growth of Jodhpur &Pali[2]
	F=C+D+E	Total Supported Population by IA	16	122	281	518	
Breakdown - residents & commuters	G=0.26×C	Commuting Workers	0	17	43	82	Commuting Ratio = 26% (India average)[3]
	H=C-G	Resident Workers	3	49	122	233	
	J=0.5434×H	Dependents of Resident Workers	13	26	66	127	
	E	Local Population with Natural Growth	16	20	26	32	Current population density and growth of Jodhpur &Pali
	K=E+H+J	**Total Population Residing in IA**	**16**	**95**	**214**	**391**	
			-	**90**	**210**	**390**	Rounded to nearest 10,000

Note:

[1]: *The dependency ratio (% of working-age population) in India was last reported at 54.34 in 2011, according to a World Bank report published in 2012. Age dependency ratio is the ratio of dependents--people younger than 15 or older than 64--to the working-age population--those ages 15-64.*

[2]*Assumes 100sq.km development area*

[3]: *Commuting ratio: For planning purposes, a 26% commuting ratio has been taken as a working assumption. This index was quoted from a survey made by Regus (a Belgium-based company) for India per their database covering the information of 150,000 salaried workers in 75 countries. The investigation result was widely quoted by various news agencies and also a subsequent investigation was made by them called 'Too long, I'm gone'.*

Validity Analysis

In order to check the validity of above population projection, the market comparison approach in the real estate valuation was referred, which is a method of appraising property by analyzing the prices of similar properties sold in the recent past and then making adjustments based on differences among the properties and the relative age of

the sold properties. After some adjustments based on this method, a similar industrial town comparison approach has been applied in this section to the forecast of the population and the employment rate of the industrial town, to see whether projection is reasonable or not.

Key points of similar industrial town comparison approach

- Comparable factors and parameters between reference and valuation can be collected.
- The degree of similarity between them is determined using the relations of similarities and dissimilarities put forward in a set pair analysis.
- Make sure no consequent relationship exists among different dimensions to prevent repeated amendments occurring in the correction process.
- Since there are many unpredictable factors in the development process, an interval estimate guarantees the accuracy of forecasts in the various stages.

Assumptions

- The IA's population and employees in 2042 can get to that of an industrial town of a similar level of development, similar industry type and similar geographical environment.
- Each industrial town is facing consistent macro-economic environment before advanced stage of development.

Steps of similar industrial town comparison approach

Step 1: Collecting and selecting comparable cases (minimum 3 are required). Six comparable case references are used for this purpose (see Table7 -2);

Step 2: Establishing a basis of comparison;

Step 3: Factor correction.

$$\mathrm{P}_T = \mathrm{P}_C \times \mathrm{AF}_L \times \mathrm{AF}_S \times \mathrm{AF}_D \times \mathrm{AF}_R$$

$\mathrm{P}_C/\mathrm{P}_T$: Population density of comparable cases/target case

$\mathrm{AF}_L, \mathrm{AF}_S, \mathrm{AF}_D, \mathrm{AF}_R$: Adjustable factors of location, industrial segment, degree of development and resource-constrictions, which are referred to

$$\mathrm{AF}_L = \frac{\mathrm{L}_T + w_L(\mathrm{L}_C - \mathrm{L}_T)}{\mathrm{L}_T}$$

$$AF_S = \frac{S_T + w_S(S_C - S_T)}{S_T}$$

$$AF_D = \frac{D_T + w_D(D_C - D_T)}{D_T}$$

$$AF_R = \frac{R_T + w_R(R_C - R_T)}{R_T}$$

This adjustment method draws on the principle of the Capital Asset Pricing Model (CAPM), and if w_L, w_S, w_D, w_R(weights of location, industrial segment, degree of development and resource-constrict) are equal to 1, this method is the same as market comparison approach in the real estate valuation.

Other parameters are referred to:

L_C/L_T: Location index of comparable cases / the industrial town to be estimated

S_C/S_T: Industry segment index of comparable cases / the industrial town to be estimated

D_C/D_T: Development index of comparable cases / the industrial town to be estimated

R_C/R_T: Resource index of comparable cases / the industrial town to be estimated

Step 4: According to each comparable case, estimate the population and employees after correction, and then average the estimations. This average is the final estimation.

Factors affecting population and employment and evaluation criteria

Next, the evaluation criteria have been defined of each factor through further exploring the segments of each criterion. Subdivision factors as well as the evaluation criteria are as follows:

Table 3- 4: Evaluation criteria for factors

Factors	**Subdivision factors**	**Evaluation criterion**
Location	Port	Ports always bring more opportunities.
	Transport	Convenient traffic means more people gather in this location.
	Transportation nodes	A large number of people would gather at transportation nodes such as public transit stations or intersections
	Metropolis	The metropolis means more convenient living conditions, and accommodates more people.
Segment	Upstream and downstream linkages	The extent of tightness of upstream and downstream linkages has an effect on the degree of aggregation of local population and employees.

Factors	Subdivision factors	Evaluation criterion
	Government support	Local industries promoted by the government cultivate more people looking for opportunities within the IA.
	Resource-intensive	Labour-intensive industries can lead to more employment.
Degree of development	Date of founding	The sooner the establishment of the industrial town, the more population accumulation.
	Development stage	These two factors are complementary to each other; the development potential of a mature industrial town is relatively weak, and the same as the population growth potential.
	Development potential	
Resource-constriction	Natural disaster	People naturally gather at suitable natural and ecological environment.
	Climate	
	Ecological environment	
	Topography	

R) It should be noted that different factors between industrial towns and comparable cases are considered alone, regardless of the common factors various industrial towns are facing, such as macroeconomic level inflation rate changes.

Table 3- 5: Characteristics of comparable cases and score matrix

	Population (million, 2011)	Area (km^2)	Employees (million)	Industrial types	Characteristics affecting the composite score
Navi Mumbai	2.1	344	0.5	Engineering, Chemical, Fabrication, etc.	Port Near Metropolis Developed in 1972 as a new urban township of Mumbai
Noida	0.64	203	0.33	IT/ITeS, auto part, agro food, Power Products, Electronics, textile	Came into administrative existence on 17 April 1976 Planned IT towns and industries in this area along with innumerable housing projects are important avenues for providing employment in this region.
Thane	1.82	147	NA	Drugs, Textiles, Engineering, Electronics, Chemicals.	Port Near Metropolis
Durg-apur	0.57	154	NA	Steels, power plants, chemical and engineering	Rapid development after 1960s

	Population (million, 2011)	Area (km^2)	Employees (million)	Industrial types	Characteristics affecting the composite score
Kanpur	2.74	300	NA	textile, leather, electronics, chemicals, food processing, automobiles, communication, real estate, information technology	Availability of many industries, viz. leather, food processing, plastics etc. Infamous to a certain extent for being home to largest tanneries in India and the subsequent pollution they cause Administrative headquarters
Panipat	1.2	64	0.45(2009)	Textiles, carpets	Continuous development of the industrial base has led to an unlimited employment capacity.

Data source: http://www.navimumbai.com/industrial-areas.aspx; Census survey of industries in Navi Mumbai Region, executive summary; NOIDA MASTER PLAN-2031; According to the ration of population in 2001; Population Change and Economic Restricting in Mumbai, by R. B. Bhagat & K. Sita; Registrar General of India projection; Provisional Population Totals, Census of India 2011

According to the characteristics listed above, a comprehensive evaluation of comparable cases has been carried out and a score matrix of comparable cases follows from four mentioned aspects: location, industry segment, degree of development and resource-constriction.

Table 3- 6: Score matrix of comparable cases

Cases	Location	Segment	Degree of Development	Resource Constraints
Navi Mumbai	10	7	10	9.5
Noida	9.5	7	10	9
Thane	10	9	10	9.5
Durgapur	9	7	10	9.5
Kanpur	8	8	10	8
Panipat	9.5	9	9	9

Analytic hierarchy process (AHP) and final estimations

The analytic hierarchy process is then used to determine the weights of the factors. The impact of various factors on population and employees differs, such as the influence of industry segments is greater than the population on employment, so higher weighting to the density of employees has been given.

Table 3- 7: Weightings of the factors

Factors	w_L (Location)	w_S (Segment)	w_D (Degree of Development)	w_R (Resource Constraints)
Density of population	1.6668	1.3332	0.6668	0.3332
Density of employees	1.27	1.5872	0.6348	0.508

According to the score matrix, it can make adjustments from comparable cases and get the population and employees in 1st approach (in millions). According to the score intervals of various stages, it can forecast the population of the various stages as follows:

Table 3- 8: Estimation of total population and employees

	Interval	2042
Total population(thousand people)	Upper limit	427
	Lower limit	355
Employees(thousand people)	Upper limit	254
	Lower limit	217

As per above analysis, current population projection of JPM IA is 3.9 Lakh by 2042 which is within the range [355 thousand, 427 thousand] and proven to be suitable.

Summary of the population and employee estimation

The existing population of the Industrial area was projected in terms of average decadal growth rate of similar regions. Based on the production figures corresponding base employment figures were arrived at. Using this figure a total employment was arrived at using 1.2 as the factor. On the basis of the World Bank suggested dependency ratio of 0.5434 and adding to the total workers, local population, total population supported by the proposed IA was arrived at. A commuting ratio of 26% which is the India average was used to calculate percentage of population residing in the Industrial Area. The population projections along with calculations are in the following table.

Table 3- 9: JPM IA population and employee projections

Category	Parameter	2012	2022	2032	2042	Assumption Notes
Total IA Population	Base jobs	3	30	75	143	
	Support Jobs	0	36	90	172	Support jobs/base jobs = 1.2
	Total Jobs	3	66	165	315	
	Total Dependents of Workers	13	36	90	171	Dependency ratio = 0.5434 (India average)[1]
	Pre-existing Population with Natural Growth	16	20	26	32	Current population density and growth of Jodhpur &Pali
	Total Supported Population by IA	16	122	281	518	All figures are in thousands
Breakdown - residents & commuters	Commuting Workers	0	17	43	82	Commuting Ratio = 26% (India average)[2]
	Resident Workers	3	49	122	233	
	Dependents of Resident Workers	13	26	66	127	
	Local Population	16	20	26	32	Current population density

Category	Parameter	2012	2022	2032	2042	Assumption Notes
	with Natural Growth					and growth of Jodhpur &Pali
	Total Population Residing in IA	16	95	214	391	
		-	90	210	390	Rounded to nearest 10,000

The table below presents the population and employee projections as per low and high growth scenarios. Further information about these scenarios can be found in the JPM IA Market Analysis Gap Assessment Report.

Table 3- 10: Summary of the population and employee estimation (Business As Usual and DMIC Induced Growth)

	Items	Unit	2012	2022	2032	2042
Business As Usual[1]	**a. Employment**[2]	thousand	3	4	5	7
	b. Local Population[2]	thousand	16	20	26	32
DMIC Induced Growth	**a. Employment**					
	Commuting Workers	thousand	0	17	43	82
	Resident Workers	thousand	3	49	122	233
	Total	thousand	**3**	**66**	**165**	**315**
	b. Local Population					
	Pre-existing and Natural Growth	thousand	16	20	26	32
	Resident Workers	thousand	3	49	122	233
	Dependents of Resident Workers	thousand	13	26	66	127
	Total Population residing in IA	thousand	**16**	**95**	**214**	**392**
	Total Population residing in IA (rounded)	thousand	-	**90**	**210**	**390**

Note:

[1] For the purposes of the Business As Usual Scenario data is taken from village level data from Census 2001. "Other Workers" classification is used with 26% decadal growth rate applied (average of Jodhpur and Pali Districts growth rate)

[2] This figure is derived from an average population density figure for Jodhpur and Pali Districts within a 100sq.km area, and will be subject to change according to the final Notified Area of the preferred Concept Master plan design option.

Table 3- 11: Population and employee per low and high scenarios

	Items	Unit	2012	2022	2032	2042
1. Scenario based on optimistic projection	**a. Employment**					
	Commuting Workers	thousand	0	23	62	129
	Resident Workers	thousand	3	66	177	366
	Total	thousand	**3**	**89**	**239**	**495**
	b. Local Population					
	Pre-existing and Natural Growth	thousand	16	20	26	32
	Resident Workers	thousand	3	66	177	366
	Dependents of Resident Workers	thousand	13	36	96	199
	Total Population residing in IA	thousand	**16**	**122**	**299**	**598**
2. Scenario based on pessimistic	**a. Employment**					
	Commuting Workers	thousand	0	12	27	48
	Resident Workers	thousand	3	33	78	138

	Items	Unit	2012	2022	2032	2042
projection	**Total**	thousand	**3**	**45**	**105**	**186**
	b. Local Population					
	Pre-existing and Natural Growth	thousand	16	20	26	32
	Resident Workers	thousand	3	33	78	138
	Dependents of Resident Workers	thousand	13	18	42	75
	Total Population residing in IA	thousand	**16**	**71**	**146**	**245**

3.4 Plan Period including Phasing

The research, projections and analysis covers the period from 2012 to 2042 and the planning process runs in tandem with this analysis. The phasing of the proposed IA is coterminous with the years 2022, 2032. The corresponding infrastructure is also being planned in phases as per the incremental requirement of the industrial area and the components including the logistics hub and the MRTS.

During the first decadal phase basic industries such as food processing, textiles, building materials and handicraft production will be accelerated with support from the industrial platforms skill development, capacity building and logistics. During the mid-phase plan period, basic industries will be reinforced with value addition. During this phase strategic industries will be attracted to set up in the IA.

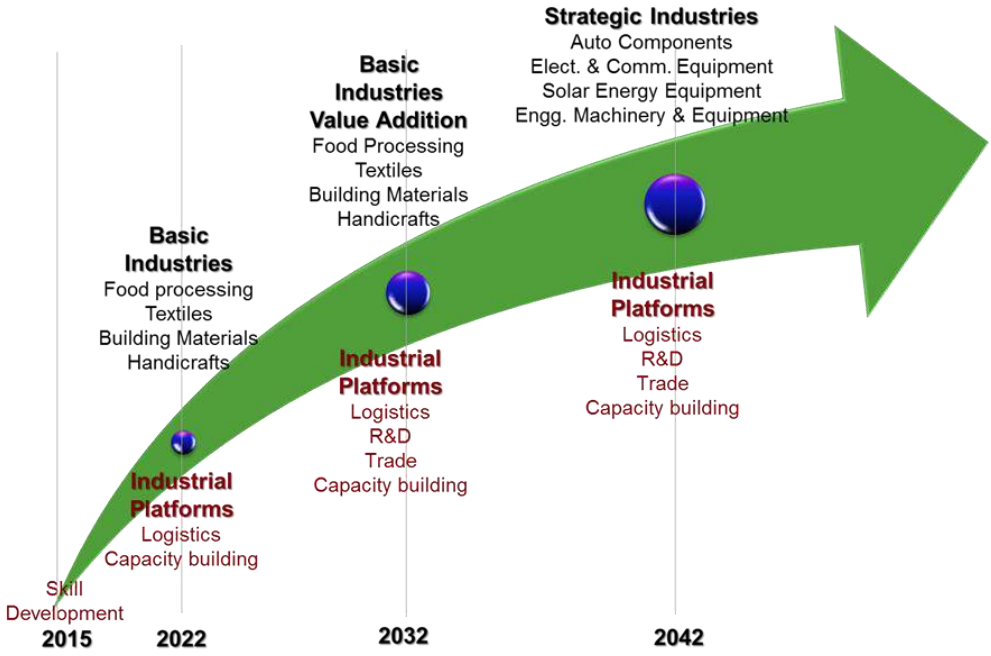

Figure 3- 3: Overview of key characteristics of ten year phases with respect to industrial development

3.5 Required Physical Infrastructure Summary

Based on the comprehensive gap assessment of critical infrastructure prepared for the JPM IA Market Analysis Report, the required infrastructure is set out as follows:

External Roads

- NH-65 is shall be upgraded to 4 lanes by 2022 and 6 lanes by 2042
- SH-61 shall be upgraded to 2 lanes by 2022 and 4 lanes by 2042
- SH-64 shall be upgraded to 2 lanes by 2022 and 4 lanes by 2042
- Extension of SH-64 past Rohat Village to connect to SH-62 shall be complete by 2022
- New highway connecting SH-64 and SH-68 shall be complete by 2032

Internal Roads

- The JPM IA shall have a road network of total around 170km in length.
- The density of the road system is approximately 2.7 km/sqkm.

Wate*r Supply*

- 45-65 MLD Domestic requirements (dual flushing system)by 2042. This is split between potable (approx. 35MLD) and non-potable (approx. 25MLD)
- 45-60 MLD Industrial use by 2042

Power

- 700MWper day by 2042

Solid Waste

- 18,900kg per day by 2022
- 81,900kg per day by 2042

The infrastructure requirements are summarised in the table below.

Table 3- 12: Indicative outline programme of physical infrastructure requirements for the three broad phases of development

Items	Base Year	2022	2032	2042
Inhabitants (‘000)	16	95	214	392
Employees (‘000)	3	66	165	315
Industrial Land Requirement (sqkm)	-	6.6	13.2	19.8
Manufacturing output of JPM IA (crores)	n/a	13,700	77,000	327,000
Potable Water Demand (MLD)	-	8.19	19.12	35.51
Non-Potable Water Demand (MLD)		5.50	13.11	24.52
Industrial Water Demand (MLD)	-	-	-	47.5
Industrial Power Demand (MW per day)	-	-	-	700
Solid Waste Generation (Kg per day)	16,000	18,900	44,100	81,900

3.6 Industrial Land Requirement

The industrial land requirement can be calculated based on an assessment of the annual economic output of forecast for each industry type. Most developed industrial cities, e.g. Tokyo, Shanghai, Chicago, and Berlin, have a set of detailed standards for output per land unit. These standardscan be used as references for the medium to long term planning of less developed regions. Furthermore, as no detailed regional or national standard is available, the Shanghai Government industry standard is used for calculating the industrial land requirement of the IA (amature industrialized area within the Asia region), in line with the assumption that the industrialization of JPM IA would have reached a mature stage by 2042. The output of each subdivision that is predicted above is used to as the target output.

The allocation of industrial lands is based on the recommendations of the *Market Analysis Gap Assessment Report for JPM IA.* The breakup of industrial lands per category is set out in the table below.

Table 3- 13: Forecast Industrial land requirements (30 year plan period)

Target Industry Sectors	Forecast Land required km^2
Agro Food	3.70
Textile and Apparel(Generalized)	1.33
Building Material	5.29
Handicrafts	0.76
Motor Vehicle & Auto Components	1.77
Computer, Electronic and Optical Products	1.20
Solar Energy and Related Equipment	1.14
Machinery & Equipment	4.60
Total	19.79

Source: Market Analysis Gap Assessment Report for JPM IA

The breakup of industrial lands per industry sub-division is set out in the table below.

Table 3- 14: Proposed Industries within JPM IA (excluding MMLH)

S. No.	Commodity / Activity	Est. Land Requirement (Km^2)
1	Dairy products	0.63
2	Processing and preserving meat	1.02
3	Vegetable and animal oils and fat	0.56
4	Animal Processing	1.49
5	Apparel product	0.53
6	Textile product	0.8

S. No.	Commodity / Activity	Est. Land Requirement (Km²)
7	Clay, porcelain and other ceramics	1.13
8	Cement, lime and plaster building	2.26
9	Other non- metallic mineral products	1.9
10	Handicraft	0.76
11	Parts & accessories	0.73
12	Motorcycle & the components	1.04
13	Computers and peripheral	0.32
14	consumer electronics	0.48
15	Communication equipment	0.4
16	Solar Heating and cooling	0.63
17	Photovoltaic cells	0.5
18	General purpose machinery	1.4
19	food and beverage machinery	0.85
20	Mining machinery	1.6
21	Other special purpose machinery	0.76

Source: Market Analysis Gap Assessment Report for JPM IA

3.7 Housing

Residential land allocation has been calculated on the basis of the forecast population of 390,000 people till horizon year 2042. Various sectors are proposed to have a mixed form of development, by type and size of dwelling units and pattern and mode of development viz. group housing or plotted, and public housing or private constructed, to cater to a socio-economic mix appropriate for each sector. The latter depends on locational factors and comparative proximity to work centres.

For the purposes of setting out development plan standards, a preliminary assessment of housing requirements has been carried.

The overall town density is calculated at 67pph (total urbanisable area divided by population). The net residential density is calculated at 335 persons per hectare (pph). This is based on the total forecast population of 390,000, with the total net residential area calculatedat965ha.

Some mixed use areas have been designated at strategic locations to encourage vibrancy and active uses day and night. Mixed use clusters are also designated along the spine road, surrounding the main commercial core and the two district sub-centres to

support phase-wide delivery of important infrastructure and services, reachable by all residential colonies.

3.8 Commercial uses, including Retail and Office

Approx. 2.2sqkm[1] of commercial lands have been allocated according to the scale of the proposed industrial township and type of activities envisaged. There are two principle types of commercial lands envisaged: Office and retail/trade. The trade system includes a wholesale and retail sub-system. The mode of development in JPM IA is proposed according to settlement scale, product characteristics, and expected consumption level. The commercial land use distribution is based on the indicative trade system set out in the *JPM IA Market Analysis Gap Assessment Report*.

Commercial areas are defined as follows:

- Retail trade areas (tiered system)
- Wholesale trade areas (specialized markets etc)
- Office areas (inc. R&D, business park, etc)

Table 3- 15: Indicative zoning guidelines for commercial development types

Land Use Zoning[2]		Max FAR / Net dph*	Max Site Coverage (%)*	Building Height(floors)	Description and typical functions
Commercial	1st level district-scale major commercial centre	1.0-1.5	20-25	3-12	• Located in the main core area. • Can also contain government/ semi-government/ private offices, business centres, financial institutes, shopping centres, hotels, restaurants, entertainment and leisure
	2nd level district centre	1.0-1.5	20-25	2-5	• Located at the junction of two main spine roads/boulevards, serving a wide catchment area • Can also contain offices, banks, shops, weekly markets, restaurant, entertainment and leisure
	3rd level sector level	tbc**	tbc	1-4	• Located in a neighborhood centre.

[1] Assuming 50% of mixed use area is commercial. Approx 111ha of stand-alone commercial is provided

[2] Facilities such as local logistics centres and major utilities infrastructure not shown

Land Use Zoning[2]		Max FAR / Net dph*	Max Site Coverage (%)*	Building Height(floors)	Description and typical functions
	commercial centre				• Provides the neighborhood/sector with local commercial services and facilities
	Wholesale Market	tbc	tbc	2-4	• Specialized markets - location and functional characteristics based on goods flow and final consumption destination
	Office Area / Business Park	tbc	tbc	2-8	• R&D services (eg Advanced Business Park (ABP), exhibition / events spaces, Innovation Park, Office Incubators

**Based on UDPFI Guidelines and international best practice*
***To be confirmed as per the requirement*

Wholesale Trade

The Market Analysis Report suggests five special markets along with their functional characteristics according to the goods flow and final consumption destination, as follows:

Table 3- 16: Suggested markets and their functional characteristics

Markets	Functional characteristics
Agro Food Market	T&O
Handicraft Market	T&O
Generalized Industrial Products Market	T&O
Auto Component Market	T
Consumer Goods Wholesale Market	D

Note: D: Destination oriented market- generally products are delivered from outside of IA to these markets and sold to local retailers. T: Transaction oriented market-generally products are sold to buyers and delivered to outside of IA. O: Origin oriented market-generally products are produced in or around IA, and sold to local retailers.

The location for each specialised wholesale shall be determined during implementation stage. Further development regulations and guidelines shall be provided at Development Plan stage.

Retail Trade

A three-tier system of retail area is suggested (not including basic local facilities), based on the Market Analysis Report for JPM IA. The three tier system is defined as follows:

- 1st level commercial centre:

- Consists of district-scale commercial centre
- Generally located in the central area and close to the transportation centre
- Mixed commercial functions including shopping, restaurant, entertainment, leisure and business

- 2nd level commercial centre:
  - Consists of a community-scale commercial centre
  - Located in a community centre
  - With multiple commercial functions
- 3rd level commercial centre:
  - Consists of a sector-scale commercial centre
  - Located in a neighborhood centre
  - Provides the neighborhood with local commercial services

Local level service centres would be included as part of residential land use zoning. This would be defined as a cluster-scale commercial centre which supplies housing clusters with daily essential commercial services and functions as a basic commercial node.

The retail system shall thus serve both local people and the wider region. Two district commercial centres area proposed along the urban spine corridor to be established during the later phase development. Two community level commercial centres and the sector level commercial centres shall serve each sector across the entire development area.

Table 3- 17: Suggested indicative retail hierarchy for the proposed JPM IA*

Commercial centre	Suggested retail formats	Population served by each centre (in ' 000)	No. of centres needed	Area per 1000 persons (sqm)	Number of shops
District commercial centre	Department stores, restaurants, specialty stores, supermarkets, characterful shopping streets, malls	125-500	1	880	1 for 300 persons
Community commercial centre	Supermarkets, special stores, shopping malls, warehouse-style membership stores; characterful shopping streets; public facilities	25-100	4	500	1 for 200 persons
Sector	Convenience store,	5-20	20	300	1 for 200

Commercial centre	Suggested retail formats	Population served by each centre (in ' 000)	No. of centres needed	Area per 1000 persons (sqm)	Number of shops
commercial centre	supermarkets, stores, weekly markets, commercial offices, basic public facilities				persons

**Based on UDPFI Guidelines and international best practice*

Office activities

With the development of DFC, FDI, technology and enterprises will be attracted to nodes within the DMIC. R&D service-oriented industries can stimulate the application of regional technology research, expand employment base and improve fiscal revenue. In future the R&D service base of JPM IA will contribute to the economy of the region and Rajasthan. Accordingly, a portion of the commercial land allocation should be designated for office use.

The types of commercial office activities envisaged are based on the *Market Analysis Report for JPM I A* and include, R&D services (eg; Advanced Business Park (ABP), exhibition / events spaces Office Incubators and an Innovation Park. These can be sub-divided as follows:

- Incubators Based On Higher Education Institutes
- Small to Medium Enterprise (SME) Incubators
- Incubators serving overseas Indian scholars
- Innovation Park / Campus to include Industrial design centre
- Innovation Park / Campus to include Technology research centre
- Innovation Park / Campus to include Industrial detection centre
- Company HQ base
- Exhibition / Expo / Conference Area

Some R&D-based uses may also be designated as part of the education and training facilities provided in the public-semi-public facilities zoning.

3.9 Physical and Social Infrastructure Requirements Summary

The analysis herein discussed has resulted out of the application of standards from Urban Development Plan Formulation and Implementation guidelines (UDPFI), and international best practice.

The JPM IA delineated zone is at a distance of about 40 km from Jodhpur, which is the primary urban centre in the study area, and with awell-developed social infrastructure consisting of world reputed educational institutes, medical facilities, parks and recreation spaces, government institutions, etc. While Pali, the other urban centre is gradually becoming self-sufficient in this respect with a number of developmental activities taking place to establish educational institutes and health care facilities. Evidently, the new JPM IA site being delineated at about midway of these two Urban centres, it is essential to make this new township largely self-sustained in terms of health, education, cultural, government, sports and recreation facilities, so as to minimise the over dependence on existing urban centres.

The total population of the existing settlements within the proposed development area and with necessary projections based on Census 2001 data is around 16000 persons. This rural population at present enjoys only limited social infrastructure in terms of educational and health care facilities such as the 'Aanganwadi's, Primary Schools, Government Higher Secondary Schools, etc and small dispensaries. Apart from this, there is scope for substantial upgradation of these existing facilities and other physical and social infrastructure.

The requirements for social infrastructure are summarized as follows:

Educational facilities

The total area requirement for the provision of Educational facilities for the first phase would be around 34.0 Ha. This phase would also address the existing gap in terms of area, equivalent to about 4 Ha. For the planning period of 30 years until 2042, the total area requirement against the provision of educational facilities would amount to an area of about 194.5 Ha. However, this requirement also includes one engineering college and one medical college which should suffice the requirements of the resident population of 392000. Alternative growth scenario requirements are also calculated in the main Gap Assessment Report.

Health care Facilities

In the developing stage of the JPM IA, since the population would be largely commuting and relatively less residing, about 7.5 Ha of land would be required to develop the health care facilities including two intermediate hospitals. Overall an area of about 37 Ha would be needed by the year 2042.

Socio-cultural Facilities

A total of 17.1 ha is required until the planning period of 2042. Smaller facilities like the community rooms and community halls/ library can be clubbed together and designed as few socio-cultural centers depending upon the final zoning pattern of the development plan.

Distribution and other Services

The area requirements and the number of facilities for distribution and other services, precisely required at zonal and sector levels, are calculated at approx. 9.4ha for the 30 year planning period.

Recreational Facilities

6 categories of recreational facilities are incorporated. These are: Neighbourhood Park, Community Park, Community sports centre, Zonal Park, Play Ground/ Open Space, City Level Park at later stages of the planning period of 30 years, larger open spaces would also be needed in terms of Zonal level parks and City level park. The total area requirement incorporating all facilities is calculated at approx. 152.4ha for the 30 year planning period.

A summary of the overall gap analysis for social infrastructure described under various sub headings, is provided in the table below. It is observed that landuse allocation for recreational/ open spaces would be about 1.5 sq. km and that for the other public and semi-publicland use would be around 2.6 sq. km.

Table 3- 18: Summary of JPM - IA Social Infrastructure requirement: Planned Growth Scenario

Planning Phase		Educational Facilities	Health Care Facilities	Socio-Cultural Facilities	Distribution & Others	Recreation/ Open spaces	Total (Ha)
		Area (Ha)	Area (Ha)	Area (Ha)	Area (Ha)	Area (Ha)	
2012	Base Year	4.0	0.1	0.4	0.0	4.4	4.5
2022	Phase I	34.0	7.5	4.1	2.3	32.2	47.9
2032	Phase II	74.2	12.9	9.0	4.8	72.4	100.9
2042	Phase III	194.5	36.3	17.1	9.4	152.4	257.3

3.10 Freight, Logistics and Transportation

One of the five Early Bird Projects associated with the Jodhpur- Pali-Marwar Industrial Area is the EBP for Development of an Integrated MMLH. The MMLH will be developed as a "Model Project" for the delivery of world-class infrastructure along the DFC. The location of MMLH within JPM IA development area will maximize the potential for the mega facility to serve the entire region, whilst providing fast convenient access to DFC along the Jodhpur to Marwar Feeder route.

The industrial area will be well served by the road network (NH-14, NH-65, NH-8, SH-61) and rail network (Marwar Junction) that offers connectivity to rest of India. Jodhpur Airport, located at 70km from Pali, serves the region with air connectivity while an airstrip located at Sojat, 40km from Pali serves the VIP movements to the region.

The Jodhpur to Marwar railway shall act asa feeder line that connects Jodhpur, Luni Junction and Pali to the Dedicated Freight Corridor. It is a broad gauge railway with total length of 104km. 24 passenger trains every day at Jodhpur to Luni section and 12 passenger trains between the at Luni-Marwar Jn section. Four major passenger railway stations in the Study Area: Jodhpur, Luni Junction, Pali, and Marwar Junction. Bhagat Ki Kothi station is the main goods terminal and connects to the Concord ICD. Marwar Junction serves as a major railway station along the DFC for traffic to / from Jodhpur and Western Rajasthan.

JPM IA is will be complimented through improved access to Jodhpur Airport which is located 5km from the centre of Jodhpur and approx. 50km away from Rohat via NH-65Marwar Junction is 90km away from Jodhpur Airport and connected to it by SH-61. SH-61 shall act as the major access road to the Airport. The re-location/expansion of the airport is the subject of a detailed Techno-Economic Feasibility Report, which is being undertaken separately.The table below sets out the area requirements for the MMLH facility at JPM IA.

Table 3- 19: MMLH Land Requirement

Horizon Year	MMLH Cargo Projection (million ton)			MMLH Land Requirement (ha)
	Jodhpur Division	JPM IA	Total	
2022	1.76	0.23	1.99	40
2032	6.95	1.25	8.20	140
2042	16.74	5.12	21.86	210

3.11 Critical Plan components

The development and the evolution of the JPM IA into a world class Industrial area depend on the image it conveys to the investors and the future inhabitants and workers of the city. This image proposed to be of a sustainable, forward looking industrial complete with world class infrastructure, connectivity, cultural vibrancy and liveability with respect for the natural, social and cultural environment. The already established Early bird projects are a step in this direction. The Early Bird Projects are of direct relevance and significance to the JPM IA Transportation Plan and the JPM IA Development Plan and shall catalyse the development of the JPM IA. Early Bird and other Projects which are critical to the development of the Industrial Area described below.

2.3.1 Water and waste water supply plan

A dependable, assured and a sustainable water supply is an essential prerequisite for the JPM IA. The “One Water” principle has been used for conceptualisation of this critical component. This principle, irrespective of quality of water and target area of application, allows potable and non – potable water demand to be treated as “Water” demand only. This outlook will allow us to treat / recycle waste water / non – potable water to the best possible techno – commercial extent and thereby minimizing the stress of extracting water demand from other potable water resources. Fresh water will be utilized only for potable applications, while the non – potable water components within the daily water demand and the industrial demand shall be met by treating the waste water being generated from potable water applications.

A key conclusion from the completed TEFR for Water and waste water system identified Rajiv Gandhi Lift Canal (RGLC)as the source for potable water, which is both sustainable in the long run and dependable as it conveys water from the Indira Gandhi Canal. Stakeholder consultation has indicated support and the consensus view is that RGLC is the only viable source of potable water to serve JPMIA, with the requirement that additional allocation for JPM IA needs to be done at the State level.

For the non-potable water which includes the water for flushing and the industries it is proposed to utilize the tertiary treated sewage from the JPM IA including existing Rohat Town. While considering the Waste water management within the proposed development, it is proposed to separately treat the municipal and industrial waste water till a secondary stage and then blend the secondary treated waste water for tertiary treatment using

Membrane Biological Reactor technology or any other as suitable. This will allow meeting the water requirements within the JPMIA without relying on external sources for meeting the non – potable water demands.

2.3.2 Integrated MMLH

The Proposed MMLH is located Rohat Station within 5km reach of most of the 19sqkmproduction area and connected to the region through a network of state and national highways. The MMLH will act as kindling force for JPM IA as it is the gateway to JPM Region from the Dedicated Freight Corridor at Marwar Junction. The MMLH will stimulate industrial growth not only within the IA itself but throughout the JPM IA region. As an Early Bird Project it is expected to act as a driving force and catalyst for change with the pre-requisites of the road and rail upgrades.

2.3.3 Pali-Sojat By-pass Road

One of the primary aims of the By-pass shall be to provide fast and convenient road access from Jodhpur to the DFC station at Marwar. The proposed bypass from NH 65 at Kharda to NH14 at Nayagaon will reduce the distance between the JPM IA and MarwarJn by about 5 kms and at the same time bypassing the urban area of Pali.

2.3.4 MMLH to NH65 Road

The transport plan includes a proposal for a new road south of the railway starting from MMLH cutting across the railway at Chotilla Village and culminating at the intersection of NH-65 and the By-pass at Kharda Lake. This will not only provide a much faster direct route for cargo traffic reaching the MMLH but also relieve pressure on the S-64 and NH-65 corridor over the long term.

2.3.5 MMLH to SH 68

The connection of the MMLH by a new road connecting the same to SH 68 between Luni and Kankani integrates the JPM IA with the Region on the North West. This will serve as a major transport corridor between the JPM IA and the region both for freight and passenger traffic. This road is proposed to have a bridge over river Luni and an underpass near the proposed Main JPM IA train station. This will not only provide a much faster direct route for cargo traffic reaching the MMLH from Jodhpur and beyond.

2.3.6 Mass Rapid Transit System (MRTS)

The TEFR for a MRTS system has been completed and the existing transportation conditions specific to public transit facilities within the immediate influence area of the NH-65 corridor (project corridor) and developing transit ridership projections based on forecasted conditions of the horizon year have been studied.

The proposed MRTS consists of a road based regional BRT in the short and medium term which integrates to the city level BRT in the JPM IA in the medium and long term. There is a provision of a rail based commuter system in the long term connecting Jodhpur and Marwar via JPM IA and Pali.

The proposals of the MRTS system also integrates to the Traffic and transportation plan of the JPM IA which is being planned as a Transit Oriented Development with greater reliance on public transport. The JPM IA has been planned in a highly compact manner with no distances in the town greater than 5 kms. All the areas in the JPM IA are within 5 minutes of walking, 5 minutes of bicycling and 5 minutes of public transport.

A dedicated passenger railway station is proposed at the urban core of JPM IA. A multi-modal transit hub (integrating BRT with commuter rail) will promote Transit-Oriented Development.

2.3.7 Airport Near Jodhpur

An efficient Air connection in today's time is a prerequisite for development of any region be it for tourism or industrial. A decision has been taken to expand the existing airport terminal at Jodhpur to accommodate a higher volume of passenger movements. The Airport operations and capacity needs to be streamlined both for incoming tourism demand and the induced demand form the JPM IA.

2.3.8 Skill Development Centres

The establishment of Skill Development centres is a very important component for the overall regional development of the JPM IA. The current skill level of the population in the region does not match with the requirements of a world class industrial city. If the current skill level of the local population is not enhanced to match the requirements, the goal of equitable development will not be achieved as the gap will be filled by the migrant work force. This is also critical in the integration of the existing village settlements in the

development both socially and economically. The least desirable result of the development is that these villages continue to remain islands in the overall development of the Industrial Area.

The industrial evolution of the JPM IA is starting from the basic industries and moving onward to the product enhancement of these industries and then over to strategic industries. The current skill level with some enhancement will match with the requirements of the basic industries and then there will be in-situ skill development to match with the requirements of the future industry.

Rajasthan was the first State in India to establish the Mission on Livelihoods (RMoL), in September 2004 in order to address the challenges of unemployment and ensuring gainful and sustainable employment. The objective of creation of RMoL was to formulate appropriate and innovative strategies to promote and facilitate large scale livelihoods for the poor and vulnerable people.

Rajasthan Skill and Livelihoods Development Corporation spearheads the skill development of the work force. Further collaborations with the technical institutions like NIFT Jodhpur, IIT Jodhpur, Hand Tool Design Development and Training Centre, Nagaur etc. need to be explored to give the necessary cutting edge to the development programs. A plot of land for a Proposed Skill Development and R&D institute in JPM IA has been earmarked.

2.3.9 Integration of Existing Village Settlements

By adopting a smaller foot print and proposing compact development the number of existing villages enveloped by the JPM IA developed are has been reduced to just few. The existing villages will be integrated within the proposed development. These shall serve as the Knowledge centres for traditional systems, be it water management or local skill development initiatives. The improved level of social infrastructure shall contribute to an enhanced quality of life in these settlements. The existing settlements will be allowed to develop and grow through natural progression and self-help rather than through forced redevelopment and relocation.

Around these villages a buffer Abadi Development area is proposed that will function as a community urban space where street markets, urban agriculture areas. With the

improved street infrastructure there will be enhanced connectivity to the settlements by all the modes pedestrian, biking, public transport or personalised motor transport.

3.12 Conclusion

To develop a compact and a liveable city with a vibrant cultural, social and economic environment there are certain fundamental requirements of physical and social infrastructure. These have to be met for the area to attain critical mass. This requirement is further compounded by the development of an Industrial Area where the synergies get further complex. All this is possible as demonstrated in brief in the preceding sections with the development of strategic components which would reduce the negative impacts and enhance the overall liveability in the Industrial area. The enhanced liveability of the city shall be inspirational for the citizens to work with zeal and evolve into a sought after Urban Area in the region. A strong Institutional & Governance Framework has to be provided and a marketing strategy has to be prepared to promote JPM IA.

Chapter 4

Socio Economic Profile

4.1 Introduction

This section presents the Social assessment of the Jodhpur –Pali Marwar Industrial Area (JPMIA). JPMIA covers an area of 154.37 km^2spread over 9 villages in Rohat Tehsil of Pali district. The JPMIA primarily covers 9 villages in the western portion of Rohat Tehsil of Pali district adjoining Jodhpur district. However, the actual developable area under JPM IA would be approximately 64.62 sqkms excluding land falling under existing abadi areas, Seasonal Watercourse / Drainage Corridor and other peripheral control area.

4.2 Socio-Economic Profile of the JPMIA Area

The proposed project will comprise of land from 9 villages falling in Rohat Tehsil. The details of the villages have been presented in Table 4-1.

Table 4- 1: Details of Villages falling in JPMIA

S No	Name of the village	Area (Ha)	Total Households	Total Population
1	Dungarpur	1,902.00	326	1917
2	Singari	2,054.00	328	1689
3	Dhundhli	761.520	128	678
4	Doodali	1,653.00	247	1,402
5	NimbliPatelan	1,385.17	218	1,318
6	NimbliBrahmnan	1,353.14	210	1076
7	Danasani	693.00	95	572
8	Rohat	4,394.44	1294	6,980
9	Dalpatgarh (part of Rohat in 2001)	1240.99	129	734
Total		15437.26	2975	16,366

Source: Census of India, 2011

4.3 Baseline Profile of JPM IA

This section describes the information on the socio economic parameters in the delineated area. The social baseline is based on the review of secondary data and information obtained through qualitative, quantitative and participatory methods.

Rajasthan is the largest state of India in terms of area and has a per capita income of Rs. 39,967 against the national average of Rs 53,331. It is a landlocked state in northern India located between 23°00' to 30°20' N latitude and between 69°50' and 77°30' E longitude. The state is bordered by Pakistan in the northwest, Uttar Pradesh, Punjab and Haryana to its northeastern and northern frontiers, Madhya Pradesh and Uttar Pradesh in its east and southeastern fronts and Gujarat bordering the southwestern boundary.

Pali district with its geographical area of 12387 Sq.km is situated in the western region of Rajasthan. The district derived its name from the town Pali which is also the headquarter of

the district administration. The district stretches between $24^0$45' and $26^0$75' N latitude and between $72^0$48' and $74^0$20' E longitude. Pali district is flanked by Ajmer, Rajsamand, Udaipur, Jalore, Barmer Jodhpur, Nagaur and Sirohi districts. National Highway 14 links Pali Jaipur in north and Ahmedabad in south. The delineated JPMIA is located entirely within Rohat Tehsil of Pali district.

Demographic pattern of JPMIA villages

As per Census 2011, the population of Pali district and that of delineated project area was 2037573 and 16866 respectively. Pali district is characterized by predominantly rural setting with around 77.5% of the population in the district residing in rural areas. The recorded decadal growth rate (2001-2011) for Pali district is 11.99%, which is one of the lowest in the state (21.44%). The 9 revenue villages forming the delineated JPMIA together have experienced a growth rate of 22.8% during 2001-2011. The average population density in the delineated JPMIA area works out to 106 persons per sq km compared to the Pali district average of 165 persons per sq. km. Table 4-2 presents the details of population growth.

Table 4-2: Population Growth

S No	Name	Population Growth %(2001-2011)
1	Delineated Area of JPMIA	22.8
2	Pali District	11.99
3	Rajasthan State	21.44

Source: Census of India, 2001 & 2011

House Hold Size

As per Census 2011, 3063 numbers of households were recorded within JPMIA. With population of16866 the average household size works out to be 5.5.

Social Stratification

Pali district and delineated JPMIA have significant SC population (19.54% and 21.58% respectively) higher than the state (17.81%). The tribal population is much lower in Pali district (7.1%) compared to Rajasthan state (13.46%). Delineated JPMIA has still lower tribal population compared to Pali district (1.31%)the district and no tribal population (ST). The concentration of SC and ST population is presented in Table 4-3.

Table 4-3: Concentration of SC, ST Population

S No	Name	SC Population	ST Population
1	Delineated JPMIA	21.58	1.31
2	Pali District	19.54	7.1
3	Rajasthan State	17.81	13.46

Source: Census of India, 2011

As per Rajasthan BPL Census 2002[1], Pali district comprises 0.72 % of total BPL families of Rajasthan which isover 19% (66924 families) of district families living below poverty level. It is important to mention here that 45.73% (30605 families) of BPL families are landless and 19.89% belong to SC,31.67% belong to ST and 41.62% belong to OBC families. In the year 2002, within the delineated JPMIA out the 832 BPL HHs, 315 HHs (37.86%) were land less. Table 4-4 presents the details of BPL households in JPMIA.

Table 4-4: BPL Households in JPMIA

Sl No.	Name of Village	Total HHs (2002)	BPL HHs		Landless BPL HHs	
			No	%	No	%
1	DungarPur	312	107	33.55	48	46.15
2	Singari	303	74	24.42	39	52.70
3	Dhundali	126	19	15.08	7	36.84
4	Doodali	237	39	16.46	10	25.64
5	Neembli Patelan	208	40	18.75	10	25.64
6	Neembli Bramnan	188	59	30.85	8	13.79
7	Rohat	1129	303	26.84	165	37.93
8	Dalpatgarh	105	26	24.76	10	38.46
9	Danasani	94	22	24.52	38	47.37

Source: Rajasthan BPL Census 2002 (Rural Families)

Literacy

Literacy rate is a development indicator of a particular area and based on its new developments canbe proposed for utilization of existing human resources for new opportunities. The literacy rate of JPMIA is 63.61% as compared to 62.39% for Pali district and 66.11% for the state of Rajasthan. There is a huge difference in the male and female literacy rates with the female literacy rate being a mere 47.74% compared to 78.29% for males. The details of the literacy rate of the JPMIA and Pali district is presented in Table 4-5.

Table 4-5: Literacy Rate

Area	Total (%)	Male (%)	Female (%)
JPMIA	8683 (63.61%)	5552 (78.29%)	3131(47.74%)
Pali District	1085693 (62.39%)	667381 (76.81%)	418312 (48.01%)

Source: Census of India, 2011

[1] *Rajasthan BPL Census 2002 (Rural Families), bpl2002.raj.nic.in*

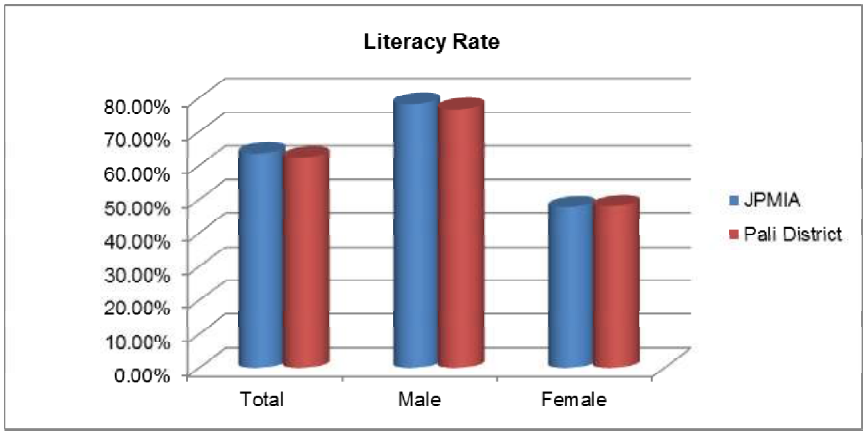

Figure 4- 1: Literacy Rate

Gender Distribution

Sex ratio (females per 1000 males) of JPMIA is much lower (917) compared to Pali districts (987) and the state average of 928. Among the 9 villages in the delineated JPMIA, the lowest sex ratio is in village Neembli Patelan (870) compared to the highest of 842 in both Danasani and Doodali villages. The detail of sex ratio of JPMIA and Pali district is presented in Table 4-6.

Table 4-6: Overview of Sex Ratio in Villages of JPM IA

Name of the village/district and State	Sex Ratio
Dungar Pur	904
Singari	908
Dhundali	937
Doodali	942
Neembli Patelan	870
Neembli Bramnan	898
Rohat	927
Dalpatgarh	882
Danasani	942
JPMIA Average	**917**
Pali District	**987**
Rajasthan State	**928**

Source: Census of India, 2011

Employment Profile

The employment pattern is another development indicator of any area. Out of the total population of 16366 in JPMIA, 40.25% (6789) are workers whereas 59.75% (10077) are non workers. Main workers comprise 78.67% of the total working population and marginal workers comprise 21.23% of the same.

In the present scenario, the entire area under delineated JPMIA is rural and most of the population is agriculture dependent. It is found that of the total working population around 36.88% (2309) are cultivators and 27.65% (1731) are agricultural laborers. Further, around 5.05% (316) belong to household industries whereas 38.86% (2,433) are involved in other trades including Livestock, Forestry, Mining & Quarrying, MAF, PRO, Construction, Trade & Commerce, Transport and Storage. The details of the employment profile of Pali district and JPMIA is presented in Table 4-7.

Table 4-7: Employment Profile

Area	Total Workers	Main Workers	Marginal Workers	Cultivators	Agl. Labourers	HH Ind. Workers	Workers in Other Services	Non Workers
JPMIA	6535	5185	1350	2268	2678	355	2584	9831
Pali District	842327	605288	237039	243491	237380	26119	335437	1195246

Source: Census of India, 2011

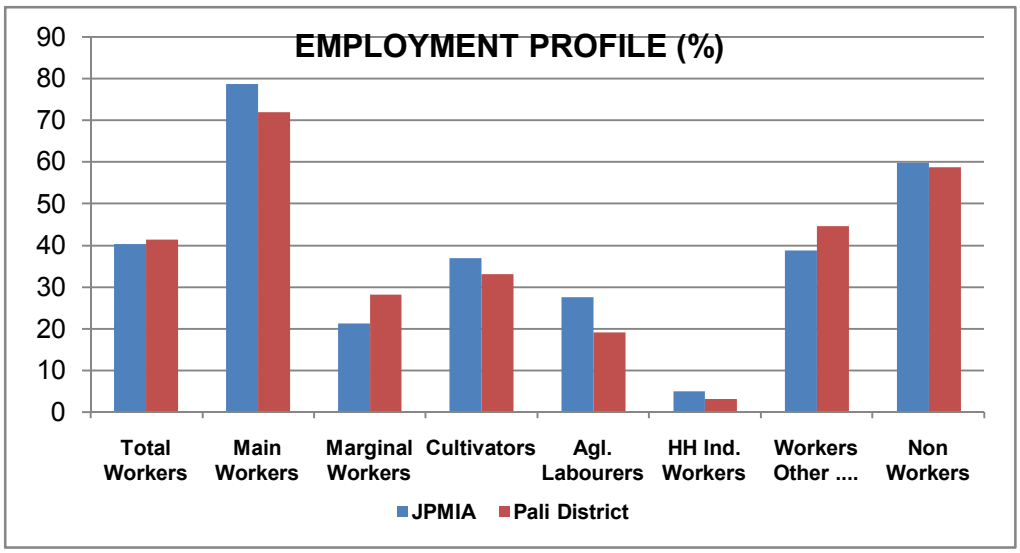

Figure 4- 2: Employment Profile

Social Infrastructure

The social infrastructure of the area indicates the nature of development of the area and facilitates mapping the areas where further development is needed and new development programmes are made to address the gaps in order to enhance the quality of lives of the local residents. An assessment of the existing social infrastructure is presented below:

Housing Facilities

Details of household facilities in Pali district is presented in Table 4-8.Households living in pucca houses comprised 66.8% of total households in Pali district compared to Rajasthan state average of 64.5%. While in rural areas it has higher (62.1%), in urban areas it has lesser (84.4%) percentage of households living in pucca houses compared to Rajasthan state average of 54.4% and 91.8% respectively. Lesser percentage (79.7%) of households in the district had improved source of drinking water compared to the state average of 88.6%, making more percentage (88.4%) of households in the district to treat water to make it safe for drinking compared to the average (54.4%) in the state. Households having access to toilet facility (29.4%) is much less compared to state average of 38.7%. The gap in terms of access to toilet facilities between the state and Pali district is higher in urban areas compared to the rural areas. About 84% of the households have access to electricity; rural areas having higher percentage (81.1%) compared to state average of 74.5%. Firewood/crop residues/cow dung cakes are the main source of fuel in the rural areas while LPG/PNG is the main fuel used in urban areas.

Table 4-8: Selected Household Characteristics – Pali District

Household Characteristics	Pali District			Rajasthan		
	Total	Rural	Urban	Total	Rural	Urban
HHs living in pucca houses (%)	66.8	62.1	84.4	64.5	55.4	91.8
HHs living in kuchcha houses (%)	15.5	18.4	4.5	20.3	26.4	2.2
HHs having improved source of drinking water (%)	79.7	74.8	98.2	88.6	85.4	98.1
HHs treating water to make it safer for drinking (%)	88.4	88.7	87.3	54.4	50.4	66.6
HHs having access to toilet facility (%)	29.4	18.9	68.8	38.7	23.1	85.0
HHs sharing toilet facility (%)	4.7	2.1	14.2	10.4	5.1	26.1
HHs having access to electricity (%)	84.0	81.1	94.7	80.2	74.5	97.1
HHs using firewood/crop residues/cow dung cake (%)	78.1	90.2	32.9	77.4	93.5	29.6
HHs using LPG/PNG (%)	20.7	9.2	63.8	21.6	6.0	68.0

Source: Annual Health Survey, 2010-11, Fact Sheet for Rajasthan

Health Care Facilities

Pali has a well-developed infrastructure to provide basic health services in the district. Almost all of the remote villages are well connected to the primary health centres and sub-centres. Department of Medical, Health and family planning is running its operation through the dispensaries, Health Centres, Family Welfare Centres and Community Health Centres located all over the district. One of the major hospitals of Pali District is Bangur Hospital, with a capacity of 300 beds. Besides, there are a large number of private hospitals and clinics.

The increase in level of availability of medical facilities in Pali district during 1999-2000 to 2007-2008 is presented in Table 4-9.

Table 4-9: Availability of Medical Facilities in Pali District

Item	1999-2000	2007-2008
Population served per medical institution	2860	3461
Population served per bed	1165	1285
Rural population services per PHC	18493	21990

Source: Human Development Report, Rajasthan (Updated 2008)

Among the 9 villages in the JPMIA, Rohat has community health centre, primary health centre, subsidised medical practitioner and a Unani dispensary while Singari has a primary sub health centre

Educational Facilities

The education facilities and enrolment at school level in Pali district is presented in Table 4-10.

Table 4-10: Enrolment and Student Teacher Ratio

	Pre primary/ primary	Upper primary	Secondary & Senior Secondary	Total
No. of Schools	1201	1451	478	3130
No. of students enrolled	114340	245181	105678	465199
No. of Teachers	2597	6253	3599	12449
Student Teacher Ratio	44.03	39.21	29.36	37.37

Source: Statistical Abstracts 2012 (Data for 2009), Deptt. of Statistics, GoR

There is very strong relationship between literacy and existence of primary school: e.g. it is impossible to educate village children in the absence of a good teacher (parents are not much help), a building to sit in, proper road access between village and school, drinking water supply and toilets etc. Three critical impediments on which data is presented here are: only one room schools, only one teacher schools and non availability of girls' toilet in schools. Pali district's performance has been average compared to other districts of the state. Table 4-11depicts a comparative scenario of educational Infrastructure and retention rate in Pali district and in the state of Rajasthan.

Table 4-11: Educational Infrastructure and Retention Rate

Area	Retention Rate (I-VIII Classes)	Single Classroom (%)	Single Teacher (%)	Girls Toilets (%)	Drinking Water (%)
Pali District	62	1	21	21	62
Rajasthan State	60	4	28	22	61

Source: Human Development Report, Rajasthan (Updated 2008)

All the 9 villages in JPMIA have primary schools and the senior secondary school is located at Rohat. Nimbli Brahmnan village has an adult literacy centre.

Other Facilities

The delineated JPMIA is served by the road and railway network (Rohat railway station located in Singari village). The service centre for administrative purposes and other related facilities like the Revenue Department Office, Panchayat Samiti office, Post Office, Telephone facilities, Bank, Agriculture Credit Society etc are located at Rohat. The village centre Rohat is on the NH65 that connects Pali with Jodhpur. All the 9 villages are connected by all-weather metaled roads under the PMGSY programme.

4.4 Population and workforce participation in Villages of JPMIA

1 Dhundhli

Dhundhli is a medium size village located in Rohat of Pali district, Rajasthan with total 128 families residing. The village has population of 678 of which 350 are males while 328 are females as per Population Census 2011.In village population of children with age 0-6 is 121 which makes up 17.85 % of total population of village. Average Sex Ratio of village is 937 which is higher than Rajasthan state average of 928. Child Sex Ratio as per census is 891, higher than Rajasthan average of 888. This village has lower literacy rate compared to Rajasthan. In 2011, literacy rate of the village was 65.35 % compared to 66.11 % of Rajasthan. Male literacy stands at 83.57 % while female literacy rate was 46.13 %.

Table 4-12: Social status of village Dhundhli

Particulars	Total	Male	Female
Total No. of Houses	128	-	-
Population	678	350	328
Child (0-6)	121	64	57
Schedule Caste	72	34	38
Schedule Tribe	0	0	0
Literacy	65.35 %	83.57 %	46.13 %
Total Workers	335	174	161
Main Worker	331	174	157
Marginal Worker	4	0	4

Source: Census of India, 2011

Schedule Caste (SC) constitutes 10.62 % of total population in the village. The village currently doesn't have any Schedule Tribe (ST) population.

Out of total population, 335 were engaged in work activities. 98.81 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 1.19 % were involved in Marginal activity providing livelihood for less than 6 months. Of 335 workers engaged in Main Work, 146 were cultivators (owner or co-owner) while 167 were Agricultural labourers.

2 Dalpatgarh

Dalpatgarh is a medium size village located in Rohat of Pali district, Rajasthan with total 129 families residing. The village has population of 734 of which 390 are males while 344 are females as per Population Census 2011. In village population of children with age 0-6 is 129 which makes up 17.57 % of total population of village. Average Sex Ratio is 882 which is lower than Rajasthan state average of 928. Child Sex Ratio for the village as per census is 720, lower than Rajasthan average of 888. This village has lower literacy rate compared to Rajasthan. In 2011, literacy rate of the village was 37.69 % compared to 66.11 % of Rajasthan. Male literacy stands at 57.14 % while female literacy rate was 16.55 %.

Table 4-13: Social data of village Dalpatgarh

Particulars	Total	Male	Female
Total No. of Houses	129	-	-
Population	734	390	344
Child (0-6)	129	75	54
Schedule Caste	0	0	0
Schedule Tribe	0	0	0
Literacy	37.69 %	57.14 %	16.55 %
Total Workers	276	186	90
Main Worker	215	182	33
Marginal Worker	61	4	57

Source: Census of India, 2011

There is no population of Schedule Caste (SC) and Schedule Tribe (ST) in the village. Out of total population, 276 were engaged in work activities. 77.90 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 22.10 % were involved in Marginal activity providing livelihood for less than 6 months. Of 276 workers engaged in Main Work, 45 were cultivators (owner or co-owner) while 61 were Agricultural labourers.

3 Danasani

This is a medium size village located in Rohattehsil with total 95 families residing. The village has population of 572 of which 289 are males while 283 are females as per

Population Census 2011. In village population of children with age 0-6 is 97 which makes up 16.96 % of total population of village. Average Sex Ratio of the village is 979 which is higher than Rajasthan state average of 928. Child Sex Ratio for the Danasani as per census is 764, lower than Rajasthan average of 888. The village has lower literacy rate compared to Rajasthan. In 2011, literacy rate of village was 61.89 % compared to 66.11 % of Rajasthan. In this village Male literacy stands at 79.91 % while female literacy rate was 44.40 %.

Table 4-14: Social data of village Danasani

Particulars	Total	Male	Female
Total No. of Houses	95	-	-
Population	572	289	283
Child (0-6)	97	55	42
Schedule Caste	217	108	109
Schedule Tribe	0	0	0
Literacy	61.89 %	79.91 %	44.40 %
Total Workers	274	145	129
Main Worker	115	100	15
Marginal Worker	159	45	114

Source: Census of India, 2011

In this village, most of the villagers are from Schedule Caste (SC). Schedule Caste (SC) constitutes 37.94 % of total population of the village. The village currently doesn't have any Schedule Tribe (ST) population.

In village out of total population, 274 were engaged in work activities. 41.97 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 58.03 % were involved in Marginal activity providing livelihood for less than 6 months. Of 274 workers engaged in Main Work, 58 were cultivators (owner or co-owner) while 2 were Agricultural labourers.

4 Doodali

Doodali is a medium size village with total 247 families residing. The village has population of 1402 of which 722 are males while 680 are females as per Population Census 2011.

In the village, population of children with age 0-6 is 216 which makes up 15.41 % of total population of village. Average Sex Ratio of the village is 942 which is higher than Rajasthan state average of 928. Child Sex Ratio for the village as per census is 878, lower than Rajasthan average of 888. As per census 2011 village has lower literacy rate compared to Rajasthan. Literacy rate of Doodali village was 62.23 % compared to 66.11 % of Rajasthan. In the village Male literacy stands at 75.95 % while female literacy rate was 47.84 %.

Table 4-15:Social data of village Doodali

Particulars	Total	Male	Female
Total No. of Houses	247	-	-
Population	1,402	722	680
Child (0-6)	216	115	101
Schedule Caste	301	150	151
Schedule Tribe	0	0	0
Literacy	62.23 %	75.95 %	47.84 %
Total Workers	465	396	69
Main Worker	445	384	61
Marginal Worker	20	12	8

Source: Census of India, 2011

Population of Schedule Caste (SC) constitutes 21.47 % out of total population in the village. The village currently doesn't have any Schedule Tribe (ST) population.

As per census 2011, out of total population, 465 were engaged in work activities. 95.70 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 4.30 % were involved in Marginal activity providing livelihood for less than 6 months. Of 465 workers engaged in Main Work, 135 were cultivators (owner or co-owner) while 60 were Agricultural labourers.

5 Dungarpur

Dungarpur is a medium size village located in JPMIA with total 326 families residing. The village has population of 1917 of which 1007 are males while 910 are females as per Population Census 2011. In village population of children with age 0-6 is 308 which makes up 16.07 % of total population of village. Average Sex Ratio of the village is 904 which is lower than Rajasthan state average of 928. Child Sex Ratio for the village as per census is 867, lower than Rajasthan average of 888. This village has lower literacy rate compared to Rajasthan. In 2011, literacy rate of Dungarpur village was 57.36 % compared to 66.11 % of Rajasthan. In Dungarpur Male literacy stands at 75.30 % while female literacy rate was 37.68 %.

Table 4-16:Social data of village Dungarpur

Particulars	Total	Male	Female
Total No. of Houses	326	-	-
Population	1,917	1,007	910
Child (0-6)	308	165	143
Schedule Caste	650	328	322
Schedule Tribe	45	22	23
Literacy	57.36 %	75.30 %	37.68 %
Total Workers	1,023	520	503
Main Worker	948	491	457
Marginal Worker	75	29	46

Source: Census of India, 2011

Dungarpur village of JPM IA has substantial population of Schedule Caste. Schedule Caste (SC) constitutes 33.91 % while Schedule Tribe (ST) were 2.35 % of total population in the village.

In Dungarpur village out of total population, 1023 were engaged in work activities. 92.67 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 7.33 % were involved in Marginal activity providing livelihood for less than 6 months. Of 1023 workers engaged in Main Work, 558 were cultivators (owner or co-owner) while 335 were Agricultural labourers.

6 Nimbli Brahmnan

Nimbli Brahmnan is a medium size village located in JPMIA with total 210 families residing. The village has population of 1076 of which 567 are males while 509 are females as per Population Census 2011.

In the village population of children with age 0-6 is 202 which makes up 18.77 % of total population of village. Average Sex Ratio of village is 898 which is lower than Rajasthan state average of 928. Child Sex Ratio for the village as per census is 961, higher than Rajasthan average of 888.

Nimbli Brahmnan village has lower literacy rate compared to Rajasthan. In 2011, literacy rate of the village was 45.77 % compared to 66.11 % of Rajasthan. In the village Male literacy stands at 59.91 % while female literacy rate was 29.76 %.

Table 4-17: Social data of village Nimbli Brahmnan

Particulars	Total	Male	Female
Total No. of Houses	210	-	-
Population	1,076	567	509
Child (0-6)	202	103	99
Schedule Caste	417	224	193
Schedule Tribe	59	30	29
Literacy	45.77 %	59.91 %	29.76 %
Total Workers	429	241	188
Main Worker	108	78	30
Marginal Worker	321	163	158

Source: Census of India, 2011

Most of the villagers are from Schedule Caste (SC) constitutes 38.75 % while Schedule Tribe (ST) were 5.48 % of total population.

In this village out of total population, 429 were engaged in work activities. 25.17 % of workers describe their work as Main Work (Employment or Earning more than 6 Months)

while 74.83 % were involved in Marginal activity providing livelihood for less than 6 months. Of 429 workers engaged in Main Work, 53 were cultivators (owner or co-owner) while 13 were Agricultural labourers.

7 Nimbli Patelan

Nimbli Patelan is a medium size village located in Rohat Tehsil of Pali district, Rajasthan with total 218 families residing. The village has population of 1318 of which 705 are males while 613 are females as per Population Census 2011.

In village population of children with age 0-6 is 215 which makes up 16.31 % of total population of village. Average Sex Ratio of village is 870 which is lower than Rajasthan state average of 928. Child Sex Ratio for the village as per census is 838, lower than Rajasthan average of 888.

Nimbli Patelan village has higher literacy rate compared to Rajasthan. In 2011, literacy rate of the village was 75.97 % compared to 66.11 % of Rajasthan. Male literacy stands at 90.48 % while female literacy rate was 59.42 %.in the village.

Table 4-18: Social data of village Nimbli Patalan

Particulars	Total	Male	Female
Total No. of Houses	218	-	-
Population	1,318	705	613
Child (0-6)	215	117	98
Schedule Caste	231	120	111
Schedule Tribe	9	3	6
Literacy	75.97 %	90.48 %	59.42 %
Total Workers	583	360	223
Main Worker	367	275	92
Marginal Worker	216	85	131

Source: Census of India, 2011

Schedule Caste (SC) constitutes 17.53 % while Schedule Tribe (ST) were 0.68 % of total population in the village.

In Nimbli Patelan village out of total population, 583 were engaged in work activities. 62.95 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 37.05 % were involved in Marginal activity providing livelihood for less than 6 months. Of 583 workers engaged in Main Work, 250 were cultivators (owner or co-owner) while 26 were Agricultural labourers.

8 Rohat

Rohat is a large village located in Pali district of Rajasthan with total 1294 families residing. The village has population of 6980 of which 3622 are males while 3358 are females as per Population Census 2011.

Population of children with age 0-6 is 1150 which makes up 16.48 % of total population of village. Average Sex Ratio of Rohat village is 927 which is lower than Rajasthan state average of 928. Child Sex Ratio for the Rohat as per census is 939, higher than Rajasthan average of 888.

Rohat village has higher literacy rate compared to Rajasthan. In 2011, literacy rate of Rohat village was 69.40 % compared to 66.11 % of Rajasthan. In Rohat Male literacy stands at 81.55 % while female literacy rate was 56.27 %.

Table 4-19: Social data of village Rohat

Particulars	Total	Male	Female
Total No. of Houses	1,294	-	-
Population	6,980	3,622	3,358
Child (0-6)	1,150	593	557
Schedule Caste	1,427	745	682
Schedule Tribe	14	7	7
Literacy	69.40 %	81.55 %	56.27 %
Total Workers	2,475	1,796	679
Main Worker	2,049	1678	371
Marginal Worker	426	118	308

Source: Census of India, 2011

Total population of Schedule Caste (SC) constitutes 20.44 % while Schedule Tribe (ST) was 0.20 % of total population in Rohat village.

In Rohat out of total population, 2475 were engaged in work activities. 82.79 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 17.21 % were involved in Marginal activity providing livelihood for less than 6 months. Of 2475 workers engaged in Main Work, 379 were cultivators (owner or co-owner) while 192 were Agricultural labourers.

9 Singari

Singari is a medium size village located in Rohat Tehsil of Pali district, Rajasthan with total 328 families residing. The village has population of 1689 of which 885 are males while 804 are females as per Population Census 2011.

In village population of children with age 0-6 is 278 which makes up 16.46 % of total population of village. Average Sex Ratio of the village is 908 which is lower than Rajasthan state average of 928. Child Sex Ratio for the village as per census is 759, lower than Rajasthan average of 888.

Singari has lower literacy rate compared to Rajasthan. In 2011, literacy rate of the village was 60.38 % compared to 66.11 % of Rajasthan. Male literacy stands at 78.54 % while female literacy rate was 41.08 %.

Table 4-20: Social data of village Singari

Particulars	Total	Male	Female
Total No. of Houses	328	-	-
Population	1,689	885	804
Child (0-6)	278	158	120
Schedule Caste	310	158	152
Schedule Tribe	80	43	37
Literacy	60.38 %	78.54 %	41.08 %
Total Workers	675	421	254
Main Worker	607	401	206
Marginal Worker	68	20	48

Source: Census of India, 2011

Population of Schedule Caste (SC) constitutes 18.35 % while Schedule Tribe (ST) were 4.74 % of total population in village.

As per census 2011, out of total population, 675 were engaged in work activities. 89.93 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 10.07 % were involved in Marginal activity providing livelihood for less than 6 months. Of 675 workers engaged in Main Work, 222 were cultivators (owner or co-owner) while 178 were Agricultural labourers.

4.5 Preliminary assessment of Impacts in the proposed JPM IA

The proposed JPM IA will have direct and indirect impact on the life of the population residing in the villages falling directly under its ambit as also in its influence area. As the project is being developed in an entirely rural area comprising of 9 villages, the existing population is within the abadi area and it is unlikely that some relocation of the existing population will take place. The direct impacts of the project will be felt more in the areas of the socio economic condition of the communities residing in these villages. A variety of implications will emerge for the population in these villages with the implementation of this project. Therefore, comprehensive strategies for minimizing/eliminating these negative impacts and integration of the dwelling population and settlements need to be considered.

Below is a list of negative impacts that are likely to emerge during the course of the project for which mitigation measures needs to be provided in the project.

Table 4-21: Likely negative impacts of the project

Impact	Description
Loss of Households	• Squatters, encroachers and landless labourers living on the agricultural lands that will be acquired. This population will be rendered homeless and have to move from the land in search of alternate place to live and adapt to the new place.
Loss of Livelihood	• Regular source of income of Landowners whose land will be acquired and the landless labourers will be critically affected. • Being unskilled, it will be difficult for the landless labourers to find a job in near vicinity.
Marginalisation	• Relatively well off families in the affected area will lose their economic power gained over a long period. • Individuals will be unable to use their skills (some may be traditional) in the new set up resulting in a loss of human capital. • In the long run, there will be repercussive effects creating psychological stress.
Difficulty in procuring fresh food products	• Families living in the rural areas are used to procure their daily needs, especially vegetables from the fields that will be acquired. • Family expenditure will increase as they will have to depend on other villages for these products.
Loss to access of common property resources	• Families dependant on animal husbandry and related activities will also lose their livelihood as grazing land for animals will be acquired. • There will be some negative impact on the families dependant on common property assets like village ponds, fire wood from fields/ panchayat land etc.
Inflow of Migrant workers	• A conflict might arise among the local workers who would be marginalized due to redundancy of their skill and migrant workers coming from outside and getting employed in JPMIA.
Integration of host population with population in the JPMIA township	• Similar to migrant workers, there may conflict in cultural integration among the native population of the acquired villages and the population in the township who might be from other cultural backgrounds.

Although there will be some negative impact as discussed above, there will be certain positive impacts as well due to the project which will be beneficial for the population in the long run. Positive project impacts anticipated on the affected population has been presented in Table 4-22:

Table 4-22: Likely positive impacts of the project

Impact	Description
Alternate Employment Opportunities	• The proposed project will create alternate employment opportunities for local people in terms of industries, corporate institutions, educational institutions, tertiary service sector and independent small scale enterprises. • The people directly affected by the project due to land acquisition will be provided trainings for skill upgradation that will enable them to be part of the

Impact	Description
	new workforce in the area. • Women will get opportunity for better education and there by opportunity for work in service sector that would emerge in the area.
Increase of Literacy Level	• In the new township, there will be better opportunity for educational institutions like pre-primary, primary, secondary schools and colleges that will give better prospects to the population residing in the area and increase the literacy level. • The adult literacy centres already present will need to revamp their functioning and integrate themselves with the new centres that will be established in the area. It is expected that the overall social awareness in the area that sees a low sex ration will increase with these efforts. • With better education, local people will have better chance for employment opportunities that will be available to them locally.
Skill Development	• With the new industries coming in , there will be development of training and coaching centres for developing the skill of the people as well as creating jobs in the small skilled trade sector.
Public Amenities	• With the new developments the local villages are expected to get the following benefits o uninterrupted electricity due to the proximity of the industries and commercial activities o public toilets o proper garbage disposal system o improved roads and better accessibility o recreational and community centres o water supply o better accessibility to banks and financial institutions
Health Facilities	• With the new developments the local villages are expected to get the following benefits o better health facilities and emergency services due to construction of hospitals, clinics, primary health centre o better outreach services such as immunization, basic curative care services, maternal and child health services and pharmacies to common people. o better access to doctors and medical staff who are usually not available earlier in rural areas.
Women Empowerment	• The project will help emancipate women living in the area by providing them opportunities relating to employability, education and health facilities.
Assistance to Farmers	• Improved agricultural know how and cooperation from high tech institutes in relation to increase of local food production and newer techniques of farming. • Ready markets nearby in the townships for selling of the farm produces. • Better/enhanced return from agricultural products to increase income levels of farmers.
Reduction of Poverty and Community Development	• With the availability of better and diversified employment opportunities, the per capita income of the local population is likely to increase. • Overall improvement in the living standard of the community

4.6 Affected Vulnerable Population

Identification of vulnerable groups in the delineated area is in the process of being done. Vulnerable groups of the population generally relates to the people who are below the poverty line, landless labourers who depend on being employed in the cultivation of fields by the landowners, people belonging to the scheduled tribe and caste category, illiterate men and women, adolescents (both boys and girls) who are school dropouts, senior citizens who avail the old age pension scheme and women who are recipient of the widow pension scheme as they fall between the age group of 45-64 years and belong to the below poverty line as determined by the Government. This group generally forms a part of the sideline of the society and need a lot of empowerment in order to develop their potentials and help them to become active community worker enabling them to be off assistance to themselves and others.

4.7 Inventory of losses to Households

As acquisition of land will be restricted to land holdings in different variation, limited rehabilitation and resettlement of people is expected to take place. However, the few sporadic houses situated away from the villages will have to be acquired. This will bound to cause immense hardships amongst the project affected population.

The socio economic condition of the 9 villages in the delineated area will be partly affected due to the acquisition of cultivable/mono cropped land. This calls for a need to construct a plan for alternate employment opportunities so that the affected population will be able to sustain themselves. A detailed inventory of losses to the households will need to be done so that proper planning of providing compensation can accordingly take place.

4.8 Losses to the Community

As mentioned that the cultivable land surrounding the villages will be acquired but besides this, the common community resources like grazing land for the cattle, small open water bodies around the affected villages, trees near the agricultural land which might act as source for fuel for the villagers, medicinal plants, common wells used for household purposes will also be affected when the acquisition process takes place. An alternate plan needs to be conceptualised so that all these losses can be countered and the community does not get affected significantly.

Chapter 5

Existing Land Use and Infrastructure

5.1 Overview of the Region

Jodhpur-Pali-Marwar Industrial Area is located centrally within the Western Rajasthan region to the west of the Aravalli mountain range, within the Districts of Jodhpur and Pali. The region is named after the two districts and the characteristic and traditional name of the region being Marwar. The region is also a part of the Jodhpur Division in Rajasthan, Jaisalmer, Barmer, Sirohi, Jalore make up the other districts of the Division.

NH-8 (Delhi – Kishangarh) of the National Highway Golden Quadrilateral network (western leg) is an important road which provides connectivity to the JPM Region from Jaipur and Dehli. NH 79 (Nasirabad– Chittaurgarh) provides connectivity from the region to Bhilwara Area. NH 8 (Udaipur – Mumbai)of GQ western leg is an important highway to connect the region to the southern India cities of Ahmedabad, Surat and Mumbai.

The wider region has a varied population base of Rajput, Jain, Vishnoi and many other communities. Both Jodhpur and Pali Districts have a rich and colourful history which is evidently ingrained in modern society. Jodhpur City was founded in the 15th century and was formerly the capital of the kingdom of Marwar, which was ruled by Rathors tracing their ancestral genealogy to Lord Rama[1]. The region has a wide variety of architectural heritage in form of splendid forts, city palaces, Jain temples, havelis, bawdis, etc. People who come from the region are known as Marwaris. Marwaris have been famous for centuries for their entrepreneurial skills and it is estimated that Marwaris control as much as sixty percent of Indian industry[2]. In attaining this position they have often been aided by a local culture of hard work, honesty, business-savvy, a willingness to help other Marwaris and a tradition of family-run businesses.

Jodhpur City is the only major urban centre existing within 100sq.km of the proposed Industrial Area. Pali is the next level urban centre located at 70 km from Jodhpur on national highway NH-65. A smaller town, Sojat, is also roughly 70km from Jodhpur along SH-58. Both Sojat and Pali are along NH-14, the major inter-regional road corridor the region which shall connect to JPM IA via Pali. Other urban agglomerations also exist as a result of outgrowths from existing settlements such as railway colonies, university campuses, military zones and industrial areas. The remainder of the region comprises dispersed village settlements of varying sizes. Rural, sparsely populated settlements are scattered throughout the region.

[1] *Khullar, 2008.*
[2] Hardgrove, 2004.

Jodhpur and Pali are major trade centres and the respective district headquarters. The people of Jodhpur and Palialso have a long tradition of artisan craftsmanship, and the area is renowned for its wooden furniture, carpets, blue pottery and other handicrafts. The locals are also famed for their skills in various facets of design, having mastered a vivid colour palette and having developed a style of garments (especially the Jodhpuri suit for Men and Bandej Sari for Women)that has become both world-famous and synonymous with the city of Jodhpur. This design heritage finds expression today in some of Rajasthan's major exports, such as Zari embroidery and various kinds of artistic prints. The local art forms are characteristically named Marwari art and handicrafts.

Pali is a small industrial town strategically located at the intersection of NH65 and NH14. The city has a good industrial base in the dyeing industry, textiles, henna, handicrafts and building materials. NH-14 connects Pali to Bar, Beawar, Ajmer and Jaipur in the north and Sumerpur, Udaipur in the south. Marwar Junction is a small but important railway node located 40km by road east from Pali Town and is the proposed DFC station for the region.

Jodhpur is 90km from Marwar Junction, connected through an almost straight SH-61. Marwar Junction's strategic location will be greatly enhanced with the arrival of the DFC. Almost 200 km of the 1484 km-long high speed rail link will pass through Pali district. The arrival of the DFC will spur development in the region, and is a major reason for the proposed founding of JPM IA. A major objective of these planned developments will be to achieve balanced regional development and to eradicate the disparities between the Western and other parts of the State.

Jodhpur City

Jodhpur city is now the second most significant city in Rajasthan after the state capital of Jaipur. Jodhpur is the legal capital of Rajasthan with both the Rajasthan High Court and the internationally known National Law University (NLU) located there[3].During recent years, there have been major social and physical infrastructural advancements in the city. Various proposals already planned as per Jodhpur Master Plan- 2023 have been considered for detailed analysis. Major institutions like the High Court, Association of Indian Institute of Medical Studies (AIIMS) (under construction), University for Ayurvedic Research, Biological Park, a sub-regional science centre, Physiotherapy College, National Institute of Fashion Technology (NIFT) and Indian Institute of Technology (IIT), have either been commissioned or

[3] PDCOR Ltd, *City Development Plan Jodhpur Final Report, Vols I & II,* 2008.

are already operating. Such initiatives are set to boost the city's social infrastructure as well as have a strong regional impact.

Jodhpur City lies near the geographic centre of Rajasthan state, which makes it a convenient base for travel in a region much frequented by tourists. Jodhpur city is governed by a Municipal Corporation which comes under the Jodhpur Urban Agglomeration. It is the second largest city in Rajasthan and one of the state's thriving tourist destinations, known famously for its sunny weather and blue painted vernacular housing around the magnificent Mehrangarh Fort. The old city circles the fort and is bounded by a wall with several gates. However, the city has expanded greatly outside the wall over the last few decades. The dominant pattern of this growth has been in a linear alignment from the south west to the north east, largely a result of physical constraints, namely the rocky and hilly lands to the immediate northwest of the city, and the airport and restricted military zone to the southeast.

Jodhpur is the divisional and district headquarters. It has a Collectorate, High Court, Jodhpur Development Authority, Nagar Nigam, Town Planning Department, PWD, NHPWD, RIICO, District Industries Commission and Public Health Engineering Department, and other services including SRSAC, DISCOM, RVPNL, etc.

Key location and population data for Jodhpur City is as follows:

Coordinates:	26.28°N 73.02°E
Mean Sea Level:	231 m
Area:	1,875.52sq.km
Population:	1,033,918 (Provisional 2011 Census figure)

As illustrated by the figures below, Jodhpur is a low-rise, compact city with a vivacious mix of architectural styles and street life.

Further analysis on Jodhpur City is provided in the review of the Jodhpur City Development Plan and Jodhpur City Master Plan in later sections.

Pali Town

Pali town is located approx. 20km from JPM IA and is the administrative headquarters of Pali District. It has a Collectorate, Nagar Parishad, Public Works Department, RIICO office, District Industries Commission and Public Health Engineering Department, amongst others. The town is situated immediately north of the River Bandi at the intersection of NH-65, SH-67 and NH-14. The town has expanded along SH67 and NH14 and from NH65 to NH14. Pali is

strategically located with good connectivity to Jaipur, Kishangarh, Ajmer and Beawar through NH-14 and with Jodhpur through NH-65. SH-67 connects Pali to SH-61 at Sardar Samand. All these major axial routes through Pali have caused growth of the town in these directions, thus giving it an 'amoeba' shap3.

Pali remained a part of the Marwar kingdom until independence in 1949. The town is famous for its textile industries, with cotton and synthetic clothes and yarn exported to throughout India and abroad. More recent established industries include marble cutting/finishing, stone crushing and cement production. The biggest cotton mill in Rajasthan, Maharaja Shree Umaid Mills, is located in Pali Town, employing 3,000 workers[4].

Key location and population data for Pali town is as follows:

Coordinates:	25.77°N 73.33°E
Mean Sea Level:	231 m
Area:	1,680.21
Population	307,412

Sojat

Sojat is a small town located about 60km from JPM IA (as the crow flies), south of the Sukri River. It is surrounded by abundant farmlands, mainly comprising henna plantations. The town is located along NH14 and is highly accessible to surrounding areas with its radial pattern of roads. The town, (formerly known as Tamravati) has a somewhat organic yet compact urban pattern, somewhat enclosed by the Sukri river to the northwest and small hills to the east and southeast. Industrial areas like Sojat City are generally located to the east of the town. An airstrip is located also to the east of the town, which provides for specialised air passenger travel, such as VIPs.The town contains an old fort with a big reservoir and several temples like Sejal Mata, Chaturbhuj. There is also an old temple of Chamunda Mata situated on top of one of the hillocks. As Sojat city is the headquarters of Sojat Tehsil of Pali District, it is expected to establish itself as a major trade and business centre by the year 2031.

Marwar Junction

Marwar Junction, the site of the region's DFC station, has grown up as a railway colony and is characterised by organic urban growth either side of the railway line and beside SH-61, which leads to Jodhpur. The station will be expanded to accommodate a new rail interchange with the coming of the DFC rail alignment and double tracking of the Jodhpur to Marwar Feeder Line.

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[4]http://en.wikipedia.org/wiki/Pali,_Rajasthan#Geography

Village Settlements

The pattern of villages is relatively consistent throughout the region. However, a more concentrated clustering of smaller villages occurs west of the railway line within Marwar Junction Tehsil. This settlement pattern is presumably as a result of the change to the physical landscape (slope, drainage, etc.) arising from proximity to the Aravalli Mountain Range. Apart from this feature, there are no major discrepancies in village pattern and distribution throughout the region.

5.2.1 Regional Existing and Proposed Industrial Development Activities

Major industrial areas within the region have been comprehensively studied and mapped and are presented in the *Site Selection, Area Delineation* Report for JPM IA. Smaller scale artisan clusters are presented in the table below.

Table 5- 1:List of small and medium scale industries existing in the Region

S. No.	Type of Artisan Cluster	Tehsil	Location of Artisan Clusters
1.	Embroidered and Crocheted goods (AaraTari work)	Pali	Kherwa
		Sojat	Dhakri
		Marwar Junction	Banta, Jojawar
2.	Leather Crafts (Leather Jutti, Leather Embroidery)	Pali	Gundoj
		Sojat	Bagri, Sojat City, Sojat Road
		Marwar Junction	Auwa, Banta, Jojawar
3.	Carpet, other floor coverings	Rohat	Diwandi
4.	Handloom weaving crafts (Khes, Twal, Pattu, Gamchha)	Sojat	Sojat
5.	Mehandi	Sojat	Sojat
6.	Stone Processing	Jodhpur	Jodhpur, Mandore
		Luni	Kankani
7.	S.S. Patta Patti/Utensils	Jodhpur	Jodhpur
8.	Guar Gum	Jodhpur	Jodhpur
9.	Assorted Handicrafts	Jodhpur	Jodhpur, Boranada

Within Jodhpur District there are a sizeable number of engineering industries and other industrial units engaged in manufacturing of cement, industrial gases, textiles, derivatives of Guar gum, chemicals, plastics, electronics, electrical, leather works, and mineral-based goods. Also well known in the district is the handicraft industry, of which, there are over 500

handicraft manufacturing and exporting units providing employment to about 200,000 people in Jodhpur. Also present are Handicraft units engaged in production of white metal, wooden toys, decorations, as well as a large number of artisan-based industries engaged in screen printing of cloth, shoe embroidery, dyeing and the printing of clothes. Jodhpur is also a prominent manufacturer and exporter of furniture in the state.

There are approximately 1,192 agro-based units in Jodhpur District. Primarily these include jowar, bajra, chillies and guar gum and have led to the establishment of a number of food processing & beverage units. A 60 acre (24 ha) spice-processing park opened in 2012 at Rampura Bhatiyan village in Osian Tehsil. The industry has helped bring prosperity to the villages and increase production and income as well as absorb surplus labour in the area. The district has traditionally witnessed activity in the basic metals manufacturing segment, owing to synergies with other prevalent industries in the district such as stainless steel utensils, furniture, electronics and electrical machinery etc. There is a stainless steel re-rolling cluster in Jodhpur with approximately 150 stainless steel units that produce more than 28,000 MT of Stainless steel sheets. The production capacity of stainless steel utensils factories that use these sheets is 1500 MT per month. As per the Industrial Potential Survey 2011-12, Jodhpur district currently has 24,388 registered industrial units.

5.2.2 Existing and Proposed Industrial Activities within Jodhpur District

Currently, RIICO is responsible for developing and managing the industrial estates in the district. Listed in the table below are the existing RIICO estates that currently provide approximately 2,080 acres of industrial land. Of the 21 existing RIICO estates in the District, most have full occupancy. This reflects the current lack of industrial space in the District. The annual allotments from RIICO have ranged between a meagre 1.15-9.86 acre per year over the 5 years between 2005-06 and 2009-10 due to non-availability of adequate industrial land.

Table 5- 2: Existing RIICO Estates in Jodhpur District (as of June 2012)

	Name of Industrial Area	Year Developed	No. of Plots Planned	Planned Area (acre)	No. of Plots Allotted	Allotted Area (acre)
1.	Basni - Phase I	1980	96	74.32	96	74.32
2.	Basni - Phase II	1981	752	530.16	751	529.52
3.	Mandore	1991	287	133.74	228	112.99
4.	Bhagat Ki Kothi	1979	12	2.95	12	2.95
5.	Phalodi	1982	123	71.97	123	71.96
6.	Khichan	1978	64	17.30	64	17.30
7.	Mathania	1987	102	27.89	102	27.89
8.	Boranada - Phase I	1991	129	49.74	129	49.74
9.	Boranada - Phase II	1992	137	75.87	102	63.23
10.	Boranada - Phase III	1999	242	102.55	241	101.34

	Name of Industrial Area	Year Developed	No. of Plots Planned	Planned Area (acre)	No. of Plots Allotted	Allotted Area (acre)
11.	Boranada - Phase IV	2006 & 2008	352	209.14	351	208.84
12.	E.P.I.P.	2003	286	113.41	272	106.48
13.	S.E.Z.	2006	289	109.21	144	51.47
14.	Food Park	2005 & 2008	318	155.24	318	155.24
15.	Stone Park, Mandore	2006	77	27.81	76	27.44
16.	Pal Shilp Gram	1994	402	22.04	338	19.29
17.	New Jodhpur		74	18.59	74	18.59
18.	Basni - Phase I – Electrical, Handicrafts	1980	46	1.67	43	1.55
19.	Transferred Industrial Area	1979				
	Industrial Estate		85	9.5	85	9.5
	Heavy Industrial Area		160	150.55	160	150.55
	Light Industrial Area		68	53.10	68	53.10
	B.N.P.H. Industrial Area		118	57.36	118	57.36
	Elec Complex / LIA		34	1.45	34	1.45
20.	Mini Growth Centre (Sangariya - Phases I & II)	1998-99	597	57.17	596	57.08
21.	Cyber Park		7	3.90	7	3.90

Source: RIICO

Special Economic Zones (SEZs) are specially designated administrative enclaves with special government incentives available to companies for the purpose of industrial, service and trade operations. They provide exemptions from customs duties and a more liberal regime in respect of other levies, foreign investment and other transactions. To eliminate domestic regulations, restrictions and infrastructure inadequacies a number of SEZs have been set-up in Rajasthan, including one at Boranada.JPM IA shall be developed in part at least as an SEZ.

An Agro Food Park was also established at Boranada in 2005, with further expansion undertaken in 2008. Most of the plots in the park (including the extension) have been allotted. A Stone Park has been established at Mandore on the main NH-65 (Jodhpur – Nagaur Road). Of the 77 plots planned here (1,000-1,500 sq.km each), 76 have been allotted. Additionally, 55 of the units are now in operation with a further 12 units are under construction.

RIICO has planned the following new industrial estates –

- Near Kankani (Luni) on Jodhpur-Pali Road (NH-65) - Here a total of 1,167.48 hectares area has been demarcated by RIICO for the development of an industrial area. The acquisition process of this land is currently underway.

- Another industrial estate is planned at Tiwri in Jodhpur District, where approx. 751 bighas (or approx. 300 acres) of government land has been identified for transfer to RIICO for the development of an industrial area. RIICO plans to commence allotment in this area by 2013.

5.2.3 Existing and Proposed Industrial Activities within Pali District

Pali district is famous for a range of products, including mehandi udhyog (Sojat), umbrellas and electronics (Falna), bangles, guar gum (Pali), agricultural implements (Rani) and aluminum foils (Pipaliya). However, it is perhaps best known for its textile industries related to handloom, dyeing and the printing of cloth. Established 1940 the 'Maharaja Shri Umaid Mills' is one of India's biggest composite textile mills, and is located in Pali Town. It processes various materials such as cotton, yarn and rubia. Pali town is the main centre for industries in the district followed by Sumerpur Town. The total number of industries in the district is 13,026 of which only 6 are medium/large scale industries, with the balance 13,020 being small scale industries (SSI). The SSI sector in Pali employed 46,639 people in 2010.[5]

Textile dyeing, printing, bleaching and processing are the most prominent traditional industries in the district. The water in the district and the weather conditions are said to be very conducive for colour fastness and colour matching. Good quality dyed and printed textiles are marketed from Pali throughout India. Other industries in the district include leather work and smithies, agricultural instruments, chemical production, construction based industries, cement (Portland), mineral based units, such as stone crashers, production of edible oil, engineering goods (incl. ACSR conductors), steel furniture, medicines, guar gum, pesticides, steel furniture, umbrellas, wire netting and mehandi. The growth of the mineral based industries is being driven by an abundance of mineral resources available in the district. Bali, Rani, Desuri and Falna to the south of the district have clusters of light engineering industries, and the district possesses clusters of screen-printing industrial units. Bilara (which also has a spice mandi) has spice-related and cumin processing units.

Pali District is rich in mineral resources, and this has led to the development of a number of mineral-based industries in the area. Ambuja cement and Ras Cement unit of Shri Cement established units in Jaitaran due to the abundance of limestone in the region. Increasingly, industries based on lime, hydrated lime, granite, stone cutting & polishing stone crusher and mineral grinding are also setting up base here.

Within Sojat Tehsil, soil conditions in the district are ideal for growing mehandi and as such, its cultivation of is prominent throughout the area. There are about 70 units involved in the

[5] *Industrial Survey 2011-12*, District Industries Centre, Pali, Rajasthan, 2012, pg. 4

manufacturing of mehandi with an investment of about INR 133 lakhs. A number of furniture units are present in Rani, Sumerpur and Falna. Steel cots, chair manufacturing and agricultural implements i.e. pickaxes, shovels and spades are marketed throughout the country and also exported to Dubai, Jeddah and USA.

As per the Industrial survey of Pali for 2011-12, there are currently 17 industrial areas in Pali managed by RIICO providing a total of 2,346.91 acres of industrial land. Pali district has also been chosen for the establishment of Jodhpur-Pali-Marwar zone 'National Manufacturing & Investment Zone' under the NMIZ Policy. For this the District Industries Centre, Pali has been appointed as the nodal agency. The table below shows that during the period between 1985 and 1996 there was a lull in the development of industrial areas promoted by RIICO. It also shows that of all the existing/established RIICO units very few have any remaining plots available, reflecting saturation in the market for industrial real estate in the District. In this respect the situation is similar to that in Jodhpur District.

Table 5- 3: List of RIICO development industrial estates in Pali District

S.No.	*Name of Industrial Area*	*Year Developed*	*No. of Plots Planned*	*Planned Area (acre)*	*No. of Plots Allotted*	*Allotted Area (acre)*
1.	*Pali Phase I*	*1971*	*71*	*18.40*	*67*	*16.88*
2.	*Pali Phase II*	*1975*	*124*	*68.19*	*124*	*68.19*
3.	*Mandia Road*	*1978*	*528*	*265.38*	*524*	*262.65*
4.	*Pali Phase IV*	*1985*	*210*	*73.73*	*197*	*62.44*
5.	*Sojat City Phase I/II*	*1971*	*39*	*11.55*	*39*	*11.55*
6.	*Sojat Phase III*	*1975*	*139*	*40.34*	*129*	*37.33*
7.	*Marwar Junction*		*40*	*7.52*	*40*	*7.52*
8.	*Sumerpur*	*1981*	*148*	*44.20*	*134*	*39.78*
9.	*Pipliya Kalan*		*10*	*4.23*	*9*	*3.81*
10.	*Ind. Estate Pali (transferred area)*		*38*	*2.21*	*38*	*2.21*
11.	*Ind. Estate Sumerpur (transferred area)*		*70*	*21.78*	*70*	*21.78*
12.	*Ind. Area Bar*		*46*	*16.44*	*28*	*11.17*
13.	*Falan – Zadri*		*308*	*60.30*	*182*	*47.07*
14.	*Punayats, Pali*		*333*	*140.50*	*270*	*118.83*
15.	*NayaGoan*	*2012*	*448*	*167.69*	*2*	*0.50*
16.	*Rabriyawas (M/s Gujarat Ambuja Cement)*	*1996*	*1*	*875.23*	*1*	*875.23*

Source: RIICO

Apart from the RIICO industrial areas, there are also 3 industrial estates in the district in the private sector at Falna and Rani. In Falna, the estate was developed by a joint stock company and this estate was assisted by the Life Insurance Corporation of India and the state

government. At Rani and Jawaria the industrial estates have been organized on a cooperative basis.

Table 5- 4: Existing private sector industrial estates in Pali District

	Name of Industrial Area	Managing Agency	No. of Plots
1.	Harish Chandra Mathur, Industrial Estate, Falna	Falna Industrial Association	169 (35 vacant plots)
2.	Cooperative Society, Rani	Cooperative Society, Rani	50
3.	Laxmi Industrial Estate Cooperative Society Limited, Jawaria, Pali	Laxmi Industrial Estate Cooperative Society Limited, Jawaria, Pali	72

Source: RIICO

Figure 5- 1Sample existing/upcoming industrial areas in Pali Town and nearby areas
Clockwise from top left: Infrastructure set up by RIICO at Nayagoan Industrial Area; Cargo entering Punayata Industrial Area; New construction along Bandi River; textile-related activities south of Pali town

Naya Gaon is a new industrial estate recently developed by RIICO and allotment of the 448 plots is currently underway in this area. This area is being established for the powerloom industry. In view of the fact that the district has a spinning mill and a total of approximately 900 units engaged in textile related operations (the grey cloth for which comes from the power looms of Maharashtra and other cities) Pali requires 180 crore meters of grey cloth. The powerloom industry in Naya Gaon will reduce the textile industry's reliance on imports from Maharashtra.

Next Gen Textile Park Pvt. Ltd (NTPL) is a Ministry of Textiles-approved eco-friendly integrated textile park of over 40 ha (100 acres)currently under construction just north of Pali Town along SH-67, which will be a private industrial park focused on the textile industry. There are expected to be almost 80 weaving, knitting, dyeing, printing, embroidery and garmenting industrial units in the park along with Exhibition and Convention centre, testing centre, training centre, warehouse facilities and a common effluent treatment plant.

Due to the continued demand from various industries, RIICO is planning a new industrial estate in the Rohat area in Kharabera and Purohitan villages, just north of the road between Rohat village and Rohat train station. Approximately 2,200 bighas (550 ha) is currently under consideration for industrial uses. RIICO has already started land acquisition in the area, which is expected to be completed by 2013-14. Part of the identified land is under government ownership (approx. 900 bighas (225 ha)) and the process of transfer of this land to RIICO is also underway. According to RIICO the area has a good scope for setting up mineral based, cattle feed, gypsum based and oil based units. Gypsum is also available in large quantities in the Rohat region.

Other upcoming RIICO estates in Pali District include Jaitaran, Rani and Bali. The development in Jaitaran, northeast of Sojat, is motivated by the substantial availability of limestone in this area. Consequently the area has the potential to support kiln hydrated lime and cement units. Rani is thought to be suitable for oil-based and cotton-ginning units, along with stone/marble and steel furniture units. Its proximity to Falna railways station will benefit any industries developed in this area.

5.2 JPM IA Administrative Context

The JPM Region comprises two Districts of Rajasthan, one of which, Pali District, contains the DFC Station that will serve Jodhpur-Pali-Marwar IA, namely Marwar Junction; and the other, Jodhpur District, contains Jodhpur City, and is adjacent to Pali District.

The location of the proposed Notified Area withinPali District and Jodhpur Division is presented in the map below.

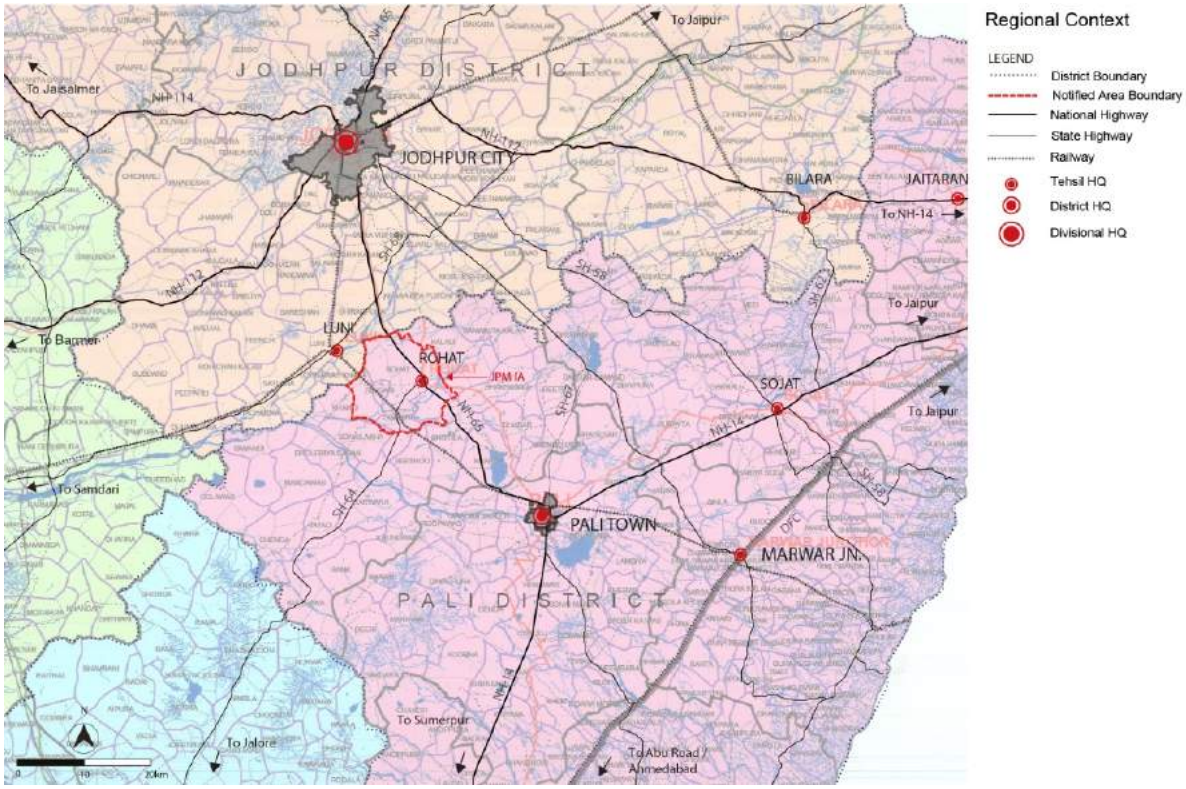


Figure 5- 2: Administrative structure of the JPM IA region

The approved location for JPM IA is at Rohat, one of nine Tehsils in Pali District. The Rohat Tehsil is composed of 80 villages and the notified area of the IA covers 9 of those villages, including Danasani, Dhundhli, Doodali, Dungarpur, Dalpatgarh, NimbliPatelan, Nimbli Brahmnan, Rohat, and Singari.

The nine villages that have been selected for the JPM IA within Rohat Tehsil are presented in the figure below. Break up existing land use of JPMIA villages is presented in the table 5-5. There is no land in the JPM IA under the category forest land and land under miscellaneous Tree Crops etc.

Table 5- 5: Existing Land Uses of JPM IA Notified Area Villages

S. No.	Name village	Administrative Area(Ha)	Area under Non-agricultural Uses (Ha)	Barren and Un-cultivable land(Ha)	Permanent Pastures and Other Grazing Lands	Culturable Waste Land (Ha)	Fallow lands other than current fallows (Ha)	Current Fallows (Ha)	Net Area Sown (Ha)
1	Dungarpur	1,902.00	81	68	71	56	129	50	1447
2	Singari	2,054.00	51	129	93	139	199	255	1188
3	Dhundali	761.52	50	35	41	56	47	37	495.5
4	Doodali	1,653.00	22	63	121	59	171	182	1035
5	Neembli Patelan	1,385.17	52	60	48	35	48	19	1123.2
6	Nimbli Brahmnan	1,353.14	56	55	100	95	296	41	710.1
7	Danasani	693.00	79	76	38	18	90	90	302
8	Rohat	4,394.44	278	325.9	278.1	525.8	256.8	582.8	2146.9
9	Dalpatgarh (part of Rohat in 2001)	1240.99	63.1	9.1	108.8	98.2	34.9	337.1	589.8
	Total	**15437.26**	**732.1**	**821**	**898.9**	**1082**	**1271.7**	**1593.9**	**9037.5**

Source: Census of India, 2011

5.3 Existing Settlement Pattern and Activities

The existing population of the site and surrounding area is largely concentrated into small villages, leaving vast tracts almost unpopulated. The settlements are more common in the strategic area between the rail line and NH-65. In terms of physical size as well as population, Rohat village is the biggest settlement, which had a population of 6,980 in 2011. Population distribution for the IA notified area is presented in the Table 4-1 of Chapter 4.

5.4 Existing Land Use and Development Activities

Existing land use within the 154.37sq.km Notified Area boundary is predominantly rural agricultural or un-developed waste/barren lands. Pockets of residential housing plots can be seen scattered along SH-64. A much larger collection of residential housing plots is located at the northern periphery, outside the proposed development area. Seasonal water bodies are also loosely distributed throughout the Area, often linked to the small village settlements. A few minor industrial development activities are located adjacent to Rohat Railway Station and to the north along SH-64. This amount to isolated development plots with single users. The existing land use situation is illustrated in the Annexure I of the Master Plan.

The current land use situation within the proposed JPM IA Notified Area is presented in the figure below. The proposed IA development zone falls within the dashed red line. The location of villages and significant development activities can be seen on the following reference map.

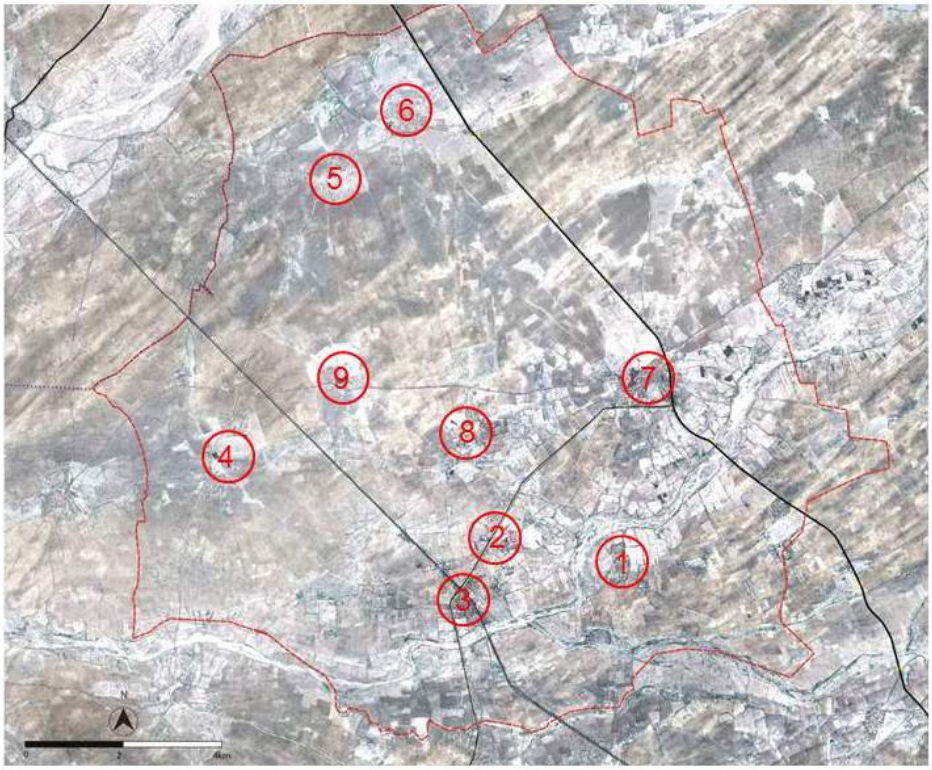


Figure 5- 3: Study of existing settlements and activities – reference map

The locations of existing settlement and major development activities are numbered as follows:

1. Danasani Village;

2. Small-scale industrial activity along SH-64 close to Singari Village;

3. Singari Village at Junction of SH-64 and Railway Line;

4. Dungarpur Village south of Railway;

5. Nimbli Patelan Village;

6. Nimbli Brahmnan Village close to NH-65;

7. Rohat Town;

8. Dhundhli Village;

9. Doodali Village.

10. Dalpatgarh Village

Depending on their location some villages and development activities are of varying significance in terms of posing a constraint to development. They are described individually below.

1) Danasani Village

Danasani Village has a recorded area of 693ha with approx. 20ha of developable government-owned land[6]. The village has the lowest population within the Notified Area (572 inhabitants). It is also outside the proposed development area. It shall be protected as appropriate with strict planning controls in accordance with the permitted uses under the 'peripheral control belt' zoning.

Figure 5- 4:Danasani village as existing southeast of Redia Nadi

2) Small-scale industrial activity along SH-64 close to Singari Village

This is one of the few existing small-scale industrial activities currently active within the notified area. The development is illustrated in the figure below.

[6]The developable government land mainly includesRainfall Dependent Land and Waste Lands.

Figure 5- 5:Small-scale industrial activity along SH-64 close to Singari Village

Figure 5- 6:Image of small-scale industrial activity along SH-64 close to Singari Village

The development does not pose as a major constraint to the proposed JPM IA and in fact can complement the early phase target industries in building materials.

3) Singari Village at Junction of SH-64 and Railway Line

Singari Village has a recorded area of 2,054ha – the second largest administrative area after Rohat – and contains approx. 168ha of developable government-owned land. Singari Village has a medium sized settlement which is located in a highly strategic part of the notified area, just south of the intersection of SH-64 and the Jodhpur to Marwar DFC Feeder Line. The main settlement is nestled between the two linear transport corridors, just south of the junction

which is a level crossing. Some settlement occurs to the north of the railway line east of SH-64. The remainder of the settlement amounts to a few scattered dwellings and small-scale industrial activities to the west of the road and south of the railway, as indicated in the figure below. While the main village settlements east of SH-64 can be protected and integrated as an Abadi Development Area, the scattered settlement to the west is likely to require redevelopment due to the strategic nature of these lands and the decision to locate the MMLH in this area.

Figure 5- 7:Singari Village at Junction of SH-64 and Railway Line

Figure 5- 8:Traffic queuing to cross the railway at SH-64 junction (north side)

4) *Dungarpur Village south of Railway*

Dungarpur Village has a recorded area of 1902ha with approx. 133ha of available government owned lands. The village has a total population of approx. 1,500 inhabitants. As it falls outside the intended development area, it shall be protected as appropriate with strict planning controls in accordance with the permitted uses under the 'Peripheral Control Belt' and / or 'Abadi Development Area' zoning. The two main settlements that comprise Dungarpur Village, together with associated village attenuation ponds, is presented in the figure below.

Figure 5- 9:Dungarpur Village settlements southwest of Railway

5) *Nimbli Patelan Village*

Nimbli Patelan Village has a recorded area of 1,385.17ha with approx. 85ha of developable government-owned lands. The village settlement is located just south of the Jodhpur-Pali district border. It has a total population of 1,318 inhabitants. The village shall be protected as appropriate with strict planning controls in accordance with the permitted uses under the 'Peripheral Control Belt' and / or 'Abadi Development Area' zoning. The main settlement of Nimbli Patelan Village, together with associated village attenuation pond and grazing lands to the south, is presented in the figure below.

Figure 5- 10: NimbliPatelan Village

6) Nimbli Brahmnan Village close to NH-65

Nimbli Brahmnan Village has a recorded area of 1,353.14ha with approx. 171ha of developable government-owned land. The village settlement is located to the west of the NH-65 corridor just south of the Jodhpur-Pali district border. It has a total population of 1076 inhabitants. The main village settlement is adjacent to the northernmost part of the intended urban development area. As such it shall be protected as appropriate with strict planning controls in accordance with the permitted uses under the 'Peripheral Control Belt' and / or 'Abadi Development Area' zoning. The village settlement and surrounding area is presented in the figure below.

Figure 5- 11: Nimbli Brahmnan Village close to NH-65

7) Rohat Town

Rohat Town is by far the largest settlement in the Notified Area and is also the Tehsil Headquarter. It has a recorded area of 4,394.44ha with approx. 453ha of developable government-owned lands. The main urban settlement is located mostly to the west of NH-65, just north of the junction of NH-65 and SH-64. It has a population of 6980inhabitants, more than three times larger than the next biggest settlement. Rohat Town shall act as an important node during early phase development and will likely receive significant development pressure, as the infrastructure for JPM IA is rolled out. The settlement will be eventually surrounded by new development on three sides, as it is adjoining the proposed development area. Adequate buffer areas shall be designated to protect the integrity of the existing town and its inhabitants from encroachments and other disturbances which may arise as a result of the proposed industrial activities. As such it shall be protected as appropriate with strict planning controls in accordance with the permitted uses under the 'peripheral control belt' and/or Abadi Development Area zoning.

The village settlement and surrounding area is presented in the figure below.

Figure 5- 12:Rohat Town and surrounding context, including low lying lands to the north which shall be protected from development

8) *Dhundhli Village*

Dhundli Village has a recorded area of 761.52ha, the second smallest of the 9 Notified Villages. It has an approx. area of 76ha of developable government-owned lands. The village settlement is located centrally within the Notified Area between the railway line andSH-64. It has a population of 678 inhabitants, the second lowest of all villages in the Area. The northernmost part of the village settlement falls adjacent to the proposed main internal freight corridor linking the IA to the MMLH. Careful planning shall be required in consultation with local stakeholders to ensure minimum disruption to the villagers and adequate protection through appropriate mitigation measures. All parts of the village settlement and associated grazing lands shall be protected insofar as possible with strict planning controls in accordance with the permitted uses under the 'Abadi Development Area' zoning.

The village settlement and surrounding area is presented in the figure below.

Figure 5- 13: Dhundhli Village settlements and surrounding plotted field pattern

9) *Doodali Village*

Doodali Village has a recorded area of 1,653ha, the third largest of the 8 Notified Villages. Like its neighbor Dhundli, it falls completely inside the proposed development area. It has an approx. area of 158ha of developable government-owned lands. It has a population of 1402 inhabitants. The easternmost edge of the village settlement falls only several hundred metres away from the proposed main north-south boulevard / spine road, linking the NH-65 to the

proposed new passenger station and commercial core area. As such careful planning shall be required in consultation with local stakeholders to ensure minimum disruption to the villagers and adequate protection through appropriate noise mitigation measures, etc. All parts of the village settlement and associated grazing lands shall be protected insofar as possible with strict planning controls in accordance with the permitted uses under the 'Abadi Development Area' zoning. The village settlement and surrounding area is presented in the figure below.

Figure 5- 14: Doodali Village and surrounding context with low-lying lands to the north which shall be protected from development

10) Dalpatgarh Village

Dalpatgarh village is by far the smallest settlement in the Notified Area, recently separated from village Rohat. It has a recorded area of 1,240.99ha and main settlement is located mostly along the NH-65, just south of Rohat. It has a population of over 734 inhabitants. As such it shall be protected as appropriate with strict planning controls in accordance with the permitted uses under the 'Peripheral Control Belt' and / or 'Abadi Development Area' zoning. Dalpatgarh is a medium size village located in Rohat of Pali district, Rajasthan with total 129 families residing. The Dalpatgarh village has population of 734 of which 390 are males while 344 are females as per Population Census 2011.

The village settlement and surrounding area is presented in the figure below.

Figure 5- 15: Dalpatgarh Village settlements

5.5 Land Ownership

Analysis of the land ownership situation is complicated by the absence of digitized revenue maps. The following analysis is based on a manual conversion (tracing) of scanned Revenue Maps which were originally prepared in an antiquated manner that pre-dates computerized mapping systems or surveying. An important factor in site desirability is the government land and size of land parcels. It is advantage if large government land parcels available in the region apart from the large private land parcels. This will reduce the land acquisition requirement and few numbers of potential land parcels would be required for acquisition. As regards this factor, then, the latter area is a relatively desirable area to site the IA. Based on the available revenue maps, Government owned land distribution is presented in the figure and table 5-6. This is further need to be validated by the state revenue department for actual availability on ground.

Table 5- 6: Village areas and associated government land availability

S.No.	Village Name	Area (Ha)	Government Land (Ha)	Government Land (%)
1	Dungarpur	1,902.00	133.38	7.01
2	Singari	2,054.00	168.31	8.19
3	Dhundli	761.52	76.1	9.99
4	Doodali	1,653.00	157.71	9.54

S.No.	Village Name	Area (Ha)	Government Land (Ha)	Government Land (%)
5	Nimbli Patelan	1,385.17	84.69	6.11
6	Nimbli Brahmnan	1,353.14	170.66	12.61
7	Danasani	693	19.86	2.87
8	Rohat	4,394.44	453.07	10.31
9	Dalpatgarh	1240.99	n/a	n/a
	Total (ha)	**15437.26**	**1263.77**	**8.19**

The radial pattern of smaller land parcels centred on Rohat village settlement denotes the local importance of Rohat village settlement as well as the facts that land use conversions and allotments to smaller entities are currently active. Hence it implies that land in the immediate vicinity of Rohat village settlement may prove somewhat more complicated to acquire. Despite this Rohat village having a total area of 43.94sqkmhas about 4.53sqkm of developable government land, one of the highest levels in the notified area. The adjacent villages of Dhundli, Doodali, Nimbli Patelanand Singari to its immediate west also have considerable levels of developable government lands. This, combined with the strategic significance of proximity to the rail line, NH-65 and SH-58, create a strong argument for the IA taking advantage of this location.

5.6 Physical Characteristics

Introduction

Extensive reconnaissance surveys and the processing and analysis of baseline information have been undertaken to map and/or describe the following physical characteristics applicable to the site: Climate, Rainfall & Wind, Natural Drainage Pattern, Geomorphology, Soil, Geology, Areas of Potential Ecological Significance, and Natural Resources. A more comprehensive assessment of the physical characteristics of the region is presented in the "JPM IA Site Selection, Area Delineation Report", prepared separately.

Regional Climate, Rainfall & Wind

The current landscape setting is one that is predominantly flat and dry barren wasteland with very strong sun-light and wide disparity in the presence of green foliage and water bodies between the wet and dry seasons. The area falls under the semi-arid region of the state further characterized by the climatic extremes of the Thar Desert. As such, conditions range from extremes in temperature, uncertain rainfall and dryness, high wind velocity as well as high and low humidity. Winter runs from November to March with temperatures ranging from

9°C to 3°C. This is followed by summer from April to June with temperatures ranging from 26°C - 42°C.

The period from July to mid-September forms the Southwest Monsoon Season. During the monsoon season the humidity normally remains quite high, with averages in the vicinity of 50%[7]. Average monthly rainfall ranges from 100-500mm. Exceptions include floods and drought periods. The site is also subject to Prevailing winds which occur from the south-west in summer and north-east in winter. Hot winds blow during the day, but nights are generally cool and pleasant. The summer wind is more significant and is locally known as the 'Loo'.

Elevation and Slope

The topography of the area is almost flat with most of the area covered by scrub forest and a small proportion of waste land and cultivated land. The highest elevation can be found at the northeast of the site with the lowest elevation at the southwest, as demonstrated in the Annexure-I, which has been adapted from information presented on the Survey of India 1:50,000 sheets. At ground level the site appears very flat. A 10m surface height difference can be observed over an area of approx. 6.5km as noted in the figure below. There are no major rocky outcrops within the notified area, as witnessed elsewhere in the region. Some lower lying lands can be observed close to village settlements where water attenuation ponds are found.

Figure 5- 16: Sandy arid plains within the Region

Natural Drainage Pattern

The topography of the area is almost flat with most of the area covered by scrub forest and a small proportion of waste land and cultivated land. Seasonal water courses – tributaries of the Luni including the Guhiya Nadi, Rediya Nadi, Guhiya Bala and Phunphariya Nadi -- are

[7] *State Environmental Atlas of Rajasthan 2009*

located within the eastern portion of the site. Natural drainage pattern of these tributaries is from the northeast to the southwest and gives assured cultivation due to stored ground water. Kharda Dam is located approx. 15km south of the proposed development area along NH-65 and there is a sluice gate and canal system that utilises water for irrigation from Kharda Lake when available.

Kharda Dam during dry season (March 2013)

Bridge over Luni tributary. Note disused water pipeline north of NH-65 (March 2013)

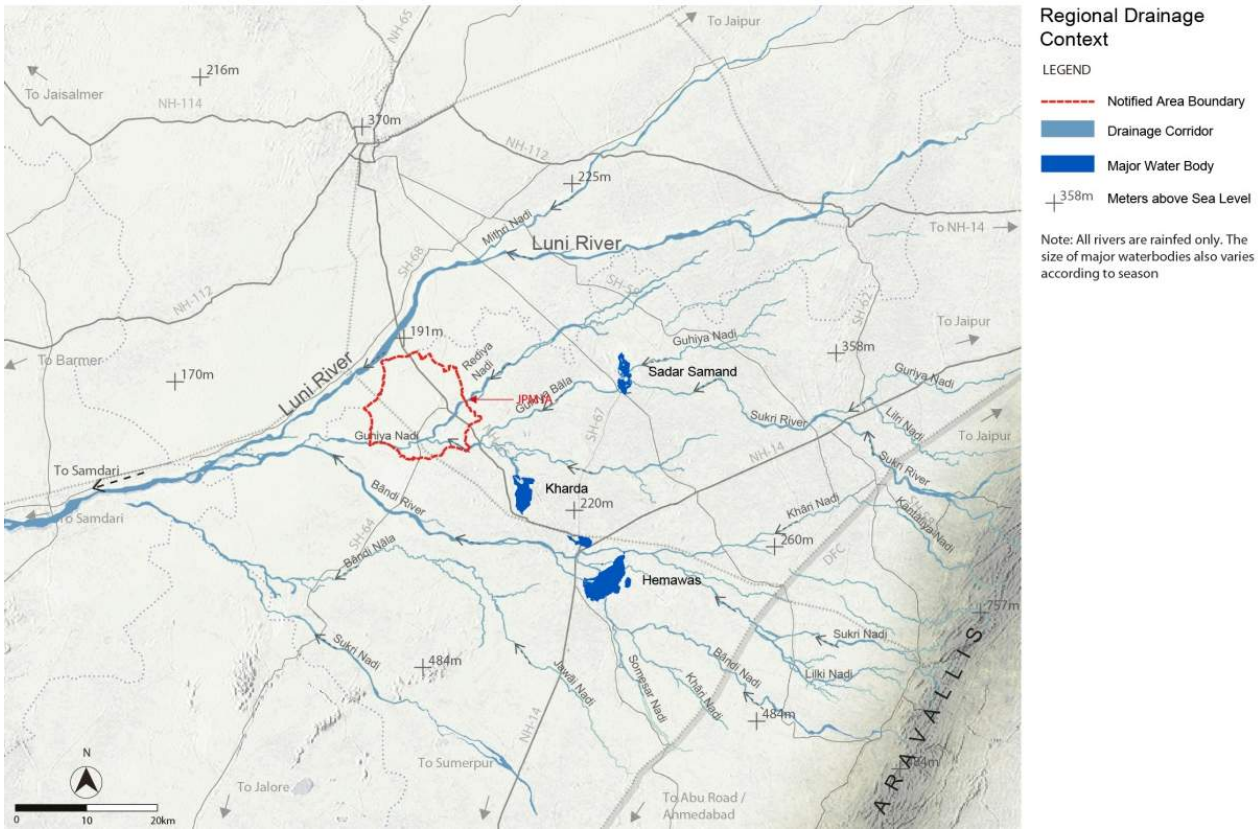


Figure 5- 17: Regional Drainage Pattern within the surrounding JPM IA Region
Source: Adapted from SRSAC Jodhpur, 2012

Water attenuation plays an important role in rural life in the area, affecting the structure of villages. Each village includes a water attenuation zone that is almost the same size of

settlement area to conserve water in monsoon season. This is presented in the diagram below. This water is used mainly for agricultural purposes.

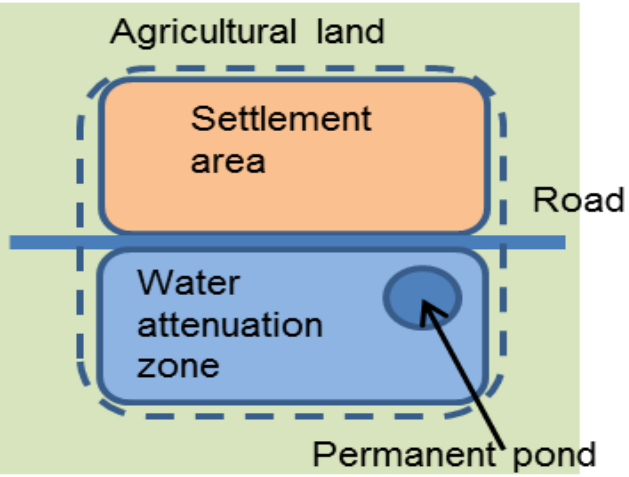


Figure 5- 18:Schematic diagram of village attributes and the integral nature of water as a common spatial element.

The close relationship of village settlements to low-lying land where water attenuates during the Monsoon season is a common feature within the Area and throughout the region.

5.2.4Geomorphology

The IA notified area forms part of the Semi-Arid Transitional Plain which regionally extends from the western edge of Jodhpur City to the foothills of the Aravalli ranges. The terrain is largely comprised of flat alluvial plains and sand dunes which incorporate a mix of barren rocky / stony waste, scrub with forest and seasonal water courses, as presented in the figure below. Small hills are scattered throughout the terrain, which are punctuated with Granite and Rhyolites ranging from 150-300m above sea level.

The northern portion of the notified area is comprised of older alluvial deposits, while the relatively dry creek beds of the Guhiya Nadi, Rediya Nadi, Guhiya Bala and Phunphariya Nadi networks comprise the younger deposits as a result some flow in recent times. Along these flood plains groundwater and fertility prospects may exist within these units.

Geology and Soil

Past alluvial and arid cycles of erosion explain the vast diversity of geological formations in the Region. Within the zone seen in the figure presented below the following metamorphic and igneous rocks may be found: Aravalli group rocks of various types, variegated slates, Phyllitesschists, Argillaceous, Sandstones, Sandquartzites. Soils are predominately

characterized by alluvial sediments derived from the Luni river network as well as those pertaining to the Semi-Arid Transitional plain.

Figure 5- 19:Examples of varying terrain in the Region during different seasons

Natural Resources

Large deposits of limestone can be found in both Pali and Jodhpur Districts. Jodhpur District contains large deposits of sand, chittar stone, brown stone as well as stone slabs used in the construction of buildings. Within Pali district, felspar, quartz, asbestos, calcite, gypsum, white clay and soap stone are primary minerals. Limestone, ryohlite, marble, masonry stone, brick clay, sand and granite are secondary.

Regional Land Utility / Land Cover

Due to the hot dry climate, the available land for cultivation is low. The majority of the land in the Rohat Tehsil is considered 'Land without Scrub'. The total area not available for cultivation within the Tehsil is 3,688 hectares. In addition, there are 19,905 hectares of land that do not receive irrigation. There are also 4,251 hectares of land deemed as 'culturable waste'. With a total of nearly 28,000 hectares being either already developed upon (small proportion considering rural context) or unavailable for cultivation. This leaves a very limited amount of space available for agricultural activity. According to the 2001 census, the total area of the Tehsil is 31,000 ha, which implies that over 80% of total land within the Tehsil is barren, arid, un-irrigated land.

The majority of the notified area is taken up with barren lands. Some isolated pockets of farmlands occur as riverbed cultivation to the north along the Luni River. There are 8 village clusters dispersed throughout the notified area. However, most of the central part of the Area is unsettled and poses no constraint to development.

5.7 Physical Infrastructure

Transport

The JPM Region is well-served by the wider road transport network with both National Highways and State Highways offering connectivity to rest of Rajasthan and to other parts of India. The majority of National Highway sections are standard double lanes or better, whilst most State Highways are currently single-lane. Taking SH-61 as an example, a 90km stretch in Pali district is below standard single lane conditions. It is understood that the upgrade of SH-61 is due to take place this year.

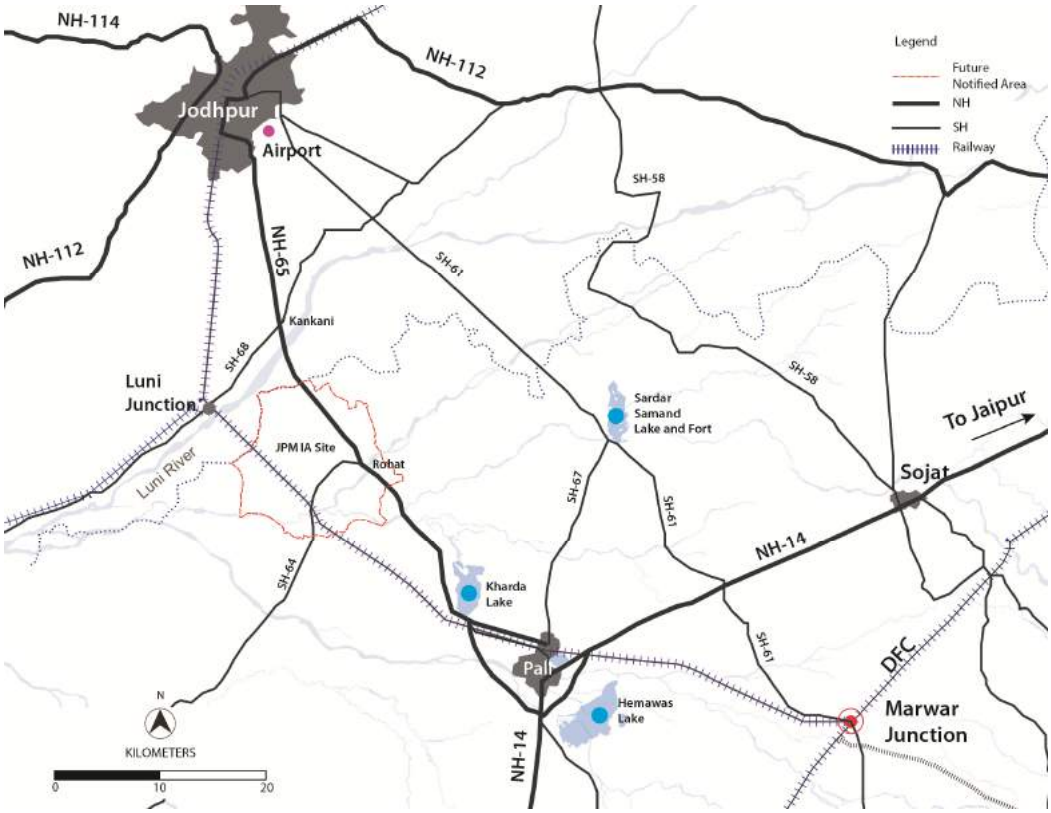


Figure 5- 20: Existing regional road network (refer Existing land use map Annexure-I)

Figure 5- 21: View North along NH-65

Figure 5- 22: SH64 near Mandawas

Figure 5- 23:NH65 north of Rohat village

Figure 5- 24:Proposed DFC Feeder Railway line looking north from level crossing junction with SH-64

Utilities Infrastructure

Power: Three power lines of different voltages run through, to, or near the IA notified area. These include a 220kV line that runs several km northeast of the Area and a 132kV line that runs roughly parallel to the east of NH-65 (approx 1-1.5km away). This 132kV line crosses the NH-65 to the north of the Area near the Luni River. A less powerful line of 33kV also serves the area and has a sub-station in the vicinity of Rohat village. There are proposals for a series of sub-stations for the 132kV line, and for 33kV lines within and approximate to the Area. It is highly likely that all of these proposals will be affected by the development of the IA.

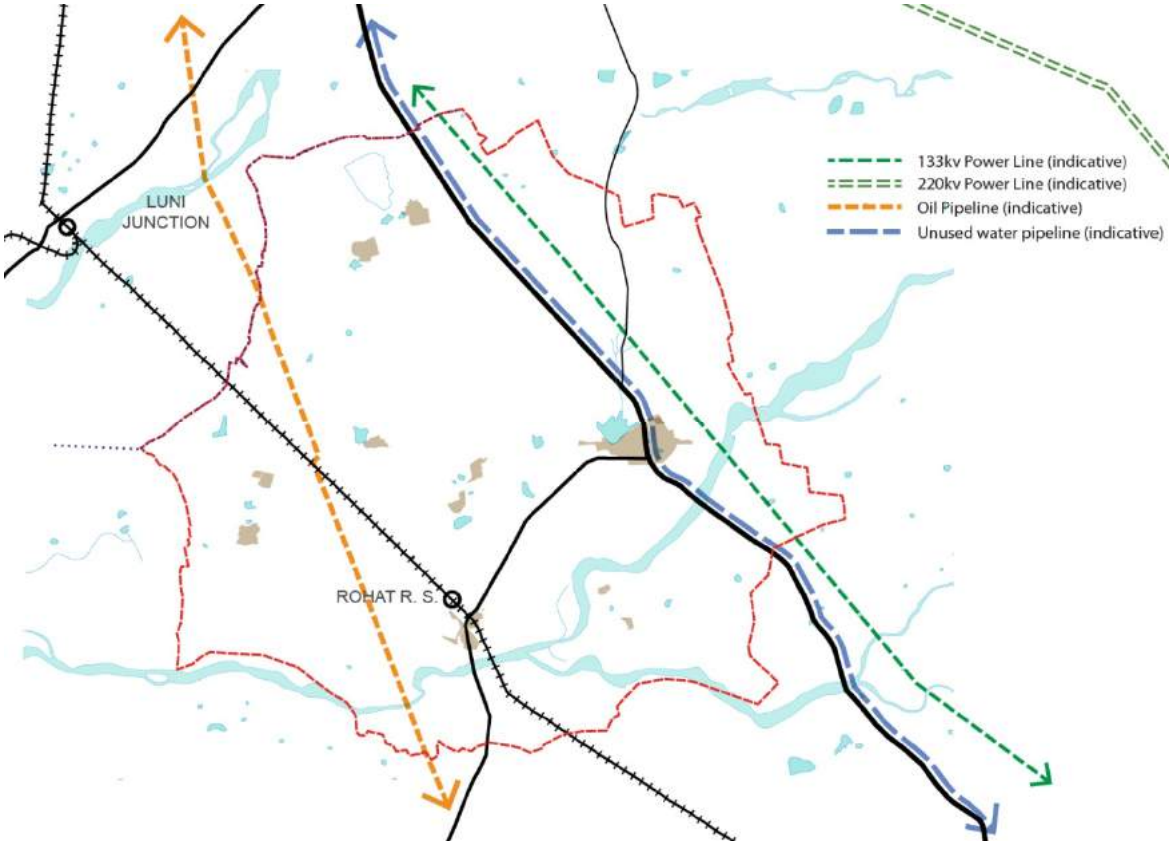


Figure 5- 25:Study of utilities infrastructure (approximate alignments) within and close to the Notified Area

Water

Tributaries of the seasonal Luni River run through the IA notified area. Pali District has two main surface sources of water, Jawai and Hemawas dams, whose capacity total 283.17 MCM. Currently a pipeline carrying water from these dams reaches as far as Rohat village. Previously this pipeline extended north to Jodhpur; however Jodhpur's connection to the Rajiv Gandhi Lift Canal rendered sections of this pipeline superfluous and therefore its use for areas north of Rohat was discontinued in 1998-1999.

Figure 5- 26: Disused water pipeline running parallel to NH-65 through the Notified Area

Wastewater: There are three municipal sewage treatment plants serving Jodhpur City and none serving Pali Town. The towns' sewage collection network covers about 70% of the area in Jodhpur and 80% of the area in Pali. An estimated total of 175 MLD of sewage is generated at present. However only 70 MLD of the total generated quantity is treated. Under the Rajasthan Urban Infrastructure Development Plan (RUIDP), one (1) Sewage Treatment Plant (STP) having a capacity of 20 MLD is operational at Nandini, while another plant of 50MLD capacity, sanctioned under Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT), is operational at Salawas.

There is a proposed treatment facility to be located at Punayata Road (30MLD). There are no tertiary treatment facilities for the existing industrial effluent treatment plants and sewage treatment plants. Tertiary treatments are required for recycling and reuse of effluent for industrial purpose, flushing, irrigation of landscaped areas, parks etc.

There are currently no tertiary treatment facilities for the existing industrial effluent treatment plants and sewage treatment plants. Tertiary treatments are required for recycling and reuse of effluent for industrial purpose, flushing, irrigation of landscaped areas, parks etc. JPM IA is being planned as a model sustainable township with minimum reliance on conventional water supply. To this end it is expected that the industrial demand will be met using tertiary treated sewage as well as treated industrial effluent from existing plants with necessary up-gradation or from proposed new plants.

The Industrial domestic water demand is 45-65 MLD excluding the system losses and the recyclable portion of the water for the design year 2042. It is expected to meet the industrial demands using tertiary treated sewage as well as treated industrial effluent from existing plants with necessary up-gradation or from proposed new plants.

Zero Discharge shall also be achieved with the use of a treated effluent reuse scheme for the region. With tertiary treatment plants in place there shall not be any spillage or disposal to streams.

5.8 Existing Social Infrastructure within JPMIA

The social infrastructure within JPM IA indicates existing development in the area and existing facilitates in the area. An assessment of the existing social infrastructure is presented below:

5.8.1 Existing Educational Facilities

Within JPMIA 8 Pre-primary School, 19 Primary School, 15 Secondary school and 3 Senior Secondary Schools are functional as per census 2011. Most of the Schools are in located in village Rohat. Village wise existing educational amenities are presented in Table 5-7.

Table 5- 7: Existing educational amenities in the JPM IA

S.No.	Name village	Pre-Primary school (PP)	Primary school (P)	Middle school (M)	Secondary School (S)	Senior Secondary school (SS)	Vocational training school /ITI
1	Dungar Pur	1	2	2	0	0	0
2	Singari	1	2	2	1	0	0
3	Dhundali	0	1	0	0	0	0
4	Doodali	1	2	2	2	0	0
5	Neembli Patelan	0	1	1	0	0	0
6	Neembli Bramnan	1	2	2	1	0	0
7	Rohat	3	6	6	6	3	1
8	Dalpatgarh	1	2	0	0	0	0
9	Danasani	0	1	0	0	0	0
	Total	**8**	**19**	**15**	**10**	**3**	**1**

Source: Census of India, 2011

5.8.2 ExistingHealth Care Facilities in JPMIA

In terms of health care facilities within JPMIA, most of them are located in village Rohat. Primary health centre (PHC) is available in Rohat and Dalpatgarh village. Primary health sub centre (PHS) are available in Dungarpur, Singari and Nimbli Patelan. Village wise existing medical amenities are presented in Table 5-8.Nearest government hospitals are available in district headquarters at Pali and Jodhpur. All India Institutes of Medical Science is also located in Jodhpur which is approximately 40kms from Rohat.

Table 5- 8: Number of Medical Amenities located within JPM IA

S.No.	Name village	Community health centre (CHC)	Primary health centre (PHC)	Primary health sub centre (PHS)	Maternity and child welfare centre (MCW)	Hospital-alternative medicine (HO)	Dispensary (D)	Veterinary hospital (VH)	Family welfare centre (FWC)
1	DungarPur	0	0	1	0	0	0	0	0
2	Singari	0	0	1	0	0	0	0	0
3	Dhundali	0	0	0	0	0	0	0	0
4	Doodali	0	0	0	0	0	0	0	0
5	Neembli Patelan	0	0	1	0	0	0	0	0
6	Neembli Bramnan	0	0	0	0	0	0	0	0
7	Rohat	1	1	0	1	1	1	1	1
8	Dalpatgarh	0	1	0	0	0	0	0	0
9	Danasani	0	0	0	0	0	0	0	0
	Total	**1**	**2**	**3**	**1**	**1**	**1**	**1**	**1**

Apart from medical amenities, some Non-Government medical amenities are available in Rohat and Singari.

Table 5- 9: Number of Non-Government Medical Amenities available

S.No.	Name village	Medical practitioner with MBBS Degree	Medical practitioner with no degree	Traditional practitioner and faith healer	Medicine Shop
1	Singari	0	1	0	0
2	Rohat	1	0	1	2
3	Dalpatgarh	0	0	0	1
	Total	**1**	**1**	**1**	**3**

5.8.3 Availability of miscellaneous facilities

In JPM IA villages miscellaneous facilities are also available. These are presented village wise in Table 5-10, 5-11, 5-12 and 5-13.

Table 5- 10: Availability of miscellaneous facilities (a)

S.No.	Name village	Self-Help Group (SHG)	Public distribution system (PDS) shop	Mandis / Regular market	Weekly Haat	Agricultural marketing society
1	DungarPur	No	Yes	No	No	No
2	Singari	No	Yes	No	No	No
3	Dhundali	No	No	No	No	No
4	Doodali	No	Yes	No	No	No
5	Neembli Patelan	No	Yes	No	No	No
6	Neembli Bramnan	No	Yes	No	No	No

S.No.	Name village	Self-Help Group (SHG)	Public distribution system (PDS) shop	Mandis / Regular market	Weekly Haat	Agricultural marketing society
7	Rohat	Yes	Yes	Yes	Yes	No
8	Dalpatgarh	No	No	No	No	No
9	Danasani	No	No	No	No	No

Table 5- 11: Availability of miscellaneous facilities (b)

S. No.	Name village	Integrated Child Development Scheme (Nutritional Centres)	Anganwadi Centre (Nutritional Centres)	Others (Nutritional Centres)	ASHA (Accredited Social Health Activist)	Community centre with/without TV	Sports Field,
1	DungarPur	Yes	Yes	Yes	Yes	No	Yes
2	Singari	Yes	Yes	Yes	Yes	Yes	Yes
3	Dhundali	Yes	Yes	Yes	Yes	No	Yes
4	Doodali	Yes	Yes	Yes	Yes	No	Yes
5	Neembli Patelan	Yes	Yes	Yes	Yes	Yes	Yes
6	Neembli Bramnan	Yes	Yes	Yes	Yes	Yes	Yes
7	Rohat	Yes	Yes	Yes	Yes	Yes	Yes
8	Dalpatgarh	Yes	Yes	Yes	Yes	Yes	Yes
9	Danasani	Yes	Yes	Yes	Yes	No	Yes

Table 5- 12: Availability of miscellaneous facilities(c)

S. No.	Name village	Sports Club / Recreation Centre	Cinema / Video Hall	Public Library	Public Reading Room	Newspaper Supply	Assembly Polling station	Birth & Death Registration Office
1	DungarPur	No	No	No	No	Yes	Yes	No
2	Singari	No	No	No	No	Yes	Yes	Yes
3	Dhundali	No	No	No	No	Yes	Yes	No
4	Doodali	No	No	No	No	Yes	Yes	No
5	Neembli Patelan	No	No	No	No	Yes	Yes	No
6	Neembli Bramnan	No	No	No	No	Yes	Yes	No
7	Rohat	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Dalpatgarh	No	No	No	No	Yes	Yes	No
9	Danasani	No	No	No	No	Yes	Yes	No

Table 5- 13: Availability of miscellaneous facilities (d)

S.No.	Name village	Post office(PO)	Sub post office (SPO)	Post & Telegraph office (P&TO)	Village Pin Code
1	DungarPur	No	Yes	No	306421
2	Singari	No	Yes	No	306421

S.No.	Name village	Post office(PO)	Sub post office (SPO)	Post & Telegraph office (P&TO)	Village Pin Code
3	Dhundali	No	No	No	306421
4	Doodali	No	No	No	306421
5	Neembli Patelan	No	No	No	306421
6	Neembli Bramnan	No	No	No	306421
7	Rohat	Yes	Yes	Yes	306421
8	Dalpatgarh	No	Yes	No	306421
9	Danasani	No	No	No	306421

5.9 Opportunities and Constraints Assessment

A summary of opportunities and constraints have been identified as part of the analysis.

It is evident that more strategic and feasible development lands occur at the centre and to the northwestern portion of the notified area. Based on an assessment of Village Revenue Maps, the northwestern portion appears to contain the most concentrated amount of developable / suitable government lands. Moreover, the NW & SW parts benefit most from access to the railway, existing stations, NH65 and SH64. They also benefit most from the existing rain fed watercourses; however, there might be an issue of flood risk appropriate mitigation measures would need to be in place with adequate green buffers etc.

It is anticipated that there will not be any substantial re-settlement of existing population. Therefore the Master plan will avoid any major conflicting land uses at or adjacent to existing settlements and adequate buffering will be designated at appropriate locations to protect existing villages.

Chapter 6

Landuse and Urban Structure Plan

6.1 Land Use Plan- 2042

Taking the accessibility of the site and the sustainability objectives for JPM IA into account, the land use strategy principles for the site have been informed by the following considerations:

- Avoiding conflicts between residential and industrial zones in terms of facilitating efficient freight movement around the IA without disturbing adjoining residential areas;
- Ease of movement to and from points of major transport accessibility facilitated by the proposed street system within JPM IA;
- Exploiting the potential of the proposed rail-road public transport interchange at the termination of the central spine boulevard as the highest density area, thus promoting a Transit-Oriented Development;
- Developing a high density urban mixed use character along the central spine boulevard and at key nodes along other radial routes which may in future complement surrounding settlements to form a connected urban area of a regional significance;
- Locating community uses and local work units at the intersection of key pedestrian routes and in close proximity to existing and proposed amenities to form nodes of local community significance;
- The opportunity to locate strategic institutional and community uses on the site, accessible at a strategic level to communities via the public transport network and at local level by a system of pedestrian friendly streets and routes;
- Retention of the ecological character of key corridors, habitats and landscape zones bisecting the site such as Redia Nadi and existing water bodies both natural and manmade.
- The development of a hierarchy of major open spaces of regional, district and local scale enabling active residential and mixed use characters in surrounding areas.

The 2042 land use plan as part of the Master Plan is presented in the Annexure IV. The plan is designed to ensure absolute minimum requirement for resettlement of existing population. All Abadi areas and existing water bodies will be protected with green buffers and strict planning controls to prevent un-authorised developments and activities. The buffer areas will act as ‘green lungs’ and water retention systems will be improved.

6.1.1 Land Use Distribution

The land use distribution is presented in the table below. The total estimated Urbanisable Area is calculated at approx. **64.62sq.km** (including proposed adjacent MMLH, railway corridor and two Abadi Development Areas). The total estimated Notified Area is calculated at: **154.37sq.km** (based on Land Revenue Records, Pali District). The figures have beenpresented in the table below.

Table 6- 1:JPM IA Proposed land use 2042 - area breakdown

S. No	Land Use	Total Gross Area (ha)	Total Percentage (%)
1	Residential	930	14.48%
2	Commercial	139	2.17%
3	Mixed Use	77	1.20%
4	Industrial	1945	30.27%
5	Public / Semi-Public	339	5.27%
6	Utilities and supporting uses	58	0.91%
7	Green Buffer	507	7.89%
8	Major Parks / Public Open Space	599	9.32%
9	Transportation Facilities	28	0.44%
10	Circulation	867	13.50%
11	**Total Proposed Development Area**	**5490**	**85.45%**
12	Abadi Development Areas	635	9.88%
13	Railway Corridor	50	0.78%
14	MMLH	220	3.42%
15	Seasonal Watercourse / Drainage Corridor	31	0.48%
16	**Total Urbanisable Area**	**6425**	**100.00%**
17	Seasonal Watercourse / Drainage Corridor	430	
18	Peripheral Control	8582	
19	**Total Notified Area**	**15437**	

6.2 Industrial Land Use

6.2.1 Land Use Allocation

Approx. 2165ha[1] of land (including 220ha area of MMLH) has been allocated for industrial use amounting to 33.4% of the total urbanisable area. The land requirement for industries has been planned in accordance with the needs of an industrial township. The target industries consist of:

- "Indigenous advantage" industries, i.e. those with existing competitive advantage or a potential competitive due to the region's natural resources etc.

[1] *The total area including MMLH and logistics facilities within JPM IA is approx. 220ha*

- Relocating or shifting industries, i.e. those industries moving in whole or in part from areas where they are already established to JPM IA in order to take advantage of the region's advantages.

- Industries already promoted by DMIC as per its Perspective Plan

Food, textiles & apparel, building materials and handicrafts were identified as the basic industrial types for the industrial foundation and pose low barriers to entry. Motor Vehicle and Auto Components, Electrical and Communication Machinery & Apparatus, Solar Energy and Related Equipment, Machinery & Equipment were identified as the strategic industrial types for the future, since these industries:

- promote significant externalities for the economy;
- generate higher rates of economic growth for the economy (perhaps characterized by economies of time (learning curves) which implies that first movers may have a significant and continuing advantage);
- Are important in terms of their contribution to GDP.

The resulting breakup of industrial lands per category is set out as follows:

Table 6-2: Forecast Industrial land requirements (30 year plan period)

S. No.	**8 Target Industry Sectors**	**Forecast Land required (km^2)**
1	Agro Food	3.70
2	Textile and Apparel(Generalized)	1.33
3	Building Material	5.29
4	Handicrafts	0.76
5	Motor Vehicle & Auto Components	1.77
6	Computer, Electronic and Optical Products	1.20
7	Solar Energy and Related Equipment	1.14
8	Machinery & Equipment	4.60
	Total	**19.79**

Source: Market Analysis Gap Assessment Report for JPM IA

Inside a certain kind of industrial area, the early stage industries can survive through coefficient and political support. A harmonious macro-environment and supportive industrial policies will secure the sustainable growth of industries. A good physical and political environment will enable industrial enterprises, particularly those that are ailing, to confront competition on the domestic and international markets on equal terms and without any handicap. The design and implementation of a variety of programs for industry and a fund to cover direct financial aid to support institutions for industry and enterprises are part of the responsibilities of an Industry Promotion Platform that needs to be established to modernize the industrial environment.

6.2.2 Spatial Strategy

Industrial zones are configured in such a way so as to maximize accessibility, minimize travel distances from living to working areas, whilst maintaining enough segregation so as to avoid conflicts of public health and safety, taking into account industry types, prevailing wind direction, location of water bodies/drainage corridors, Abadi Areas etc.

Based on certain kinds of impact factors, which including industrial type, pollution, main raw material resource, main market, main transport mode, %of road transport, distance with water ponds and land area, proposed a general spatial distribution for the 8 target industry sectors. (At this stage, only planned a general spatial layout for the proposed target industry categories)

Table 6-3: Impact factors for the location of 8 Target Industry Sectors

Target Industry Sectors	Pollution	Main Raw Material Resource	Main Market	Main Transport Mode	%of Road Transport
Agro Food	Light	Rajasthan	Region/Domestic	Truck	80%
Textile and Apparel	Heavy	Rajasthan	Domestic/Global	Rail/Truck	60%
Handicraft	Light	Rajasthan	Domestic/Global	Truck/Air	80%
Building Material	Heavy	Rajasthan	Domestic/Global	Rail/Truck	40%
Motor Vehicle & Auto Components	Light	Rajasthan/DMIC	Domestic	Rail/Truck	40%
Computer, Electronic and Optical Products	Light	DMIC	Domestic/Global	Truck/Air	100%
Solar Energy and Equipment Related	Light	DMIC	Domestic/Global	Truck/Rail	60%
Machinery & Equipment	Light	Rajasthan/DMIC	Domestic/Global	Rail/Truck	40%

6.3 Residential Land Use

6.3.1 Land Use Allocation

Approx. 1007 ha of land (including 77 ha of mixed use) has been allocated to living areas. This amounts to 15.8% of the total urbanisable area. Residential land allocation has been calculated on the basis of the forecasted population of 392,000 people till horizon year 2042. Various sectors are proposed to have a mixed form of development, by type and size of dwelling units and pattern and mode of development viz. group housing or plotted, and public housing or private constructed, to cater to a socio-economic mix appropriate for each sector. The latter depends on locational factors and comparative proximity to work centres. In each sector community facilities in the form of schools, dispensaries, shopping centres, open spaces, parks and playgrounds shall be provided in a hierarchic manner.

About 87,000 dwelling units are required to meet the housing requirement of JPM IA till the horizon year 2042. Dwelling types will be matched to the needs of the new population in terms of affordability, size and typology. The demand for housing is derived from the detailed employment forecast and an examination of the likely employment structure of JPM IA till horizon year 2042, including the income levels of employees, both for those directly employed in the manufacturing industries of the industrial parks and in the service and support sectors (eg education, retail, and construction and infrastructure services).

The requirement is based upon a target population of 392,000 inhabitants living at an average household size of 4.5 persons sharing a single dwelling. The allocation of residential area is such that it provides for all social income categories over several phases. The proportion of housing generally is lower in phase one compared to later phases. There are several reasons for this. It can be assumed that the income distribution of the population will change and this will lead to increased demand of better living areas and neighbourhoods. As infrastructure is established and the real estate market begins to mature JPM IA shall serve as a premium residential area enticing even people from Jodhpur and Pali, which will in turn account for increased migration and out-commuting population

During phase one; residential sectors shall be developed closer to the anchor industries which are expected to set up near the MMLH along the railway track. These areas will have more convenient access to industry zoned lands near the railway and MMLH south of the railway. Further the industrial areas would flourish due to the advantage of SH-64 as a major trade route. This would suggest that the residential areas will grow in a linear fashion adjacent to the river corridor providing convenient access to employment zones along SH-64. These areas will have more convenient access to industry zoned lands near the railway and MMLH south of the railway.

During the second phase, residential lands are structured along the central spine boulevard and lands occurring adjacent to Abadi areas. A mixed-use zone has been designated along the Boulevard itself to encourage vibrancy and diversity along this key artery. Residential areas are also allocated close to the urban core and transit hub.

During the third phase residential lands are mainly focused on the area between the commercial core and outer bands of industrial areas. This provides an optimum balance between the need to keep a level of segregation and proximity to working and living quarters and the need to provide convenient access to facilities, commercial areas etc.

6.4 Mixed Use

Mixed use essentially means provision of both residential and non-residential activity in an area. These are generally vertically combined use of commercial and residential lands in order to provide for choice, diversity and self-sufficiency. On a single premise or in an area, mixed residential and non-residential activity has its positive and negative environmental and socio-economic impacts. It suits the socio-economic needs of a large section of society and reduces transportation needs and traffic movement considerably. Some stand-alone public-semi-public facilities may also be permitted in the Mixed –Use zone. Detailed list of activities that are permitted and permissible in the Mixed-Use zone have been listed out in the Development Control and Regulations chapter of this report. Lands falling within the Mixed Use zone designation are shown in the Annexure IV.

6.5 Public Semi-Public Facilities

6.5.1 Spatial Allocation

Approx. 311ha of city level public/ semi-public lands (i.e. major institutional uses) have been designated for specific public and semi-public uses according to the scale of the proposed industrial township and type of activities envisaged. Local (sector) level facilities are accounted for in other broad categories of land use designations such as residential, industrial and open space/recreational.

The JPM IA delineated zone is at a distance of about 40 km from Jodhpur, which is the primary urban centre in the study area, and with a well-developed social infrastructure consisting of world reputed educational institutes, medical facilities, parks and recreation spaces, government institutions, etc. While Pali, the other urban centre is gradually becoming self-sufficient in this respect with a number of developmental activities taking place to establish educational institutes and health care facilities. Evidently, the new JPM IA site being delineated at about midway of these two Urban centres, it is essential to make this new township largely self-sustainable in terms of health facilities, educational institutes, cultural facilities, government institutions, sports and recreational facilities, so as to minimise the over dependence on existing urban centres.

The total population of the existing settlements within the proposed development area and with necessary projections based on Census 2001 data is around 16000 persons. This rural population at present enjoys only limited social infrastructure in terms of educational and health care facilities such as the ‘Aanganwadi’s, Primary School, Government Secondary School, etc and some small dispensaries. Therefore to establish a sustainable industrial area, there is wide

scope for substantial up gradation of these existing facilities and establishing other physical and social infrastructure of high standard.

Standards for Gap Analysis

The projected population for each phase is therefore analysed to identify the Gaps and propose additional requirements of social infrastructure within the Development Plan. The projected population is as below:

Table 6-4: Projection for Industrial Area

S.No.	Total Resident Population	2012	2022	2032	2042
1	JPM IA Projections	16000	95000	214000	392000
2	Alternative Growth: Optimistic	16000	122000	299000	598000
3	Alternative Growth: Pessimistic	16000	71000	146000	245000

Source: Consultant Assessment

The gap analysis for Social infrastructure is based on the standards provided in the UDPFI guidelines. These standards and the provision for Social infrastructure in the Development Plan are elaborated in terms of Educational, Health Care, Socio-cultural, Distribution and other services as below:

Table 6-5: Standards for Education Facilities (Primary, Secondary, Higher, Technical & Professional)

S. No.	Facility	Number	Population Served	Area(Ha)/ Unit	Other particulars
1	Pre-primary, nursery school	1	2500	0.08	to be located near a park
2	Primary school (I-V)	1	2500	0.04	strength to be 500 with 18mX36m play field
3	Secondary and Senior Secondary school (VI-XII)	1	7500	1.6	strength to be 1000 with 68mX126m play field
4	Integrated school (I-XII)	1	100000	3.5	strength to be 1500 with 2.5 ha play field & 0.3 ha of parking area, with hostel, area to be 3.9 ha with 0.4 ha of residential facilities
5	School for handicapped	1	45000	0.5	strength of school to be 400
6	College	1	125000	4	strength to be 1000-1500
7	University campus	1	1000000	10	
8	New university area	1	1000000	60	
9	Industrial training institute	1	1000000	1.6	
10	Polytechnic	1	1000000	2.4	
11	Technical training center	1	1000000	2.1	
12	Coaching center	1	1000000	0.3	Strength to be 400-500

S. No.	Facility	Number	Population Served	Area(Ha)/ Unit	Other particulars
13	New engineering college	2	1000000	60	strength to be 1500-1700, to be located in an urban extension
14	New medical college	2	1000000	15	the area includes space for a specialized general hospital

Table 6-6: Standards for Health Care Facilities

S.No.	Facility	Number	Population Served	Area(Ha)/ Unit	Other particulars
1	General hospital	1	250000	6	capacity of 500 beds with residential facility of 2 ha
16	Intermediate hospital (A)	1	100000	3.7	capacity of 200 beds with residential facility of 1 ha
17	Intermediate hospital (B)	1	100000	1	capacity of 80 beds with residential facility of 0.4 ha
18	Poly-clinic	1	100000	0.3	
19	Nursing home, child welfare & maternity center	1	50000	0.3	capacity of 30 beds
20	Dispensary	1	15000	0.12	

Table 6-7: Standards for Socio- cultural Facilities

S.No.	Facility	Number	Population Served	Area(Ha)/ Unit	Other particulars
21	Community room	1	5000	0.07	
22	Community hall & library	1	15000	0.2	
23	Recreational club	1	100000	1	1 for 15000persons in 2000 sq m, 1 for 50000persons in 0.5 ha and 1 for 100000 persons in 1 ha
24	Music, dance & drama center	1	100000	0.1	
25	Meditation and spiritual center	1	100000	0.5	
26	Socio-cultural center	1	1000000	15	

Table 6-8: Standards for Distribution and Other Services

S.No.	Facility	Number	Population Served	Area(Ha)/ Unit	Other particulars
27	Petrol pump	one petrol pump for 150 ha of gross residential area, one for 40 ha of gross industrial area, two in a freight complex, two in a district center, one in a community center			

S.No.	Facility	Number	Population Served	Area(Ha)/ Unit	Other particulars
28	Milk booth	1	5000		
29	LPG godowns	1	40000		location has to be away from residential areas
30	Police station	1	90000	1.5	area inclusive of residential accommodation
31	Police post	1	50000	0.16	essential for areas not served by police station
32	District office and battalion	1	1000000	4.8	
33	Police line	1	2000000	5	
34	District jail	1	1000000	10	
35	Civil defence & home guards	1	1000000	2	
36	Religious building	2	15000	0.04	
37	Telephone exchange	one telephone exchange for a population of 125000-500000			
38	Telegraph office	one telegraph office for a population of 25000-100000			

Table 6-9: Standards for Recreational Facilities

S.No.	Facility	Number	Population Served	Area(Ha)/ Unit	Other particulars
39	Neighbourhood Park	1	5,000	0.8	3 to 4 parks
40	Community Park	1	10,000	1	3 to 4 parks
41	Community sports centre		100,000	2	
42	Zonal Park	1	100,000	5	
43	Play Ground/ Open Space	1	275,000	3	1 park
44	City Level Park	1	300000- 500000	20	1 park
	Overall Town/ city level				**10-12 sq. m per person**

Figure 6- 1: Existing Social infrastructure in terms of Government primary and secondary schools

The provision for required social infrastructure is presented as follows:

Educational facilities

The total area requirement for the provision of Educational facilities for the first phase would be around 34.0 Ha. This phase would also address the existing gap in terms of area, equivalent to

about 4 Ha. For the planning period of 30 years until 2042, the total area requirement against the provision of educational facilities would amount to an area of about 194.5 Ha. However, this requirement also includes one engineering college and one medical college which should suffice the requirements of the resident population of 392000.

Table 6-10: JPM - IA Social Infrastructure (Education) requirement: Planned Growth Scenario

S.No.	Facility	Year 2012	16000	Year2022	95000	Year 2032	214000	Year 2042	392000
		No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)
1	Pre-primary, nursery school	7	0.6	38	3.0	86	6.9	157	12.6
2	Primary school (I-V)	7	0.3	38	1.5	86	3.4	157	6.3
3	Secondary and Senior Secondary school (VI-XII)	2	3.2	13	20.8	29	46.4	52	83.2
4	Integrated school (I-XII)	0	0.0	1	3.5	2	7.0	4	7.0
5	School for handicapped	0	0.0	2	1.0	5	2.5	9	2.5
6	College	0	0.0	1	4.0	2	8.0	3	8.0
7	University campus	0	0.0	0	0.0	0	0.0	0	0.0
8	New university area	0	0.0	0	0.0	0	0.0	0	0.0
9	Industrial training institute	0	0.0	0	0.0	0	0.0	0	0.0
10	Polytechnic	0	0.0	0	0.0	0	0.0	0	0.0
11	Technical training centre	0	0.0	0	0.0	0	0.0	0	0.0
12	Coaching centre	0	0.0	0	0.0	0	0.0	0	0.0
13	New engineering college	0	0.0	0	0.0	0	0.0	1	60.0
14	New medical college	0	0.0	0	0.0	0	0.0	1	15.0
	TOTAL		**4.1**		**33.8**		**74.2**		**194.6**

Although, the facilities such as Industrial training institutes, Polytechnic and Technical training institutes are found not required as per the standards, it is highly recommended that adequate area shall be reserved for provision of ITI's and Polytechnics for allowing vocational trainings, skill development of the uneducated rural population. For this 5 percent of the area has been added to the resulting area requirement for educational facilities.

Health care Facilities

In the developing stage of the JPM IA, since the population would be largely commuting and relatively less residing, about 7.5 Ha of land would be required to develop the health care facilities including two intermediate hospitals. For the next two phases until 2032, the area requirements would almost double itself, as almost all the health care facilities would require more provisions to meet the needs of estimated population of about 392000. Overall an area of about 37 Ha shall be developed by the year 2042. The detailed description against each facility is mentioned in the table 6-11:

Table 6-11: JPM - IA Social Infrastructure (Health) requirement: Planned Growth Scenario

S.No.	Facility	Year 2012	16000	Year 2022	95000	Year 2032	214000	Year 2042	392000
		No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)
15	General hospital	0	0.0	0	0.0	0	0.0	2	12.0
16	Intermediate hospital (A)	0	0.0	1	3.7	2	7.40	4	14.8
17	Intermediate hospital (B)	0	0.0	1	1.0	2	2.00	4	4.0
18	Poly-clinic	0	0.0	1	0.3	2	0.60	4	1.2
19	Nursing home, child welfare & maternity center	0	0.0	2	1.8	4	1.20	8	2.4
20	Dispensary	1	0.12	6	0.72	14	1.68	26	1.92
	TOTAL		**0.12**		**7.5**		**12.88**		**36.32**

Socio-cultural Facilities

A total of 17.1 ha is required until the planning period of 2042. Socio cultural facilities are very important as they may easily be neglected in the aspiration of achieving greater objectives of urban design. However, the traditional values and cultural aspects have to be understood while planning a new urban centre as the design should allow the inhabiting population to exist culturally and socially. In order to achieve a holistic approach, the standards have also been adopted for identifying the requirements for socio- cultural activities. The findings have been tabulated table below:

Table 6-12: JPM - IA Social Infrastructure (Cultural) requirement: Planned Growth Scenario

S.No.	Facility	Year 2012	16000	Year 2022	95000	Year 2032	214000	Year 2042	392000
		No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)
21	Community room	3	0.2	19	1.3	43	3.0	78	5.5
22	Community hall & library	1	0.2	6	1.2	14	2.8	26	5.2
23	Recreational club	0	0.0	1	1.0	2	2.0	4	4.0
24	Music, dance & drama center	0	0.0	1	0.1	2	0.2	4	0.4
25	Meditation and spiritual center	0	0.0	1	0.5	2	1.0	4	2.0
26	Socio-cultural center	0	0.0	0	0.0	0	0.0	0	0.0
	TOTAL		**0.4**		**4.1**		**9.0**		**17.1**

Distribution and other Services

The area requirements and the number of facilities for distribution and other services, precisely required at zonal and sector levels, are found to be as tabulated in the table below:

Table 6-13: JPM - IA Social Infrastructure (other eminities) requirement: Planned Growth Scenario

S.No.	Facility	Year 2012	16000	Year 2022	95000	Year 2032	214000	Year 2042	392000
		No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)
1	Petrol pump	-	-	-	-	-	-	-	-
2	Milk booth	3	-	19	-	43	-	78	-
3	LPG godowns	0	-	2	-	5	-	10	-
4	Police station	0	0.0	1	1.5	2	3.0	4	6.0
5	Police post	0	0.0	2	0.3	4	0.6	8	1.3
6	District office and battalion	0	0.0	0	0.0	0	0.0	0	0.0
7	Police line	0	0.0	0	0.0	0	0.0	0	0.0
8	District jail	0	0.0	0	0.0	0	0.0	0	0.0
9	Civil defence & home guards	0	0.0	0	0.0	0	0.0	0	0.0
10	Religious building	2	0.0	13	0.5	29	1.2	52	2.1
11	Telephone exchange	0	-	1	-	1	-	3	-
12	Telegraph office	0	-	1	-	2	-	4	-
	TOTAL		**0.0**		**2.3**		**4.8**		**9.4**

It is observed that services for civil administration like police stations, district jail, civil defence and home guards are not required for the planned population, going by the standards. However, it is mandatory to have these provisions in order to establish a disciplined civil society. Hence the total area required until 2042 should be at least 1.5 times of the resulting area as per standards.

Summary

A summary of the social infrastructure provisions in the Development Plan described under various sub headings is provided in the table below.

Table 6-14: Summary of JPM - IA Social Infrastructure Gap Assessment

Planning Phase		Educational Facilities	Health Care Facilities	Socio-Cultural Facilities	Distribution & Others	Total (Ha)
		Area (Ha)	Area (Ha)	Area (Ha)	Area	
2012	Base Year	4.0	0.1	0.4	0.0	**4.5**
2022	Phase I	34.0	7.5	4.1	2.3	**47.9**
2032	Phase II	74.2	12.9	9.0	4.8	**100.9**
2042	Phase III	**194.5**	**36.3**	**17.1**	**9.4**	**257.3**

6.5.2 Spatial Distribution

As depicted in the figure below, public semi-public landuse are located near the residential areas in general. They are concentrated along the central boulevard and in the area near to the passenger railway station. The sub district commercial areas are also allotted some public

semi-public uses so that the overall public semi-public landuse area is distributed in all phases of development and would provide a certain degree of decentralisation. These institutional areas will accommodate institutes of higher learning like colleges, intermediary hospitals, other specialized research institutes, socio-cultural centres, as well as the main administrative centre of the IA. Smaller nodes have been designated in highly accessible locations within industrial areas to provide for centralized capacity building and training facilities needed to support employee up-skilling, etc. The relative proportion of public-semi-public zoning is higher in Phase Three, when the need for higher order functions such as regional technical colleges is established by virtue of the critical mass of the surrounding catchment. The largest cluster of public/semi-public lands has been designated to the south of the railway station within the urban core zone. Higher order education facilities shall be prioritized here to take maximum advantage of proximity to the passenger transit hub, MMLH and phase three light industries which may have a higher demand for R&D. The location of major research institutes here would encourage synergies between training and research at this highly strategic location. The spatial distribution of Public/Semi-Public lands is presented in the Annexure-IV land use plan of JPM IA.

6.6 Utilities Infrastructure

Utilities infrastructure requirements are set out in the *Market Analysis Gap Assessment Report for JPM IA*. They are briefly summarized as follows:

Water supply:	*Pumping stations to supply 45-65 MLD for the design year 2042 (subject to feasibility studies)*
Wastewater:	*Wastewater Treatment Plant / Common Effluent Treatment Plant (subject to feasibility studies) to practice zero discharge and recycling of waste water to be used within industries after tertiary treatment thereby meeting the non-potable water demands of industries amounting to 45- 55 MLD.*
Solid Waste:	*Municipal Solid Waste infrastructure to be determined (eg incinerator, organic/inorganic waste separator, truck depot, paper, glass re-cycling facilities etc). For Industrial waste a centralised waste sorting plant and re-cycling facility is desirable*
Power:	*Power infrastructure including the Grid Substations and Distribution Substations to supply electricity in order to meet the estimated demand of 2,900 million kWh total per year and 755 MW total per day for the design year 2042. The Power infrastructure also proposed to use the SMART GRID concept wherein, electricity can be locally generated through Renewable sources.*
'Green infrastructure' (GI):	*Demand side Management shall be actively employed to reduce the infrastructure demands within the JPM IA. GI facilities shall be provided to:* • *Reduce water demand (eg water treatment facilities and large-scale rainwater harvesting and flood management systems. These may be incorporated into green buffer areas.).* • *Reduce energy demand (this could be several district heating and cooling plants, solar hot water devices, etc)* • *Reduce domestic and commercial waste (eg centralized / district recycling and reuse plant)*

A total of 38 ha of lands have been designated for major water, wastewater power and related utilities. Other utilities infrastructure such as communications and green infrastructure may be permitted in the 'Green Buffer' and/or circulation zones as appropriate.

6.7 Transport Infrastructure

Circulation space in the IA includes all proposed roads which accounts for approximately 900ha of land which is approximately 15% of the total urbanisable area. 80m ROW has been allocated for the up-gradation (double-tracking) of the railway corridor. This incorporates space for a 15-20m embankment (based on DFC standard) and 25-30m green buffer on either side. The total land area for this corridor amounts to 94ha (excluding proposed station complex and ancillary infrastructure). Approx. seven hectares of land have been allocated for dedicated transport facilities, including new passenger station, public transport terminals etc. Issues relating to traffic and transportation are set out in detail in Chapter 8.

6.8 Logistics, MMLH and Supporting Uses

The Multi-Modal Logistics Hub Early Bird Project, together with the associated infrastructure rolled out as part of the Dedicated Freight Corridor, shall act as a catalyst and driving force for kick-starting economic development, facilitating the transformation of the entire region into a major centre for manufacturing, business and trade. To this end the Logistics Hub should have major supporting facilities within the designated area to promote trade. This can include such things like a wholesale market, trade and exhibition area. Located towards to the south of the railway station just 3km from the main city core, the logistics hub can take advantage of proximity to major trade areas and shall act as the primary interface between JPM IA and DMIC. As such appropriate areas have been earmarked for warehousing, offices complex and wholesale trade within the MMLH Zone and at strategically located nodes equally distributed across the IA.

Logistics facilities shall serve agro-food, building material, generalized manufacturing goods, handicrafts and consumer goods to guarantee incoming of raw materials from outside, outputting of local products and commercial trade.

The logistics system is considered not only for the Industrial goods transportation for the IA but also the consumer goods for the residents in the IA as the township matures and also to serve the surrounding catchment such as Pali Town. Based on the guidelines set out in the *JPM IA Market Report*, as well as further considerations appropriate to the level of detail required for this report and for this scale of township, a logistics system with a two level hierarchy of

logistics facilities and services is provided for. The 2 level hierarchy[2] of the logistics system of JPM IA includes:

- **Nodal logistics base (MMLH)**: One logistics base as a mega comprehensive logistics facility, regulating and connecting different types of transportation;
- **Freight Complex/Logistics centre**: Three large logistics centres/ freight complexes serving the surrounding production areas and providing support to the MMLH facilities.

Logistics areas are described as follows:

Table 6-15: Proposed major logistics development types for JPM IA

Land Use Zoning	Description and typical functions
MMLH	Main logistics base serving the entire region. Containing a mega comprehensive logistics facility, regulating and connecting different types of transportation, and the gateway or interface between JPM IA and DMIC. Shall contain: • Loading / unloading spaces, warehouses, storage, parking, public utilities • The main wholesale trading centre of the IA (specialized markets) • Offices and wholesale business establishment • Ancillary uses, exhibition area, etc.
Logistics Centres	Large logistics centres / freight complexes serving the surrounding production areas and providing support to the MMLH facilities

6.9 Commercial

6.9.1 Land Allocation

The mode of development in JPM IA is proposed according to settlement scale, product characteristics, and expected consumption level. Approx. 216ha[3](including 77ha area of mixed use) of commercial lands have been allocated according to the scale of the proposed industrial township and type of activities envisaged under commercial landusezone. The commercial landuse zone have been categorised into City Centre and Sub City Centre. Based on the two commercial land use zone classes, various types of commercial activities are set out in development control regulations set out in Chapter 10.

Commercial areas may include:

- Retail trade areas (tiered system)
- Wholesale trade areas (specialized markets etc)

[2] This is excluding minor dispatching nodes etc that could be permitted under various other land use categories

[3] This includes 139ha of stand alonecommercial use and 77ha of mixed use (ground floor commercial)

- Entertainment Areas
- Office Areas

Table 6-16: Proposed commercial development types for JPM IA

Commercial Area / Type	Description and typical functions
1st level district-scale major commercial centre	• Located in the main core area. • Can also contain government/ semi-government/ private offices, business centres, financial institutes, shopping centres, hotels, restaurants, entertainment and leisure
2nd level district centre	• Located at the junction of two main spine roads/boulevards, serving a wide catchment area • Can also contain offices, banks, shops, weekly markets, restaurant, entertainment and leisure
3rd level sector level commercial centre	• Located in a neighbourhood centre. • Provides the neighbourhood/sector with local commercial services and facilities
Wholesale Market	• Specialized markets - location and functional characteristics based on goods flow and final consumption destination

**Based on UDPFI Guidelines and international best practice*

Retail Trade: A three-tier system of retail area is suggested (not including basic local facilities), based on the Market Analysis Report for JPM IA. The three tier system is defined as follows:

- 1st level commercial centre:
  - Consists of district-scale commercial centre
  - Generally located in the central area and close to the transportation centre
- 2nd level commercial centre:
  - Consists of a community-scale commercial centre
  - Located in a community centre
  - With multiple commercial functions
- 3rd level commercial centre:
  - Consists of a sector-scale commercial centre
  - Located in a neighbourhood centre
  - Provides the neighbourhood with local commercial services

Local level service centres would be included as part of the residential land use zoning. This would be defined as a cluster-scale commercial centre which supplies housing clusters with daily essential commercial services and functions as a basic commercial node.

The retail system shall thus serve both local people and the wider region. Two district commercial centres area proposed along the urban spine corridor to be established during the

later phase development. Two community level commercial centres and the sector level commercial centres shall serve each sector across the entire development area.

Table 6-17: Suggested indicative retail hierarchy for the proposed JPM IA*

Commercial centre	Suggested retail formats	Population served by each centre (in ' 000)	No. of centres needed	Area per 1000 persons (sqm)	Number of shops
District commercial centre	Department stores, restaurants, specialty stores, supermarkets, characterful shopping streets, malls	125-500	1	880	1 for 300 persons
Community commercial centre	Supermarkets, special stores, shopping malls, warehouse-style membership stores; characterful shopping streets; public facilities	25-100	4	500	1 for 200 persons
Sector commercial centre	Convenience store, supermarkets, stores, weekly markets, commercial offices, basic public facilities	5-20	20	300	1 for 200 persons

**Based on UDPFI Guidelines and international best practice*

Office activities: With the development of DFC, FDI, technology and enterprises will be attracted to nodes within the DMIC. R&D service-oriented industries can stimulate the application of regional technology research, expand employment base and improve fiscal revenue. In future the R&D service base of JPM IA will contribute to the economy of the region and Rajasthan. Accordingly, a portion of the commercial land allocation should be designated for office use.

The types of commercial office activities envisaged are based on the *Market Analysis Report for JPM I A* and include, R&D services (eg Advanced Business Park (ABP), exhibition / events spaces Office Incubators and an Innovation Park. These can be sub-divided as follows:

- Incubators Based On Higher Education Institutes;
- Small to Medium Enterprise (SME) Incubators;
- Incubators serving overseas Indian scholars;
- Innovation Park / Campus to include Industrial design centre;
- Innovation Park / Campus to include Technology research centre;
- Innovation Park / Campus to include Industrial detection centre;
- Company HQ base;
- Exhibition / Expo / Conference Area.

Office activities will be permitted in City Centre zoned commercial lands. Some R&D-based uses may also be designated as part of the education and training facilities provided in the public-semi-public facilities zoning.

6.9.2 Commercial Areas Spatial Allocation

The commercial land use distribution is based on the target population and indicative trade system set out in the *JPM IA Market Analysis Gap Assessment Report*. Major commercial lands are focused along the central spine boulevard and urban core and transit hub area. These areas will have restricted vehicular access for freight vehicles to ensure a vibrant yet safe and pedestrian-oriented public realm.

Two district centres are strategically located to serve the northern and southern areas. These are accessible via arterial and sub-arterial roads. Sub City Centres are spread throughout the IA to serve residential communities. Service nodes are similarly spread throughout industrial zones to provide local commercial support and facilities for the surrounding industrial-zones lands. Generally Sub City Centres are clustered with open space and recreational areas and major community facilities (schools/colleges, health clinics etc). Similarly, Service Nodes within Industrial Zones are clustered with open spaces and public/semi-public facilities (egspecialized training centres). Community Centres are supported by higher density residential lands.

6.10 Recreational

6.10.1 Spatial Allocation

The open space network is based on the aspirations of a sustainable industrial township with high quality of life for residents and workers and minimum impact on the environment, including existing water bodies and lands used for drainage and attenuation. The proposed open space system consists of city level parks and ecological areas incorporating water bodies/retention ponds, which may also have an ecological function with respect to the proposed sustainable drainage system.

Approx. 557ha of city level parks and recreational open space have been specially designated in the 2042 Land Use Plan. Two types of major open spaces have been designated. These are District Parks and Ecological Parks. The latter contain existing or proposed attenuation ponds which shall require careful management as part of an integrated rainwater harvesting and sustainable drainage system. Open space types are described in the table below:

Table 6-18: Proposed major open space development types for JPM IA

Open Space type	Description and typical functions
District Park	• Recreational open space serving a wider community catchment • A major Open Space along RediaNadi seasonal river corridor has been designated as a linear park • May contain some pavilion buildings for recreation, culture and amenity • May also contain proposed 'green infrastructure' such as flood storage areas / storm water conveyance
Ecological Park	In addition to the above description: • Shall incorporate special development regulations to protect existing/proposed sensitive areas such as attenuation ponds/water bodies from incursions and possible polluted runoff as part of sustainable drainage strategy

6.10.2 Spatial Distribution

District parks are spatially distributed so as to maximise accessibility from the residential areas with all parks within walking distance throughout the entire development area. The Master Plan for JPM IA facilitates and encourages a highly permeable grid system which avoids any unnecessary circumnavigation around lengthy blocks. This means that major park spaces shall be accessible within 800m-1200m or less walking distance throughout the various residential neighbourhoods. Smaller neighbourhood parks, which shall be designated during implementation stage, should be configured so as to encourage green links and good connectivity between major public open spaces.

6.11 Green Buffer

Green buffers occur along main roads to mitigate noise and pollution, and to protect and secure adjoining land uses, especially existing settlement and sensitive landscape areas. Therefore, green buffers have been categorised into two categories namely; G-1 (along water bodies) and roadside green buffers (G-2), which may also have an ecological function with respect to the proposed sustainable drainage system.

Table 6-19: Proposed Green Buffer types for JPM IA

Green Buffer type	Description and typical functions
Green Buffers (G-1)	• Buffering belt along water bodies to mitigate noise and pollution, • May contain 'green infrastructure' such as flood storage areas / storm water conveyance devices such as swales, bio retention, etc.
Green Buffers (G-2)	• Buffering belt along main roads to mitigate noise and pollution, • May contain 'green infrastructure' such as flood storage areas / storm water conveyance devices such as swales, bio retention, etc. • May also contain roads for circulation and area for parking, etc.

An important special function of green buffers is to provide for 'green infrastructure', as part of a sustainable drainage management system. It is recognized that a successful and integrated monsoon rainwater harvesting system is of critical importance to the long term sustainability and prosperity of JPM IA.

The designation of green buffers (G-1) per road class is as follows:

Table 6-19: Proposed Green Buffer types for JPM IA (not building setback)

Road Type*	ROW	Green Buffer Setback	Rationale
Sub-Arterial Roads adjoining Abadi Areas	45m	50m	To protect Abadi Development Areas from new urban development activities.
Arterial Road and Sub-Arterial Roads	60m / 45m	30m	To mitigate noise and pollution, and to protect and secure adjoining land uses, especially existing settlement and sensitive landscape areas.
Restricted Traffic Arterial Roads (Spine Boulevard)	60m	10m	Provide safe, comfortable and convenient routes with appropriate planting for shading for pedestrians and slow vehicles.

**Internal roads only. NH-65 corridor is excluded as it falls outside the urbanisable area boundary. SH-64 is designated as a Sub-Arterial Road. For all other road types there is no provision for green buffers*
^ The setback may be reduced to zero along designated commercial stretches

Green buffers have been designated within private development blocks. However, they are not a determinant of building setback. Requirements for building setback are based on a combination of factors including land use type.

6.12 Peripheral Control Belt

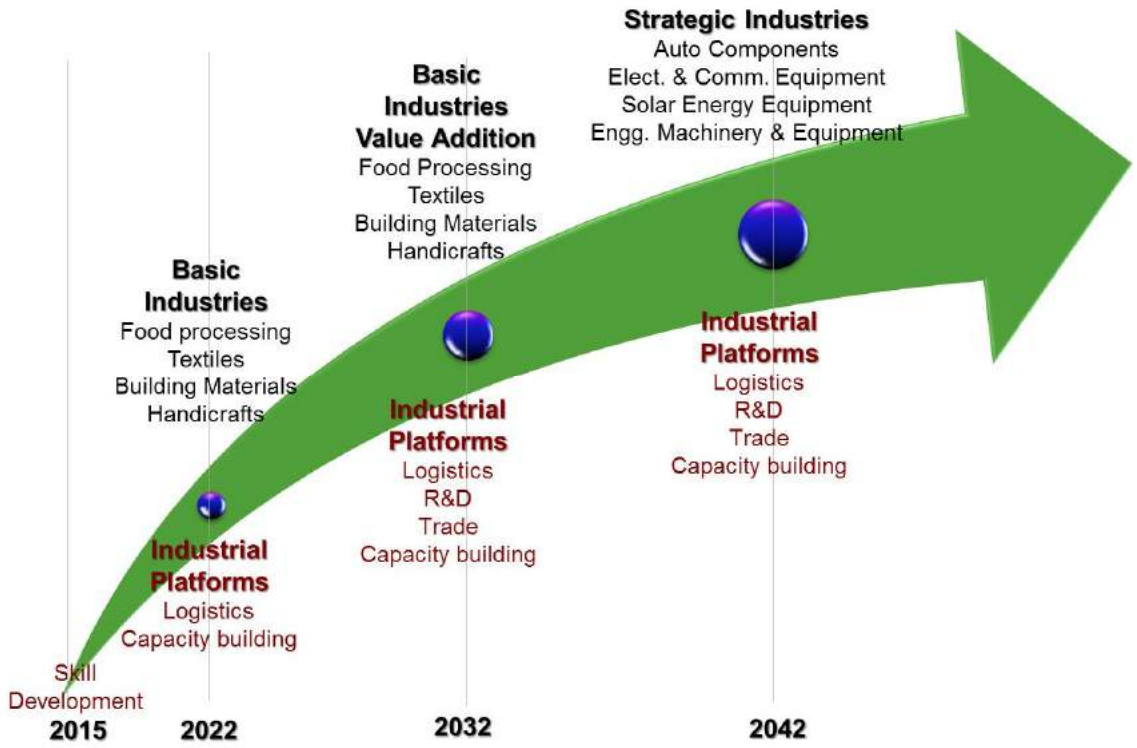
The Peripheral Control Belt (PCB) is the area between the Urbanisable Area limit and Notified Urban Area limit. Approximately 55.59% of the total proposed Notified Urban area, totalling approx.8.58sq.km has been designated as Peripheral Control Belt. The objective of the peripheral control belt is to restrict haphazard development on the periphery of the city, especially along roads and adjacent to proposed development sites. As such the majority of lands within the PCB shall be retained as farmland for the duration of the plan period. Under special circumstances limited activities may be permitted within the PCB like agriculture and allied activities, mining/quarrying and stone crushing, motel, resort, amusement parks, brick kilns, etc. Detailed list of activities that may be permitted in the Peripheral Control Belt (PCB) have been listed out in the Development Control and Regulations chapter of this report. Lands falling within the PCB designation are shown in the Annexure IV.

Chapter 7

Phasing Strategy

7.1 Phasing Strategy and Development Timeline

The development of the JPM IA will span over three decades where it moves from a fledgling Industrial area, kick started by the DFC, MMLH and dependent on the existing urban centers of Jodhpur and Pali to an Primary Industrial city in the Marwar Region. The below figure shows a timeline of the development of the industries and related infrastructure:



It is important to define the Development Phases in order to better align the spatial development with Plan provisions and objectives. In order for the city to be developed as envisaged and Master plan to be successfully implemented and keeping in view this timeline of the industrial growth, the physical development of the JPM IA has been phased out as below:

- Phase 1 – Initiation, pilot phase infrastructure and early development - Years 2016-2022;
- Phase 2 - Core development - Years 2023-2032
- Phase 3 – Mature development and completion - Years 2033-2042

It is assumed that the actual implementation would start from 2016 and the years leading upto 2016 would be focused on preparing detailed Town Planning schemes and institutional setups. 2016 onwards upto 2042, the development would be driven by firstly the industrial setups and secondly the infrastructural developments such as water supply and waste water system,

sewage network including STP's, industrial waste water collection and treatment facilities like CETP's, power distribution network, telecom, etc. The Phasing strategy has been prepared keeping in mind that there is a certain time lag between:

- Infrastructure development and Industrial development
- Industrial Development and Non industrial uses such as Residential, Commercial and Public-Semipublic, etc.

Duration of construction for industries and that for residential housing typologies, open and recreational spaces, commercial buildings, etc vary with the former consuming lesser time as the industries majorly use prefabricated construction materials and are large span structures. In this regard, even if the residential development is simultaneously planned along with the industrial setup, there is a time lag of may be 1.5 – 2 years. Hence the Phasing Plan is further subdivided into 2 year development periods from 2016 to 2042. This would help to reflect upon year wise development phasing of various Sectors (Blocks) of the Landuse Plan as well as individual Landuse types. These have been discussed towards the end of this chapter. For clarity, the indicative phasing programme is set out graphically below to show potential progression of development at JPM IA.

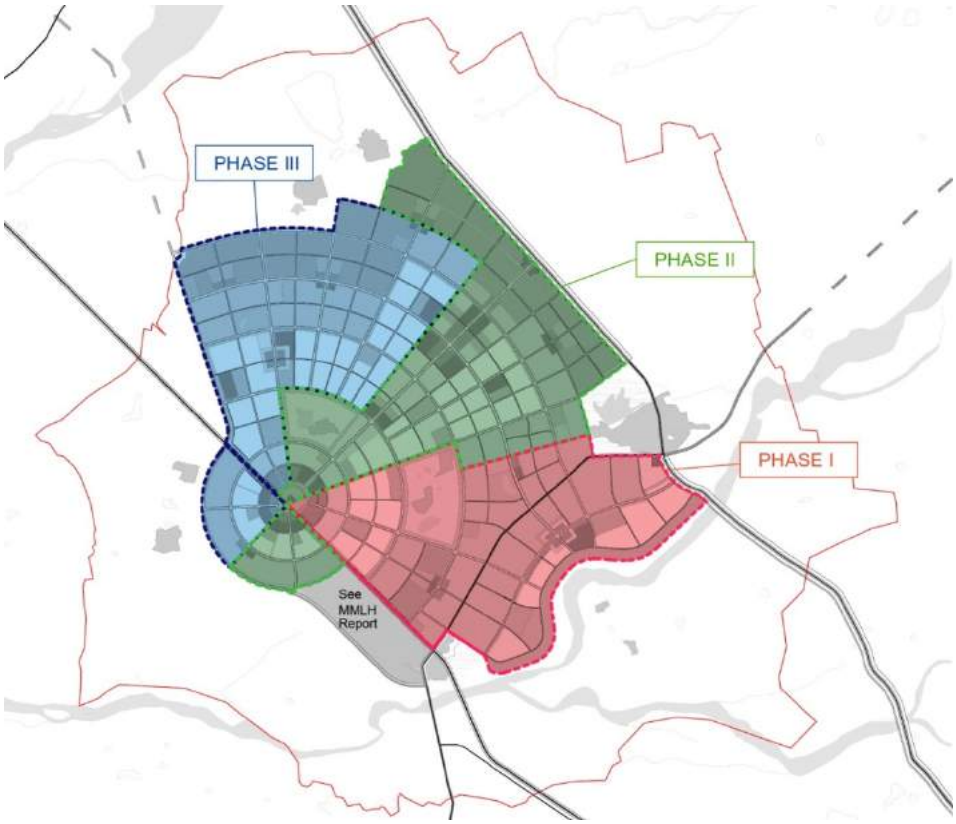


Figure 7-1: Phasing strategy for JPM IA

The earliest phase of development (shown in red) is focused on the existing infrastructure connecting the railway (DFC feeder line) to NH-65 (main trade route), namely SH-64. This SH64 also has the potential to connect the JPM IA to the districts of Barmer, Jalore and Sirohi in the south. The proportion of industrial lands proposed in the Landuse Plan is higher in this phase, as it is assumed that the IA will attract more commuters during earlier development phases with its dependence on the urban centers of Jodhpur and Pali. The development then grows in an anti-clockwise direction to encompass the main spine road as part of phase two. During this phase the character of the township is consolidated with most of the blocks along NH-65 being developed. During the final phase the development continues in an anti-clockwise fashion back towards the railway. The main urban core is developed during this phase along with the hi-tech area south of the railway tying into the consolidated logistics hub with supporting services.

The table 7-1 shows a Landuse distribution as per the three broad phases of development. This is based on the detailed gap assessment study carried out as part of the *JPM IAMarket Analysis Gap Assessment Report.* Further details on phase-wide infrastructure requirements are provided in Chapter 9: Physical Infrastructure Strategies.

Table 7-1: Proposed land use area breakdown per phase

S. No	Land Use	Phase 1 Gross Area (ha)	Phase 1 Percentage (%)	Phase 2 Gross Area (ha)	Phase 2 Percentage (%)	Phase 3 Gross Area (ha)	Phase 3 Percentage (%)	Total Gross Area (ha)	Total Percentage (%)
1	Residential	279	13.26%	249	11.8%	403	19.17%	930	14.48%
2	Commercial	35	1.65%	71	3.4%	33	1.58%	139	2.17%
3	Mixed Use	11	0.54%	61	2.9%	4	0.19%	77	1.20%
4	Industrial	630	29.98%	682	32.4%	634	30.17%	1945	30.27%
5	Public / Semi-Public	48	2.27%	184	8.7%	107	5.11%	339	5.27%
6	Utilities and supporting uses	25	1.20%	8	0.39%	25	1.20%	58	0.91%
7	Green Buffer	160	7.59%	175	8.3%	173	8.22%	507	7.89%
8	Major Parks / Public Open Space	320	15.22%	135	6.4%	144	6.85%	599	9.32%
9	Transportation Facilities	0	0.00%	14	0.68%	14	0.66%	28	0.44%
10	Circulation	277	13.18%	293	13.96%	297	14.15%	867	13.50%
11	**Total Proposed Development Area**	**1783**	84.89%	**1873**	89.15%	**1834**	87.29%	**5490**	85.45%
12	Abadi Development Areas	212	10.07%	212	10.07%	212	10.07%	635	9.88%
13	Railway Corridor	17	0.79%	17	0.79%	17	0.79%	50	0.78%
14	MMLH	73	3.48%	73	3.48%	73	3.48%	220	3.42%

S. No	Land Use	Phase 1 Gross Area (ha)	Phase 1 Percentage (%)	Phase 2 Gross Area (ha)	Phase 2 Percentage (%)	Phase 3 Gross Area (ha)	Phase 3 Percentage (%)	Total Gross Area (ha)	Total Percentage (%)
15	Seasonal Watercourse / Drainage Corridor	16	0.76%	14	0.65%	1	0.06%	31	0.48%
16	**Total Urbanisable Area**	**2101**	100.00 %	**2188**	104.15%	**2136**	101.70%	**6425**	100.00%
17	Seasonal Watercourse / Drainage Corridor							430	
18	Peripheral Control							8582	
19	**Total Notified Area**							**15437**	

Table 7-2: Indicative outline programme of infrastructure requirements for the three broad phases of development

Items	Base Year	2022	2032	2042
Inhabitants ('000)	16	95	214	392
Employees ('000)	3	66	165	315
Industrial Land Requirement (sqkm)	-	6.6	13.2	19.8
Manufacturing output of JPM IA (crores)	n/a	13,700	77,000	327,000
Potable Water Demand (MLD)	-	8.19	19.12	35.51
Non-Potable Water Demand (MLD)		5.50	13.11	24.52
Industrial Water Demand (MLD)	-	2.18	11.70	47.5
Industrial Power Demand (MW per day)	-	31.70	175.84	736.99
Solid Waste Generation (Kg per day)	16,000	18,900	44,100	81,900
Health Facilities Land Requirement (ha)	0.1	7.5	12.9	36.3
Education Facilities Land Requirement (ha)	4	34	74.2	194.5
Socio-cultural Facilities Land Requirement (ha)	0.4	4.1	9	17.1
Recreation/Open spaceLand Requirement (ha)	4.4	32.2	72.4	152.4
Admin /Distribution & Others Land Requirement (ha)	-	2.3	4.8	9.4

The following sections present a description of the key development types anticipated during each phase.

7.1.1 Phase 1 (2014-2022)

Multi Modal logistics Hub

The proposed MMLH shall kick start the development of the Industrial Infrastructure in the Area. This is anticipated to be the main catalyst of growth in the initial phases when it will be the

primary connection of the region to the DFC and then as it grows in phases in tandem with the JPM IA it will be the primary connection of the Township both for export and import.

Skill Development Centres

During the initial development phase, the skill development of the population in the region shall be the top priority. The existing skill development programs in the region shall be upgraded to meet the anticipated skill level of the industries proposed in the Township.

Processing areas

During the first development phase, the SH-64 corridor shall be the focus for development. Four Basic Industry groups are expected to be attracted to the IA and consolidated as regional economic drivers. These are:

- Agro food,
- Apparel and textile,
- Building materials,
- Handicrafts.

Phase one area breakdown and proportion of land uses proposed for JPM IA

S. No	Land Use	Phase 1 Gross Area (ha)	Phase 1 Percentage (%)
1	Residential	279	13.26%
2	Commercial	35	1.65%
3	Mixed Use	11	0.54%
4	Industrial	630	29.98%
5	Public / Semi-Public	48	2.27%
6	Utilities and supporting uses	25	1.20%
7	Green Buffer	160	7.59%
8	Major Parks / Public Open Space	320	15.22%
9	Transportation Facilities	0	0.00%
10	Circulation	277	13.18%
11	**Total Proposed Development Area**	**1783**	84.89%
12	Abadi Development Areas	212	10.07%
13	Railway Corridor	17	0.79%
14	MMLH	73	3.48%
15	Seasonal Watercourse / Drainage Corridor	16	0.76%
16	**Total Urbanisable Area**	**2101**	100.00%

Figure 7-2: Indicative Phase One proposed land use and development

Due to its potential to cause disturbance to residential areas, the building materials group shall be located so as to avoid south-west and north-east orientation and away from main living areas. Apparel and textiles group can be located closer to living quarters provided adequate mitigation measures are put in place to avoid any pollution/ public health issues. Both of these two industries shall rely heavily on export-oriented, rail-based logistics, taking huge advantage from proximity to the DFC feeder line at Rohat Station. Therefore, it is suggested to locate building materials and textile activities in the southern sectors, away from residential and abadi areas.

The agro food and handicraft industry groups can be located closer living areas, and will rely less on rail freight transport. Therefore, it is suggested to locate these industry groups in the northern sectors and closer to residential and abadi areas. The figure 7-2 presents the development area and land use plan for phase one.

Non-processing areas

As indicated in the figure above, residential lands occur on either side of the industrial corridor. This has the following advantages:

- Minimizes risk of cross wind air pollution from industrial activities
- Residential area can take advantage of seasonal water course and linear park
- Freight traffic will be focused along a single corridor and avoid crossing through residential lands
- Residential colonies located west of the industrial lands can take advantage of proximity to future commercial centre.

The main commercial node for this phase is centrally located to the southeast of SH-64. Several small service nodes are equally distributed across the industrial lands to provide local services and training facilities. There is one main linear park to the south which will also act as a green buffer / flood protection area given the proximity of the RediaNadi main drainage corridor. Several city level parks are equally distributed across Phase One.

With the rollout of infrastructure and development activities during this pilot phase, it is expected that great development pressure will be placed on adjoining Abadi Areas. These include Rohat, Singari and Dundhli. Careful consideration shall be given to these areas to avoid informal development, based on local consultation and in line with the recommendations of the Social Assessment carried out as part of the Development Plan.

7.1.2 Phase 2 (2023-2032)

Processing Areas

The second development phase is a transitional phase where the initial Emerging Strategic Industry [1] groups are attracted, based on changing market conditions, consolidation of infrastructure, labour supply, government incentive schemes etc. During this phase therefore,

[1] *Defined as per Market Analysis, Gap Assessment Report for JPM IA*

some of the Basic Industry groups would continue to thrive and be located within or adjoining industry zones/parks where the Emerging Strategic Industry groups would be set up.

Consideration of cross-wind pollution is particularly important in phase two, given the orientation and configuration of the land use plan. A major objective is to avoid cross wind air pollution from building materials industry to residential areas. To this end it is suggested to focusall Building Materials activities along the NH-65 corridor. It could be co-located with the motor vehicles, auto components and general machinery and equipment sub-divisions. Behind this corridor, along the inner belt, lighter industrial activities would be placed (eg some types of textiles, electrical and communication machinery & apparatus, etc). These activities could act as a buffer to protect the proposed residential lands to the south from any major disturbances.

The figure below presents the development area and land use plan for phase two.

Phase two area breakdown and proportion of land uses proposed for JPM IA

S. No	Land Use	Phase 2 Gross Area (ha)	Phase 2 Percentage (%)
1	Residential	249	11.8%
2	Commercial	71	3.4%
3	Mixed Use	61	2.9%
4	Industrial	682	32.4%
5	Public / Semi-Public	184	8.7%
6	Utilities and supporting uses	8	0.39%
7	Green Buffer	175	8.3%
8	Major Parks / Public Open Space	135	6.4%
9	Transportation Facilities	14	0.68%
10	Circulation	293	13.96%
11	**Total Proposed Development Area**	**1873**	89.15%
12	Abadi Development Areas	212	10.07%
13	Railway Corridor	17	0.79%
14	MMLH	73	3.48%
15	Seasonal Watercourse / Drainage Corridor	14	0.65%
16	**Total Urbanisable Area**	**2188**	104.15%
17	Seasonal Watercourse / Drainage Corridor		
18	Peripheral Control		
19	**Total Notified Area**		

Figure 7-3: Indicative Phase Two proposed land use and development

Finally, a small amount of industrial lands south of the railway could be permitted as part of phase two, given the proximity to MMLH. An industry park here during this phase could benefit from more high-skilled labour force with R&D as a supporting element. Such higher value production activities could be promoted by giving priority accessto MMLH. An additional advantage would be proximity to both the commuter rail line and future city centre. In this way, this cluster could act as a pilot scheme for the entire southern district which would be developed as part of phase three.

Non-processing areas

Phase two contains a higher proportion of non-industrial to industrial lands compared to phase one. This is based on the assumption that the real estate market will have begun to consolidate and the employment areas will rely less on commuters, and more on local residents. It is during this phase that JPM IA will be perceived more as a living breathing township rather than a mere collection of large-scale industry parks and logistics activities. The urban spine boulevard shall be mostly developed during this phase. This is a crucial element that shall tie the township together and act as a major urban set-piece and gateway from NH-65.

The focus of development along this corridor shall be higher density, mixed use with active street frontages for much of its length. The boulevard shall act as the most important radial route along which an important commercial and civic centre shall be established with higher level public facilities that will be of benefit to the region as well as the development itself. Residential colonies are focused to the south of this corridor which can serve both phase one and phase two employment areas. Further elaboration on the design aspects of this corridor is presented in follow-up chapters.

During this phase it is expected that pressure will be placed on adjoining Abadi Areas, including Doodali, Nimbli Patelan and Nimbli Brahmnan. Careful consideration shall be given to these areas to avoid informal development, based on local consultation and in line with the recommendations of the Social Assessment carried out as part of the Development Plan.

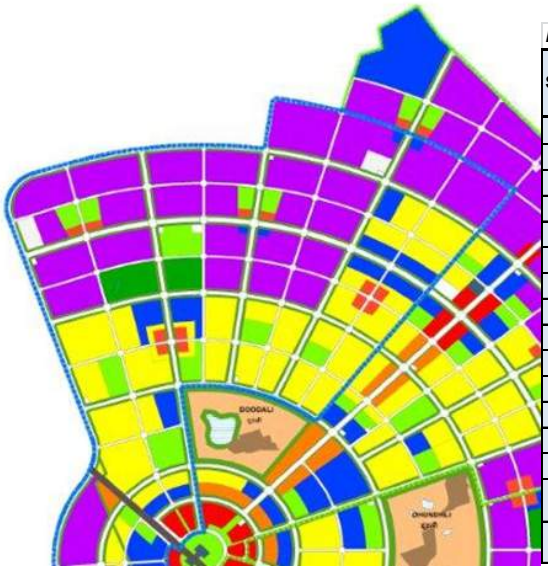
7.1.3 Phase 3 (2033-2042)

Processing areas

During the third development phase, a large portion of the industrial lands is taken up by general machinery and equipment. These activities are flexible but need larger spaces so can be co-located with others. It is suggested to locate general machinery and equipment production close to the railway since it is expected that the main delivery method of these bulky goods shall be by rail.

In order to avoid possible noise or ground pollution issues, it is suggested that the electrical and communication machinery & apparatus subdivision should be located away from main living areas. Therefore, it could be co-located with other heavy industries at the periphery.

The figure 7-4 presents the development area and land use plan for phase three.



Phase three area breakdown and proportion of land uses proposed for JPM IA

S. No	Land Use	Phase 3 Gross Area (ha)	Phase 3 Percentage (%)
1	Residential	403	19.17%
2	Commercial	33	1.58%
3	Mixed Use	4	0.19%
4	Industrial	634	30.17%
5	Public / Semi-Public	107	5.11%
6	Utilities and supporting uses	25	1.20%
7	Green Buffer	173	8.22%
8	Major Parks / Public Open Space	144	6.85%
9	Transportation Facilities	14	0.66%
10	Circulation	297	14.15%
11	**Total Proposed Development Area**	**1834**	87.29%
12	Abadi Development Areas	212	10.07%
13	Railway Corridor	17	0.79%
14	MMLH	73	3.48%
15	Seasonal Watercourse / Drainage Corridor	1	0.06%
16	**Total Urbanisable Area**	**2136**	101.70%

Figure 7-4: Phase three proposed land use and development

Lighter industries can be focused in the areas to the south of the railway could be promoted as a “high-tech” area, taking advantage of proximity to the main commercial centre and the DFC feeder line.

Non-processing areas

The proportion of non-industrial lands is also higher during this phase, as it is anticipated that with the maturing of the real estate market, more diverse land use types become economically viable and the residential sector takes off. A key element to the success of phase three shall be the development of the commercial core. This will require a major new transit hub, which connects the new commuter rail system to the BRT line. The remainder of the urban spine corridor shall be built, terminating at a major new plaza. The commercial district will be intense, vibrant and pedestrian-oriented.

A substantial part of the area will have controlled access, barring any freight movement through the centre. A number of key public and/or semi-public institutes will be given primary locations in the commercial centre. A substantial mixed use (residential/commercial) area will encircle the commercial centre to ensure a healthy and vibrant mix of activities at all times, not just during business hours. Further elaboration on the design aspects of this node is presented in follow-up chapters.

During this phase it is expected that pressure will also be placed on adjoining Abadi Areas, including Nimbli Brahmnan and Doodali. Careful consideration shall be given to these areas to

avoid informal development, based on local consultation and in line with the recommendations of the Social Assessment carried out as part of the Development Plan.

7.2 Development Timeline

As discussed earlier in the Real Estate section, the necessity for determining a Development timeline arises from the fact that land is the most crucial factor for development at JPMIA. It is essential to know the chronology of future developments in order to meet the Phase wide objectives and Plan provisions set out in this Development Plan for JPMIA. It will assist the Development Authority in its assessment of the amount of land to be procured under each phase and enable it to prepare the procurement strategies as well as the Land disposal strategies. Further, the Development timeline is graphically represented below, in order to depict the spatial developments over every two year spans. This will assist the timely phasing of developments in infrastructure, industries and non-industrial uses. These have been depicted in Figures 7-2, 7-3 and 7-4 respectively.

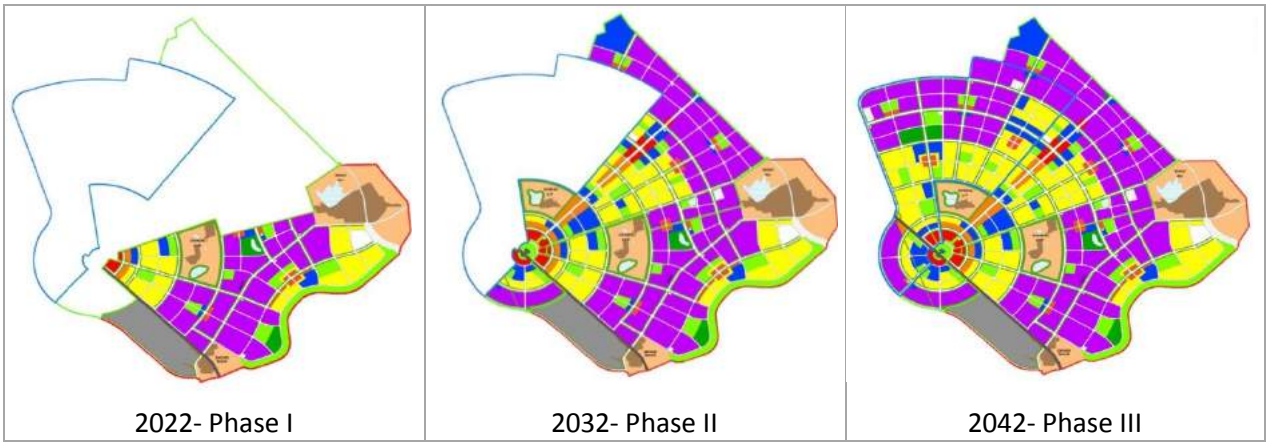


Figure 7-5: Development Timeline for JPMIA

Chapter 8

Traffic and Transportation Plan

8.1 Introduction

This chapter sets out the proposed transport system for JPM IA within the horizon year 2042 development scenario.

8.2 Principles of Transport Planning

JPM IA aims to have an integrated urban transportation system developed in the future, which is sustainable, highly efficient and suitable to the city's spatial structures. JPM IA will develop an accessible, extensive, and advanced transport system in the city and also coordinate with the regional transport system. The JPM IA transport system will be developed considering the following principles and strategies:

Sustainable Development: A sustainable transport system meets mobility needs while also preserving and enhancing human and ecosystem health, economic progress, and social justice now and for the future. Planning for sustainable development aims to attain the objectives simultaneously and in a just manner, considering accessibility as well as mobility in the process.

Transit Oriented Development: The spatial distribution shall be based on the principles of Transit Oriented Development (TOD) to arrive at a highly compact development. TOD encourages walkability, non-motorized and public modes of transport. Ageneric TOD concept is presented in the figure 8-1, showing a highly accessible transit node surrounded by higher density mixed use development.

Integrated urban transportation system shall be developed in the future, which is sustainable, highly efficient and suitable to the city's spatial structures. This goal can be described as "integrated within the city, connected to outside the city, focusing on both passenger and freight transport".

Prioritise walking and cycling as modes of transport. Sustainable places prioritise walking and cycling. A key indicator for the success of any place is the quality of the walking environment for children and older people. Providing for effective and balanced transport that prioritises cycling, walking and public transport will be essential to the success of JPM IA as a place.

The movement of freight and cars will need to be carefully managed in conjunction with slower modes and public transport in line with the figure below. In this prioritisation hierarchy diagram pedestrians have highest priority, private cars have least priority. This is a guiding principle for

street design in urban areas and especially in areas with a higher density of pedestrians such as along the Spine Boulevard and commercial core area.

Flexibility in street design can allow for longer – term strategies such as BRT to be retro-fitted without having to re-design the street specifications, ROW, etc. This is illustrated in the figure below.

Integrated Traffic Design: The performance of a public transportation system and its capacity to satisfy residents depends on how complementary and well-coordinated the various modes of transportation are (bus, trains, shuttles, taxis, rickshaw, bikes, etc.).Integrated traffic design helps to reduce traffic and mitigate the negative impacts of automobile travel on the urban environment. This shall be a key consideration in the design of the road system in order to facilitate the objectives of a compact, walkable city. JPM IA will develop an accessible, extensive, and advanced transport system within the city and also **coordinate to improve the regional transport system**. The JPM IA transport system will be developed considering the principles and targets for sustainable development set out in the preceding chapter.

Travel Demand Management (TDM): TDM refers to application of strategies and policies to reduce demand or to redistribute this demand in space or in time. TDM aims collectively to encourage more efficient use of transport resources such as road and parking spaces as well as capacity and energy use. Similar to the planning philosophy of Transit-Oriented Development (TOD), TDM should be regarded as a holistic philosophy that requires cooperation across sectors to implement strategies overseen by a unifying programme.

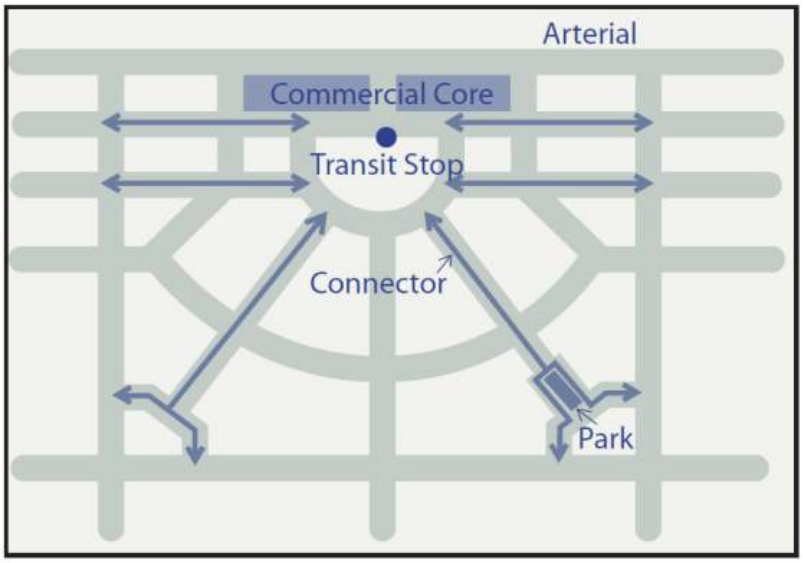


Figure 8- 1: Generic TOD concept: A highly accessible transit node surrounded by higher density mixed use development

8.3 Integration of Garden City and Neighbourhood Planning

In order to provide a high quality urban street environment two basic influencing factors need to be considered and balanced, the land use context and the transport carrying capacity. Urban streets are not just for movement, but for supporting the land uses along them, including space for social exchange, children playing, informal trade and public events. Emerging best practice is moving towards an understanding that streets serve many functions. To this end, street classifications must reflect more than the simple balance between automobile movement and access. Street design guidelines should always take account of the land use context, and not merely the transport function. That means designers, planners, civil and traffic engineers must work together in an **integrated** way during the detailed design and implementation phase to meet the standards expected of a world class new town development.

Key ingredients for successful street design can be considered as follows:

- Good enclosure ratio. 1:2 ratio is recommended for more dense urban environments (see figure below). Less urban street sections can be designed with a ratio of building height to road corridor width of between 1:6 (low), 1: 3 (medium) and 1:2 (high), as per the figure below;

Figure 8- 2: Street design concept with comfortable (shaded) and safe space for walkers and cyclists

Figure 8- 3: Consideration of different zones within a main street avenue/boulevard context
Source: Delhi - Street Design Guidelines 2010

- Mix of uses - create vitality - many reasons to go to one space;
- Activity - people at all times of day and year;
- Tamed traffic – priority for pedestrians with lots of crossing points;
- Create 'incidents' - tall buildings, celebrate nodes and intersections;
- Trees for shading. Street trees also provide the sense of enclosure and give more comfort to users, which is essential in hot arid climates.

8.4 Travel Demand Analysis of IA

The travel demand of JPM IA is estimated following the traditional four-step travel demand analysis method as illustrated in the Figure below.

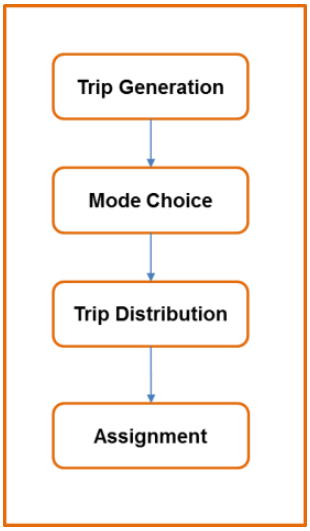


Figure 8- 4: General Transport Demand Forecast Framework

Trip generation predicts the number of trips originating in (Production) or ending in (Attraction) a particular area. Trip distribution matches trip makers' starting points and destinations to develop a "trip table", usually based on a gravity model which distributes trips in inverse proportion to the distance between zones. Mode choice analysis allows the modeller to determine what mode of transport will be used, and what modal share results. At the traffic assignment step, the trips are assigned to specific road segments in the transportation network. There are two types of demand in IA: passenger travel demand from people work and live in IA and freight traffic demand from IA's industry. Therefore, JPM IA travel demand is estimated based on the proposed IA target population, employment and industry output.

Passenger Travel Demand

The passenger traffic generated by the proposed IA has been analyzed by taking the projected population and employment as the base and applying the average trip rate. The passenger travel demand is estimated for two categories, namely trips from IA to surrounding cities/region or trips from surrounding cities/region to IA i.e. external-internal trips, and trips within the IA i.e. internal trips.

The external-internal trips generated by IA will impact the national and state highway traffic volumes. Trips within the industrial area will be greatly affected by the IA's land use master plan. Trip production is the trips produced by population in the IA. Trip attraction is the trips attracted by the IA which is mostly related to the employment. The trip rates were adopted from Comprehensive Mobility Plan for Jodhpur. The preliminary estimation of IA generated external trip rate (i.e. trip rate to external areas) is to be four per hundred persons per day and IA attracted trip from external area is to be thirty per hundred employees. As for the internal trips, the per capita trip rate for production is 0.8 and 1.8 for attraction or employment. The following table summarized the average daily trips generated in IA area. The total external trips will be 163,280 trips per day and internal trips will be 733000 trips per day after the full development of Industrial Area.

Table 8- 1: Industrial Area Person Trips

		2022	2032	2042
Population		95000	214000	392000
Employment		66000	165000	315000
Commuting Employment		17000	43000	82000
Internal External Trips (Person Trips/Day)	Production	3800	8560	15680
	Attraction	30600	77400	147600
	Total	34400	85960	163280
Internal Trips	Production	76000	171200	313600

		2022	2032	2042
(Person Trips/Day)	Attraction	88200	219600	419400
	Total	164200	390800	733000
Total Trips (Person Trips/Day)	Production	79800	179760	329280
	Attraction	118800	297000	567000
	Total	198600	476760	896280

The generated Passenger Trips will use various transport modes such car, bicycle, bus, train etc. This will depend on personal preference, ownership condition and trip characteristics. This modal share percentage is estimated based on traffic count surveys, Comprehensive Mobility Plan for Jodhpur and the Study on Traffic and Transportation Policies and Strategies in Urban Areas in India by the Ministry of Urban Development, May 2008.The modal share among different traffic types is assumed to be as in Figure 8-5 for internal-external trips and Figure 8-6 for internal trips.

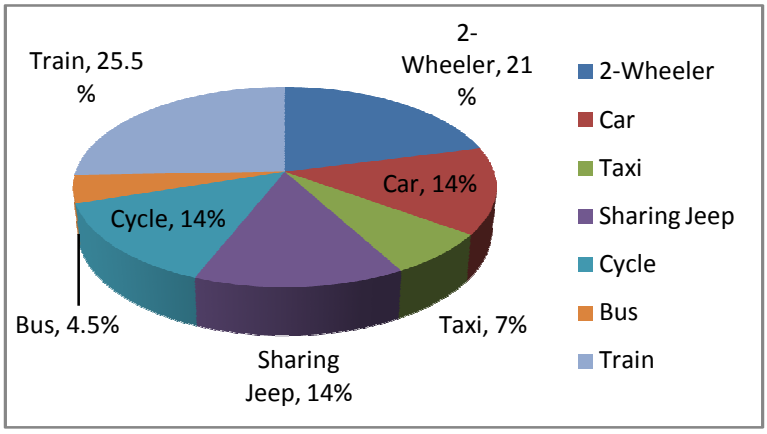


Figure 8- 5: Mode Share Percentages for External-Internal Trip

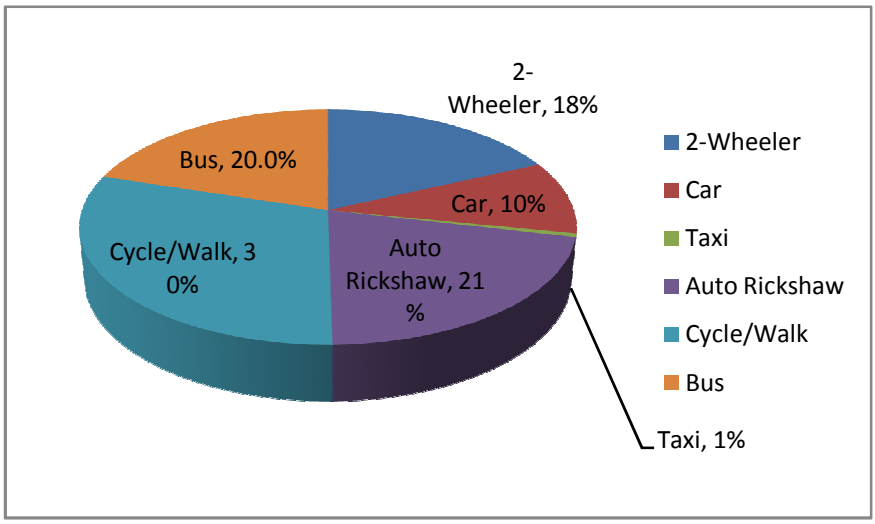


Figure 8- 6: Mode Share Percentages for Internal Trip

The table below shows estimated person trips per day for all the motorized movements. Trips from the JPM IA to outside are expected to be relatively low because most people will work and reside within the IA. The internal road hierarchy and widths are based upon the trip forecasts.

Table 8- 2: Person Daily Travel Demand Estimates by Mode

Mode	Internal External Trips (Person Trips/Day)			Internal Trips (Person Trips/Day)		
	2022	2032	2042	2022	2032	2042
Two Wheeler	7224	18052	34289	29556	70344	109950
Car	4816	12034	22859	16420	39080	36650
Jeep(I-E trip) /Rickshaw(I-I trip)	4816	12034	22859	34482	82068	153930
Taxi	2408	6017	11430	821	1954	3665
Bus	1548	3868	7348	32840	78160	146600
Total	**20812**	**52005**	**98785**	**114119**	**271606**	**450795**

Table 8-3 presents vehicle occupancy rates and PCU conversion factors adopted in this study. With mode share, vehicle occupancy and the PCU factors, person trips can be converted to passenger car trips as show in Table 8- 4.It is estimated that the IA area will generate a total of 163637 Passenger Car Equivalent (PCU) internal vehicle traffic a day at year of 2042. At the same time, 37000 PCU of cars will come into or go outside of IA every day. The peak hour factor (PHF) has been assumed as 0.1 based upon Comprehensive Mobility Plan for Jodhpur. The peak hour motorized traffic will be 16370 PCU/hour inside IA during year 2042.

Table 8- 3: Travel Estimate Parameters

Mode	Occupancy	PCU
Two Wheeler	1.2	0.5
Car	2	1
Rickshaw	2.5	1
Taxi	1.5	1
Bus	55	3

Source: 1. Comprehensive Mobility Plan for Jodhpur
2. Rajasthan Public Works Department Traffic Census Data

Table 8- 4: Motorized Passenger Car Equivalent (PCU) Daily Travel Demand Estimates

Mode	Internal External Trips (PCU/Day)			Internal Trips (PCU/Day)		
	2022	2032	2042	2022	2032	2042
Two Wheeler	3010	7522	14287	12315	29310	54975
Car	2408	6017	11430	8210	19540	36650
Jeep (I-E trip) /Rickshaw(I-I trip)	688	1719	3266	13793	32827	61572
Taxi	1605	4011	7620	547	1303	2443
Bus	84	211	401	1791	4263	7996

Mode	Internal External Trips (PCU/Day)			Internal Trips (PCU/Day)		
	2022	2032	2042	2022	2032	2042
Total	**7796**	**19480**	**37003**	**36656**	**87243**	**163637**

Freight Travel Demand

The truck or freight traffic in IA area was analyzed based on the value of the Industrial Area's output forecast. The DMIC JPM IA Area Market Assessment Report estimated the main industry and it production value for the IA area in the future year. The Value to Weight ratio from different types of industry was applied to convert the input value to commodity weight. The values to weight ratios were adopted from Bureau of Transportation Statistics North America trans-border freight data. Based on the value to weight ratio and the commodity output value, the commodity cargo demands were calculated for each horizon year as shown in Table X. By 2022, the total cargo generated by IA is only about 32000 ton. While with the development of the IA, the total cargo amount reaches 7.2 million ton. At the same time, the commodity export ratio increases will cause the increase of the EXIM cargo.

Table 8- 5: IA Industry Cargo Demand Estimates

Year	Industrial Production (INR Crore)	Export (INR Crore)	Domestic Sale (INR Crore)	Export Ratio	Cargo Demand (Ton)
2022	13700	2393	11307	17%	324,360
2032	77002	19627	57375	25%	1,756,108
2042	327000	106394	220606	33%	7,178,669

The raw materials for the JPM IA industrial manufacture come from various regions, some are local materials, some are from Rajasthan region and some may from other region of India. The final products also have different sale markets. Some products are mainly for regional sale such as food product. Textile and Handicrafts are mainly exported globally. The table below lists the main transport modes and percentage of road transport of different commodities. Furthermore, the transport mode used to transfer the commodity will depend largely on the commodity type and transport characteristics. Road traffic can provide door to door services, while railway usually handles bulky freight and not time sensitive cargos. Since the food products are usually time sensitive and need special cold storage during transport. Therefore, cold storage trucks will be most suitable for food transport. Computer and electronic products are delicate, high-tech, small volume and of high cost, making them more suitable for air transport. Since Jodhpur airport need road transport support to connect to the IA area, the computer and electronic products will first need to use trucks to arrive to the airport.

Table 8- 6: Commodity Distribution and Transport Mode

Commodity	Main Raw Material Resource	Main Market	Main Transport Mode	%of Road Transport
Agro Food	Rajasthan	Region/Domestic	Truck	80%
Textile and Apparel	Rajasthan	Domestic/Global	Rail/Truck	60%
Building Material	Rajasthan	Domestic/Global	Rail/Truck	40%
Handicraft	Rajasthan	Domestic/Global	Truck/Air	80%
Motor Vehicle & Auto Components	Rajasthan/DMIC	Domestic	Rail/Truck	40%
Computer, Electronic and Optical Products	DMIC	Domestic/Global	Truck/Air	100%
Solar Energy and Equipment Related	DMIC	Domestic/Global	Truck/Rail	60%
Machinery & Equipment	Rajasthan/DMIC	Domestic/Global	Rail/Truck	40%

The cargos transport by rail and highways are distributed as in Table below by applying the analysis results of above Table 8-6.Total cargo generated by IA is 0.32 million ton in 2022, 1.76 million ton in 2032 and 7.18 million ton in 2042. Of all the cargo, average 30% will use rail and 70% use the road to transport.

Table 8- 7: Industrial Area Generated Cargo Demand

Year	Industrial Output (Crore)	Cargo Tonnage (Million Tons/Year)	Rail Cargo Tonnage (Million Tons/Year)	Road Cargo Tonnage (Million Tons/Year)
2022	13700	0.32	0.09	0.24
2032	77000	1.76	0.49	1.27
2042	327000	7.18	2.04	5.14

Using the truck vehicle mode split obtained from the cargo OD survey, the road cargo will be split among different truck types based on the commodity type. Different commodity has different truck mode split to transport the commodity. Table 8-8 gives mode split results of different type truck vehicles for each day. It indicates that the IA industry will generate 86 trucks per day in 2022, which equal to 271 passenger car units. In 2042, it will generate more than 1800 trucks per day, which equal to 5800 passenger car units.

Table 8- 8: Industrial Area Generated Cargo Trucks

Year	LCV/Day	2-Axle Truck/Day	3-Axle Truck/Day	Multi-Axle Truck/Day	PCU
2022	30	18	34	4	271
2032	162	96	184	20	1800
2042	652	393	744	82	5800

8.5 Regional Network Analysis of IA

External Roads Connectivity

National Highways and State Highways are the predominant types of surface transport facility currently available to the communities of the JPM IA. They offer the most convenience to local and long-distance travellers in terms of connectivity and accessibility compared to any other transport facility. Under existing conditions, NH-65, SH-64 and SH-61 are major highways linking the IA to the outside region.

SH-64 is one of the busiest roads within the JPM IA area. The SH-64 segment from Rohat Station to NH-65 is located inside the JPM IA development area. With the development of the IA, this segment will become a major interior urban arterial. In order to exploit the strategic potential of connecting JPM IA to SH-61 (thus providing potentially faster access to Jodhpur City, Jodhpur Airport and NH-14 over the long term), it is recommended that SH-64 be extended further northeast from the junction at NH-65. The design of this segment would need to satisfy the urban road design requirement and avoid disturbance to Rohat Town. Pedestrian and bicycle facilities, such as sidewalk, bicycle lane, may require to achieve the sustainable transport goal of the IA. As urban traffic increase, median separation may also need to assure traffic safety.

To better serve the freight transport of IA area, it is recommended to add two highways in the future. One proposed new highway construction is to extend SH-64 to SH-61 to facilitate truck access to Jodhpur Airport and to DFC at Marwar Junction. The other highway project is to connect the IA with SH-64 and SH-68. The project will provide easy access to MMLH from other Districts of Jodhpur Region such as Barmer, Jalore and Sirohi. These road extensions are illustrated in the figure below. Based on the travel demand analysis, improvement to those key highways to the wider region is recommended as given in Table 8-9.

Table 8- 9: Recommended Strengthening of the Regional Road Network

	2022	**2032**	**2042**
NH-65	4-lane	4-lane	6-lane
SH-61	2-lane	2-lane	4-lane
SH-64	2-lane	4-lane	4-lane
Extension of SH-64	2-lane	2-lane	6-lane
New highway connecting SH-64 and SH-68	-	2-lane	4-lane

It is estimated that traffic on SH-64 will be heavy at the later phase of JPM IA. To relief the traffic congestion on SH-64, SH-64 bypass is recommended. One alternative is using a current existing unpaved road along the rail and upgrade this road. The road will connect the

newly constructed freight corridor from the junction of SH-64 to Pali Bypass. For the long term, it is proposed a new bypass south of the railway starting from SH-64, cutting across the railway at Chotilla Village and finishing at the intersection of NH-65 and the By-pass at Kharda Lake. This will not only provide a much faster direct route for cargo traffic reaching the MMLH but also relieve pressure on the SH-64 and NH-65 corridor over the long term.

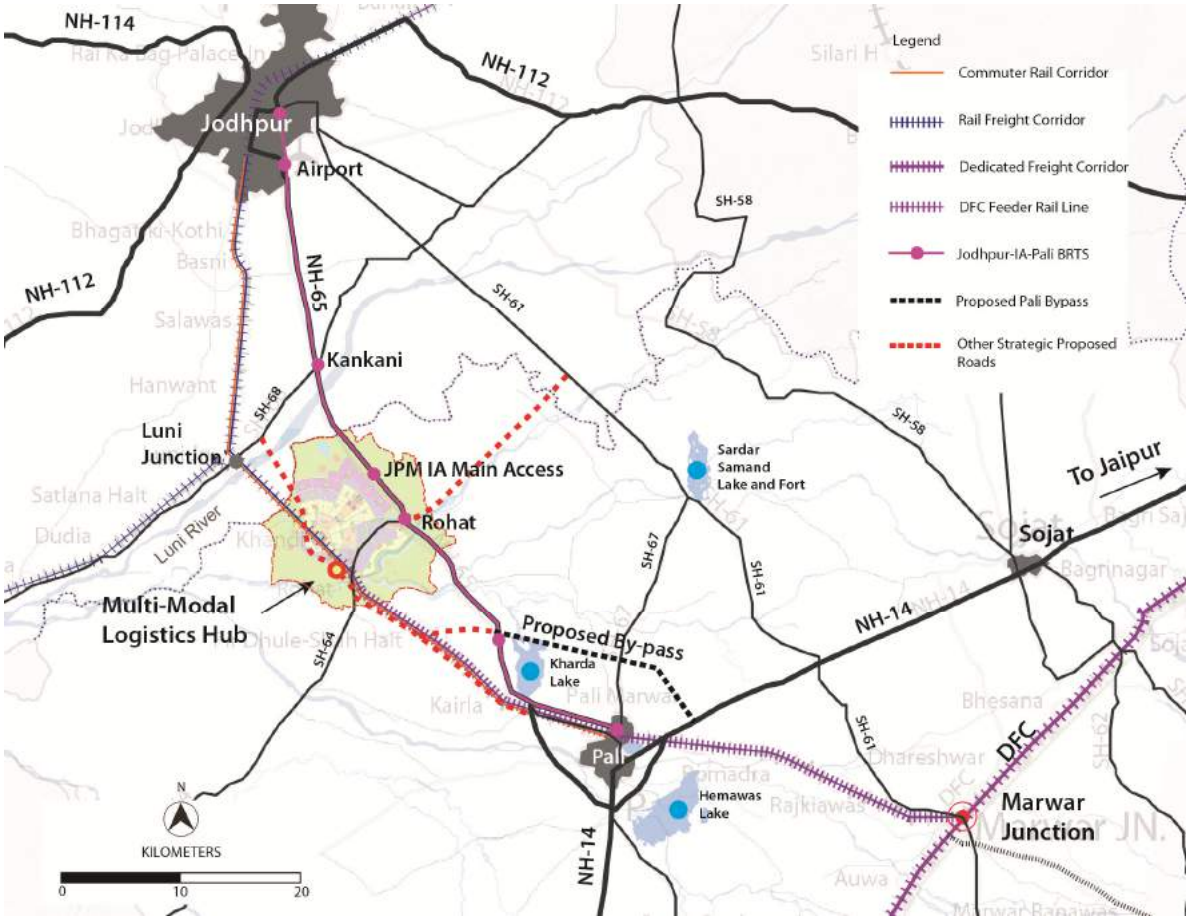


Figure 8- 7: Proposed Strategic Road and Rail Corridors for JPM Region

External Rail Connectivity

Regional freight and passenger rail services will play an important role in connecting the JPM IA with the rest of the country and the DFC. Jodhpur to Marwar Junction rail line connects JPM IA with Jodhpur and DFC. Currently, it is a single track broad gauge line. The government is intending to convert the existing single track to double tracks. It is proposed that the current Rohat Station will be used mainly for freight in the future. A new passenger rail station will be constructed near the IA city centre. The new passenger station will be promoted to develop as a Transit Oriented Development (TOD) model and become the city commercial centre. TOD is a trend in creating vibrant, livable communities which are compact and walk able, and centred on a public transport terminal. The new Rohat passenger station will be designed to maximize access to public transport and incorporate features to encourage transit

ridership. The station neighbourhood which is within a radius of 800 meters will be built for relatively high-density development.

The proposed Multi-modal Logistic Hub (MMLH) is located on southern side of current Rohat Station. The MMLH will not only serve the JPM IA area but also the wider region of whole Jodhpur Division. The location the MMLH is a balance of transport accessibility, available government land, environment impact etc. As an important component of MMLH, rail sidings extend from the current Rohat Station will be developed. To develop railway sidings for the MMLH it is only possible to take an access from the rail station as it is a signalized zone for regulating rail movement. The layout of proposed railway sidings will be parallel to the railway at the south side as depicted in the concept layout scheme below.

Figure 8- 8: Possible configuration for MMLH south of Rohat Station *(concept plan prepared as part of feasibility study; not an actual scheme).*

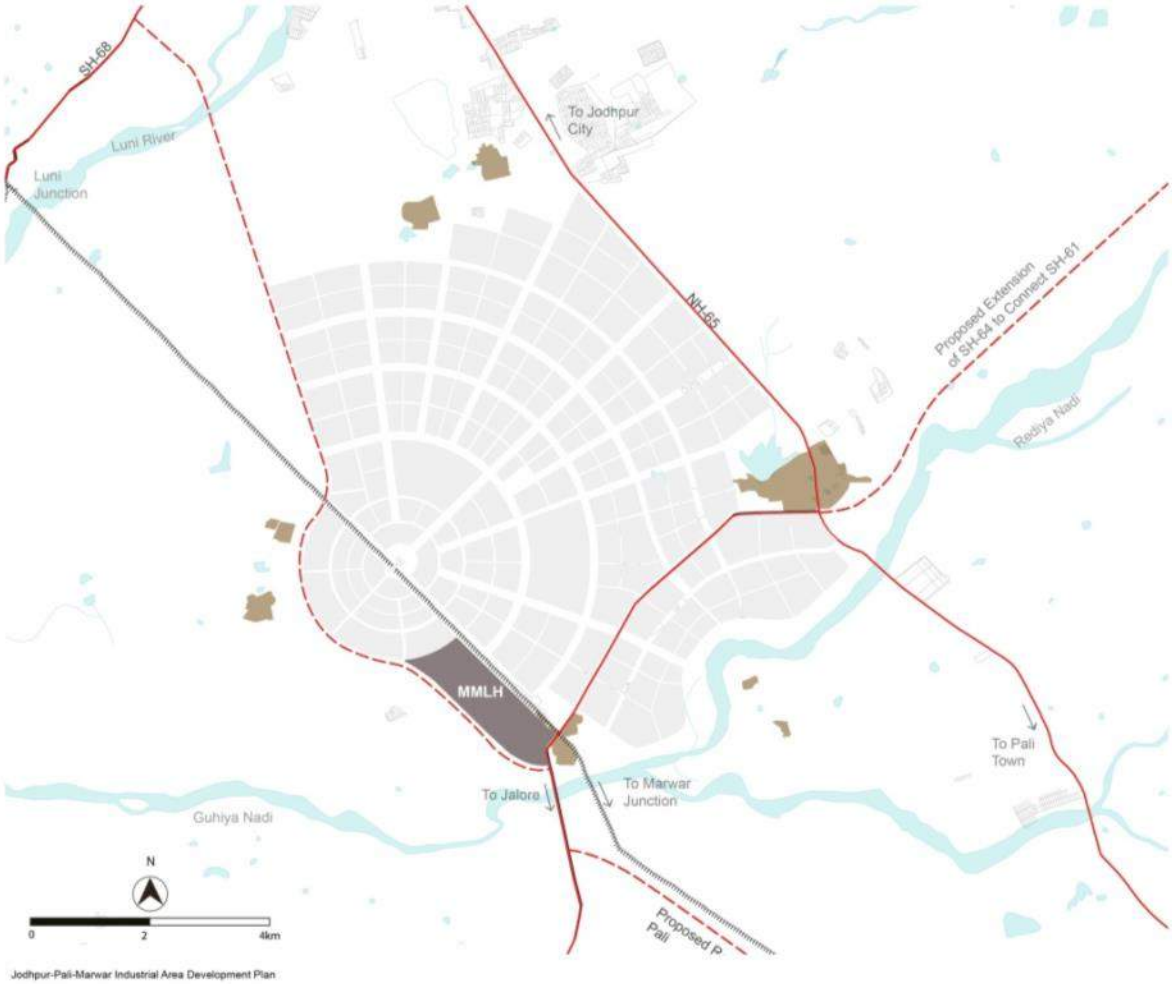


Figure 8- 9:Main Road and MMLH Connectivity

The double track conversion of Jodhpur to Marwar railway will be important to the development of the JPM IA as well as the MMLH. This railway will be used for freight movement from MMLH to Jodhpur and the DFC. In addition, the future commuter rail will also use this railway. Therefore, the rail should have enough capacity to accommodate the increasing freight and passenger trains.

8.6 Transportation Plan for the IA

Road System Configuration

Based on the design philosophy and urban structuring of the JPM IA master plan, the road configuration in the city is radial-based supported by several partial ring roads. The newly constructed passenger rail station will be the centre for the city road system. The radial-ring road system will provide easy access to the city centre and the major highways of the region.

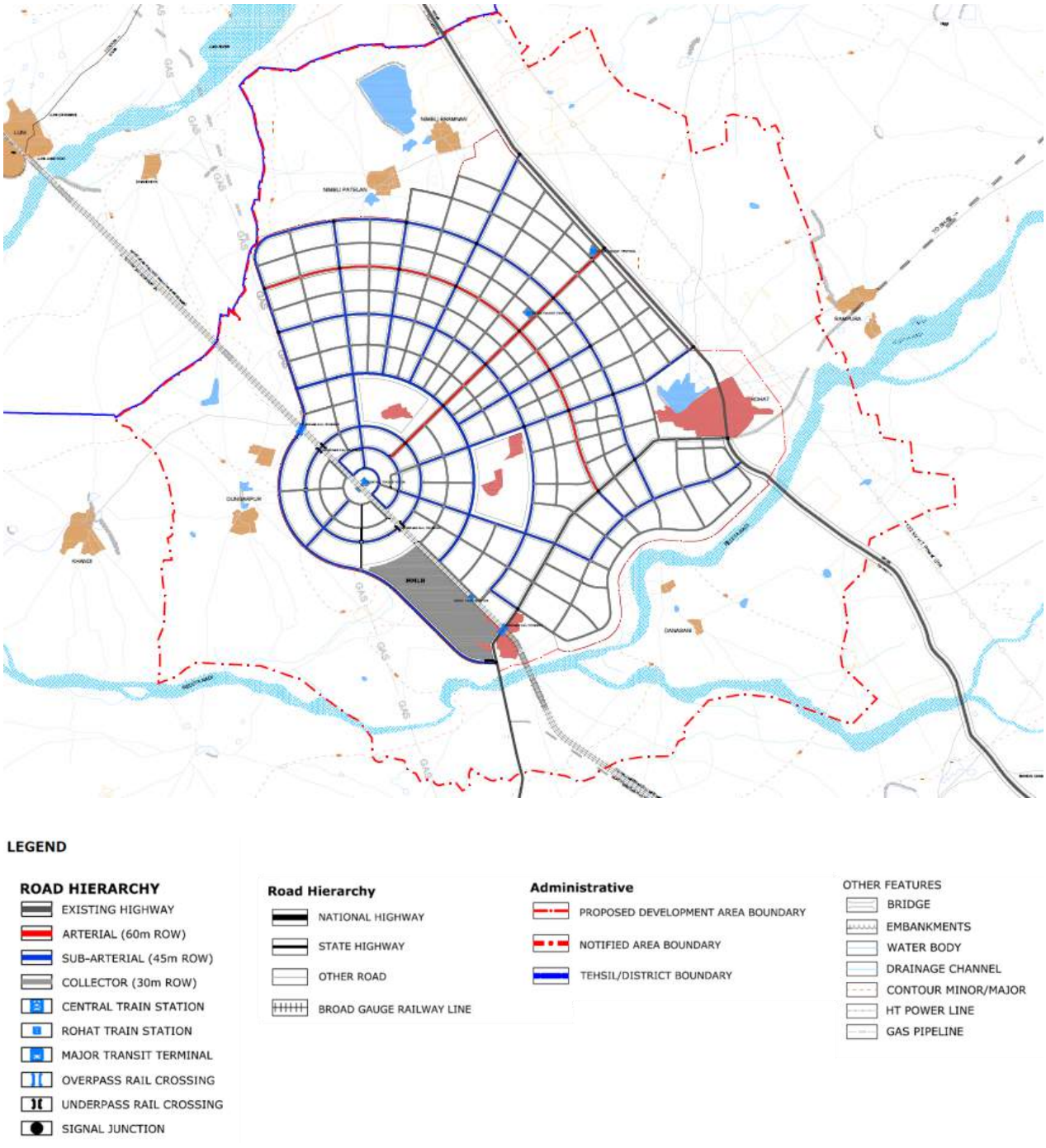


Figure 8- 10: Proposed Road System (refer Annexure IV for Land Use map)

The JPM IA area has planned a road network of total around 204km. The density of the road system is approximately 2.96 km/sqkm. The proposed road system is presented in Figure 8-10. The road classification and junctions will be described in detail in the next sections. The freight traffic from/to the outside region to JPM IA will pass through the freight access point. The freight access points are the junctions at the major highways and intersecting with the freight corridors inside JPM IA. Those points are mainly located at the city edge area to reduce the impact of freight traffic on city life. The urban central area will forbid or have limited truck access. The passenger traffic from the region will access the JPM IA through the local access points illustrated on the Figure. This will reduce the mix traffic and increase the traffic safety.

Road Classification

All planned roads in JPM IA are categorised so that the network will work efficiently. Categorisation is based on the avoidance of conflict, by separating roads serving different purposes from each other and from non-road uses. This consideration is not only to do with the functional efficiency of traffic flow, but also to ensure the safety, amenity and environmental quality of urban areas. The adoption of a hierarchy allows consistent decision to be taken about the design and management of a road or street along its length. The classification is based on priority of the different modes and purposes such as freight movement, daily commuting for workers, leisure trips and so on. The division of function can boost efficiency of the system along with ensuring safety for all users involved.

Function class categories of roads are indicated in Figure above. The system comprises six classes of road as illustrated below.

1. **National or state highways:** National and state highways are located at the edge of IA. They are used to connect IA with the outside region and mainly for long distance travel at a high speed. The proposed right of way for NH-65 is 180m. This will be capable of accommodating 6-lane carriageway and 6m each side service road. The 180m wide corridor allows for a provision of a Bus Rapid Transit (BRT) within the ROW. When the NH-65 passes through existing settlement, the right of way will be decreased to 45m to reduce the traffic impact on local life. Freight traffic from IA is discouraged to use this section of NH-65, while through truck traffic between Jodhpur and Pali will still have to use this section of NH-65. Freight traffic from IA will circulate through the priority freight road inside IA to access NH-65. The priority freight road near Rohat Village can be considered as a NH-65 bypass for Rohat Village for freight traffic from/to the IA.

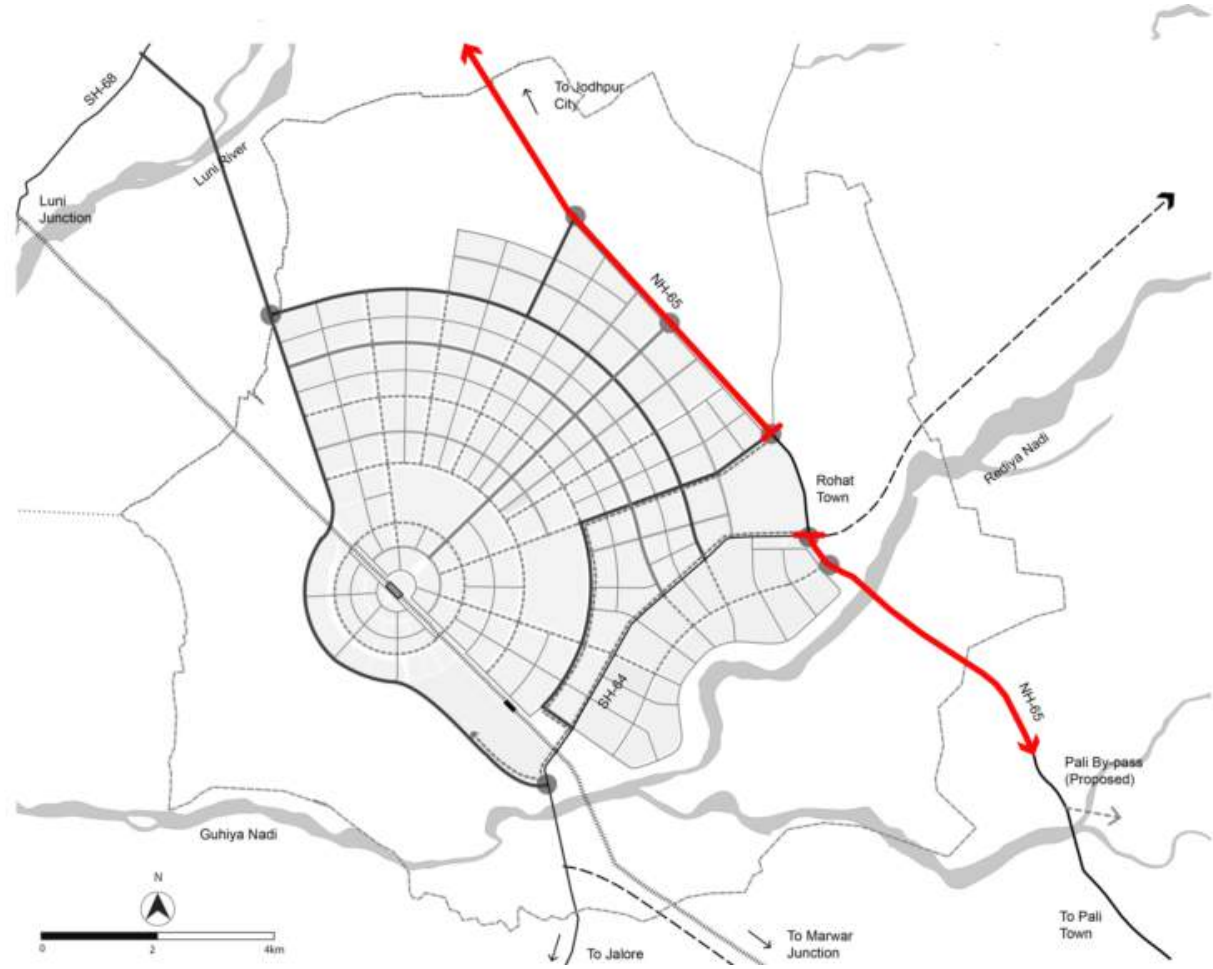


Figure 8- 11: Location of proposed NH-65 180M ROW

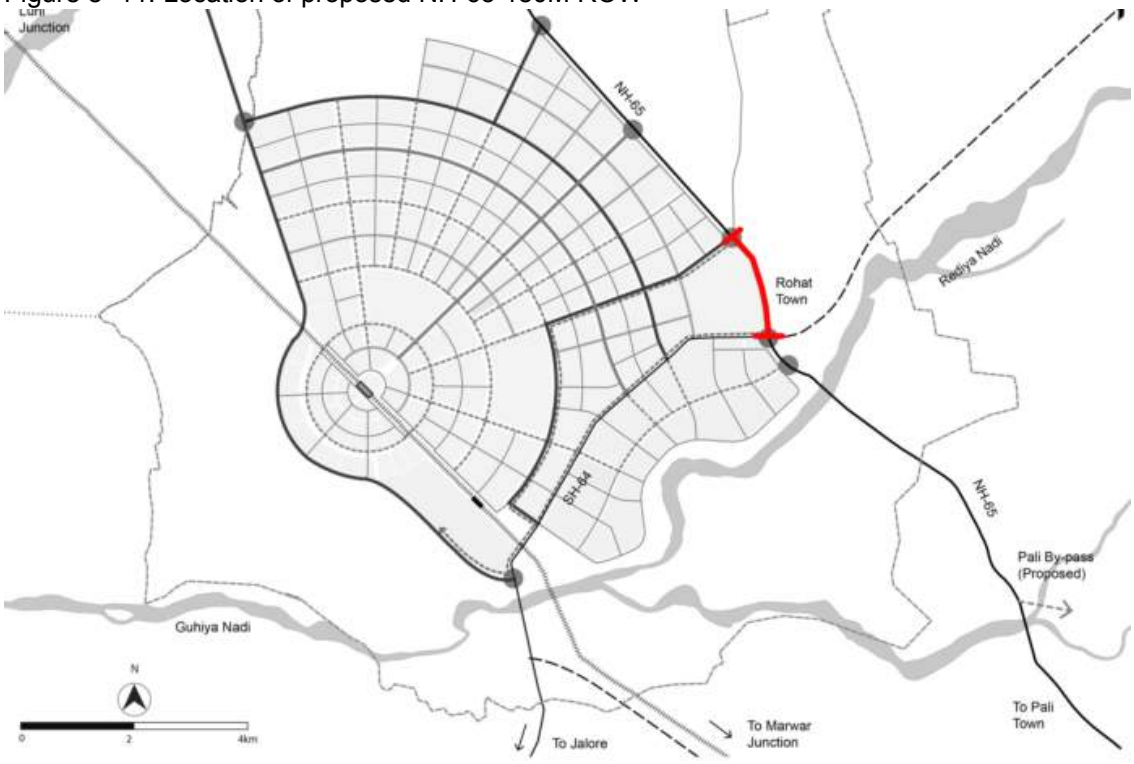


Figure 8- 12: Location of proposed NH-65 45M ROW through Existing Settlement

2 **60M arterial road (Spine roads):** The 60-meter right of way arterial roads or spine roads provide fast access to the city center and various land blocks. The proposed right of way is 60m. This will be capable of accommodating 8-lane carriageway and one lane service road at each direction. For the Central Spine road, it is recommended that the outer lane be used for BRT service in order to provide fast public transport connection from NH-65 BRT to the city center.

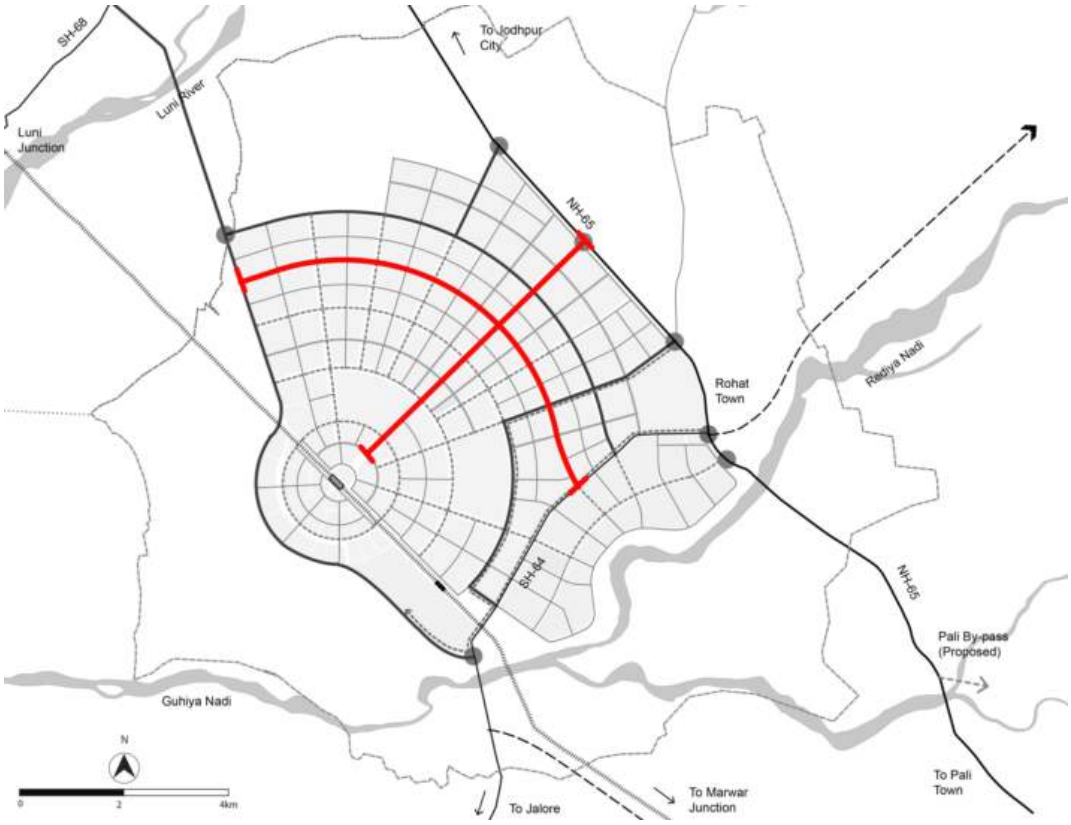


Figure 8- 13: Location of proposed Arterial Road 60M ROW

3 **45M sub arterialroads:**45-metersubarterial roads are provided for the efficient movement of traffic within the city and have a right of way of 45m. They are 6-lane carriageway roads that will facilitate the movement of high traffic volumes and provide links between different districts within the city. Traffic signals or roundabout will be provided at the intersections of these roads with local roads. The cross sections will be designed differently based on the service areas of industrial or residential.

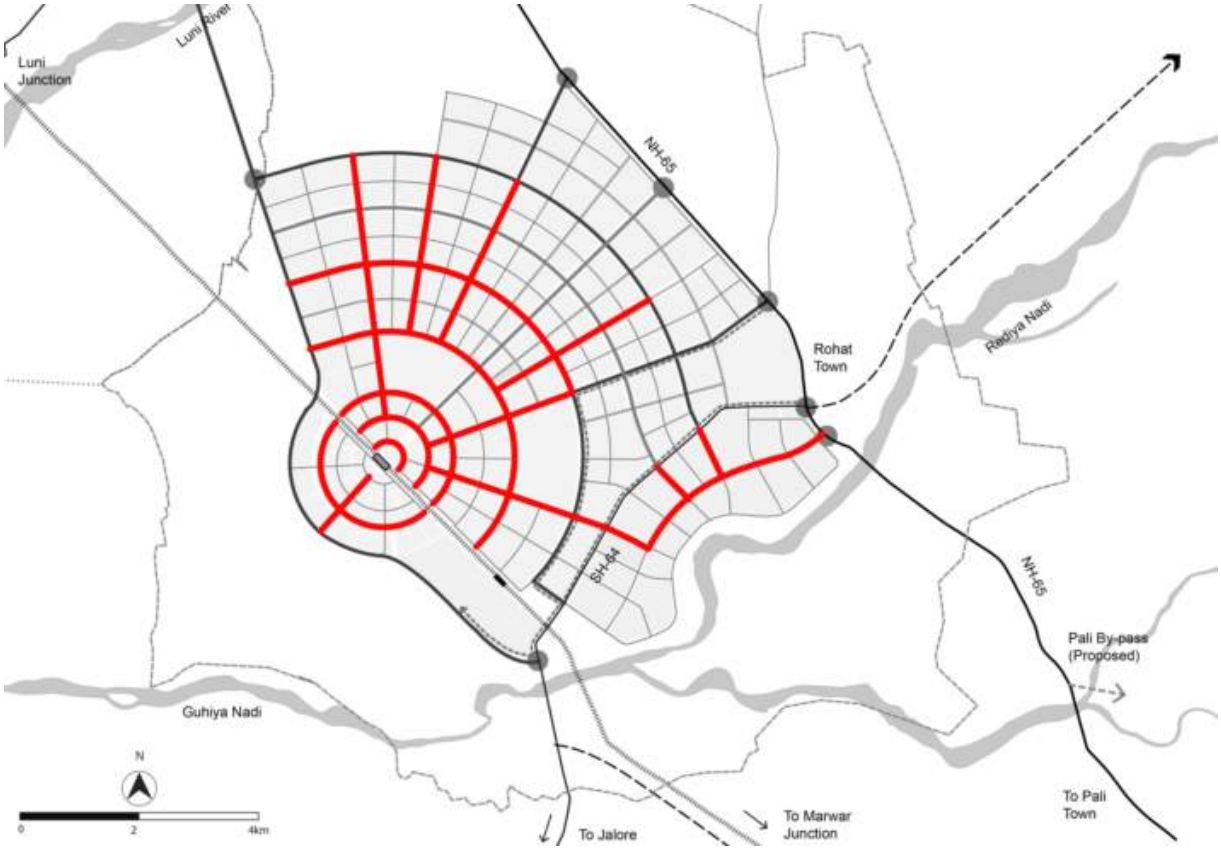


Figure 8- 14: Location of proposed Sub Arterial Road 45M ROW

4 **45M sub arterial freight priority roads:**These roads are provided for the efficient movement of freight traffic from industrial zones to the MMLH or highways. They are 6-lane carriageway roads that will facilitate the movement of high truck traffic volumes.

SH-64 is one of the busiest roads within the JPM IA area. The SH-64 segment from Rohat Station to NH-65 is located inside the JPM IA development area. With the development of the IA, this segment will become a major interior urban arterial. The design of this segment would need to satisfy the urban road design requirement and avoid disturbance to Rohat Town. Pedestrian and bicycle facilities, such as sidewalk, bicycle lane, may require to achieve the sustainable transport goal of the IA. In order to reduce the impact of heavy vehicles on resident's life and to increase the efficiency of the road, it is recommended to separate passenger vehicle and truck lanes on urban section of SH-64.

Separating the two types of vehicles will be beneficial from many perspectives, e.g., safety, economy, user appeal. It is safer because passenger vehicles and trucks have differing operational characteristics, and lane separation will increase visibility. Heavy trucks require thicker pavement. With the two modes of vehicles separated, only the truck lanes having significantly load-carrying capacity will be economically advantageous. Moreover, passenger vehicles do not have to slow down for trucks climbing grades (considering there are overpass

bridges proposed here). Separate passenger and truck lanes will reduce stress and fatigue for drivers of both types of vehicles.

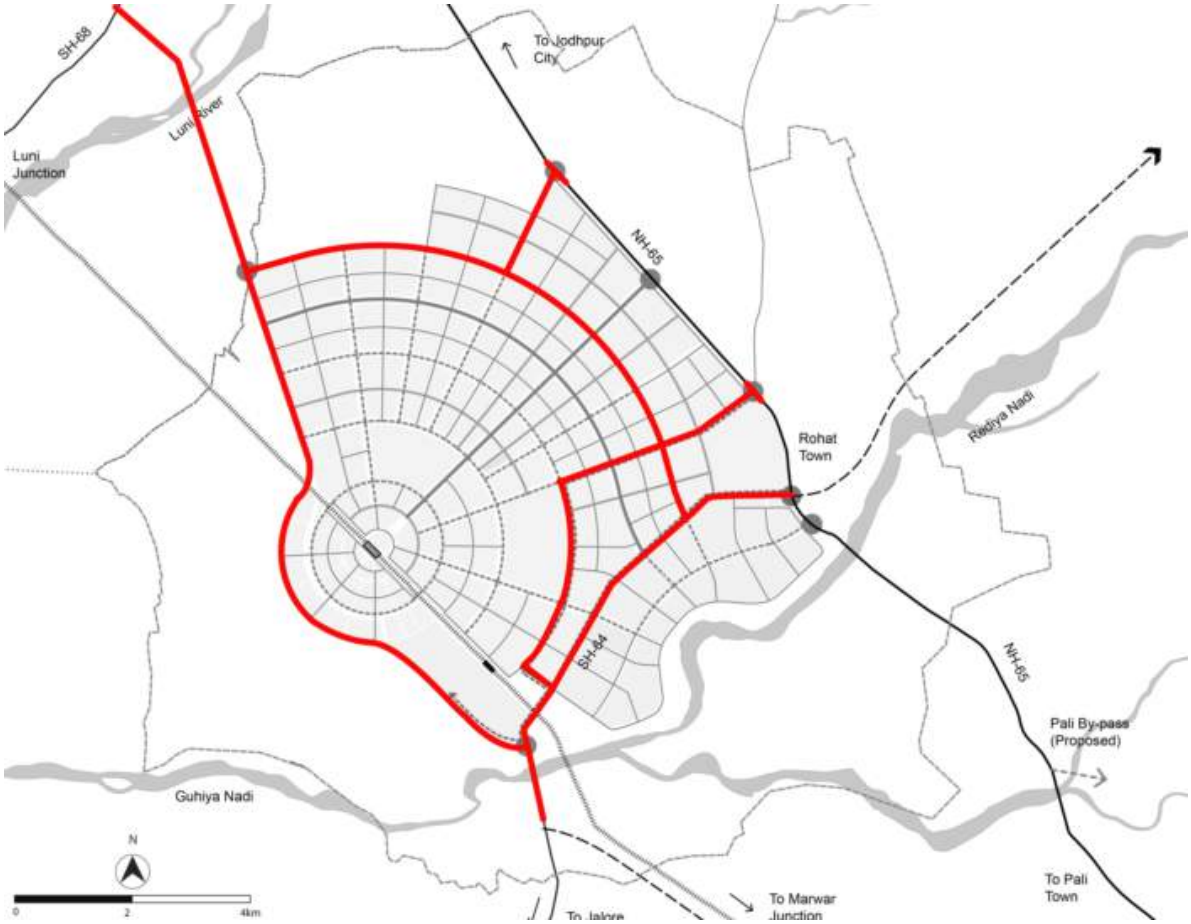


Figure 8- 15: Location of proposed Sub Arterial Freight Priority Road

5 **Urban collector roads (30m ROW):** The urban collector road network intercepts traffic from inside the city land blocks and feed it into the arterial roads. All these roads are non-continuous since their primary function is the service of districts and their design is to connect with local roads. The proposed cross section of these collector roads requires a right of way of 30m, which comprises a dual lane carriageway with a lane width of 3.5m and separate cycle-tracks and pedestrian footpaths.

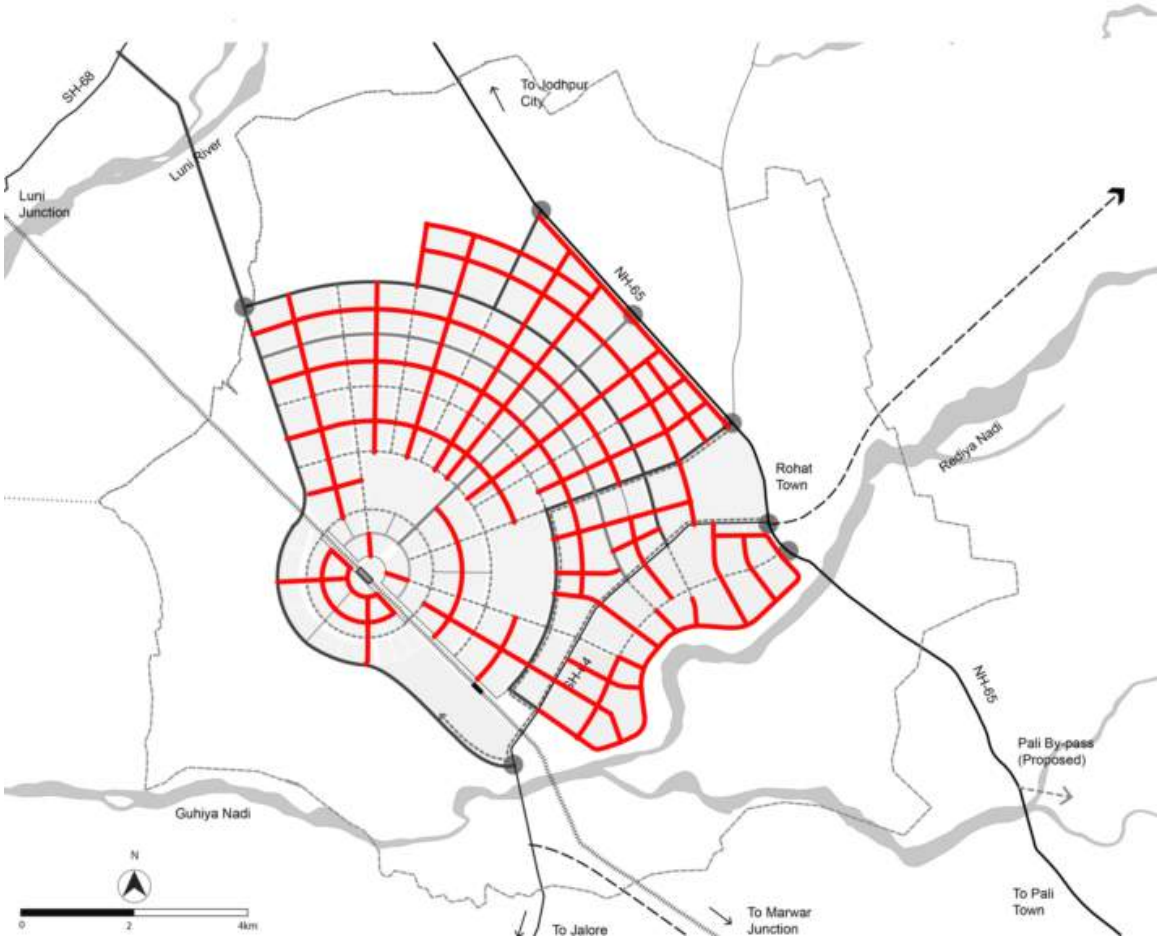


Figure 8- 16: Location of proposed Urban Collector Roads 30M ROW

6. Local roads (24m ROW): local roads provide services at the destination of the vehicular trips. They are the lowest classification of the city road hierarchy and will have low traffic volumes. The proposed right of way is 24m. Local roads are a single 2-lane carriageway with a lane width of 3.5m, provided with parallel on-street parking and cycle track on each side of the road. Local road are roads designated within superblocks, therefore not shown the master plan drawing.

Road Junctions

Road junctions in JPM IA are planned in such a way that vehicular traffic going in different directions can proceed in a controlled manner to minimize accidents. Mainly two kinds of junctions are planned in JPM IA, they are:

At grade junctions: At grade junctions are intersections that do not use grade separation and roads are crossing directly. Forms of these junction types include roundabouts, traffic circles, and signal controlled junctions.

For the at grade junctions, some signalized intersections are planned on Highways, Arterial roads and Sub arterial roads where the traffic volume will warrant traffic signal (approximately 1000 to 1200 vehicles per hour)to ensure the safe crossing of vehicles and pedestrians.

Most of junctions at urban collector and local roads will be un-signalized intersections or roundabouts. The final junction type shall be determined based on the traffic volume at planning scheme stage.

The capacity of signalized junctions will increased with proper planning of all the component of junction. Widening and channelization of intersecting roadways may be warranted to reduce the delays caused by intersections controlled by traffic signals. Following figure 8-18 illustrate a demo conceptual arrangement of signalized junction at NH-65 and Central Spine Road.

Grade separated interchanges: Grade separations are used to prevent single point of conflict. At grade separated interchange, roads pass above or below one another.

For the rail crossing, at grade crossing will be used at the initial phase of IA. With the development of IA, the rail crossing must be either overpass or underpass grade separation. When the road's function is mainly for freight, an overpass should be built such as at the SH-64 rail crossing and the newly built freight road - rail junction. When the road's function is mainly for pedestrian and passenger cars, an underpass may be built such as at the rail junctions near the new Rohat station. Details of junction types and locations are provided in the Transportation Plan mapping which is presented in the Annexure.

The sketch section views of the overpass bridges are illustrated in the figure 8-19. To ensure the freight driving safety, it is recommended that the maximum slope of the bridge to be 3%.DFC proposals include double stack container trains. Therefore, the overhead clearance of the bridges should satisfy the requirement of double stack container trains. On the other hand, the overhead clearance should also satisfy the requirement of future railway updating to electrified railway. Double-stack cars come in a number of size srelated to the standard sizes of the containers they are designed to carry. Well lengths of 40 ft (12.19 m), 48 ft (14.63 m) and 53 ft (16.15 m) are most common. Heights range from 8 ft (2.44 m) to 9 ft 6 in (2.9 m) ("high cube").Double stack requires a higher clearance above the tracks than do other forms of rail freight. In North America, CSX lists three clearance heights above top of rail for double stack service:

Double stack 1 — 18 ft 2 in (5.54 m)

Double stack 2 — 19 ft 2 in (5.84 m)

Double stack 3 — 20 ft 2 in (6.15 m)

The last clearance offers the most flexibility, allowing two high cube containers to be stacked. In India, it was reported that some freight-only corridors with the overhead wiring at 7.45mabove rail, which is high enough for double stack container trains. Based on the above facts, the height clearance of the bridges is recommended to be 8 meters here in JPM IA.

A 4.5 meter height clearance is recommended for passenger and bus travel through the underpass. The truck freight will be prohibited to use the underpass.

Figure 8- 17 Section Views of Underpass Bridges

NH-65 and Spine-Boulevard junction:NH-65 and Spine-Boulevard junction is a major access point to the IA. Two options are proposed for this junction: signal controlled junction with intersection channelization design as Figure 8 - 27illustrated a draft concept design or Trumpet interchange as Figure 8-28 shows a rough concept. The two options both have advantages and disadvantages. The signal controlled junction is cost saving and do not need to require much land. Moreover, it will have less impact on the vicinity environment. However, without proper junction design and management the level of services may decrease with increasing traffic after full development. The grade separate interchange could provide fast access to each direction, while the building cost will be much higher and it requires a lot of land.

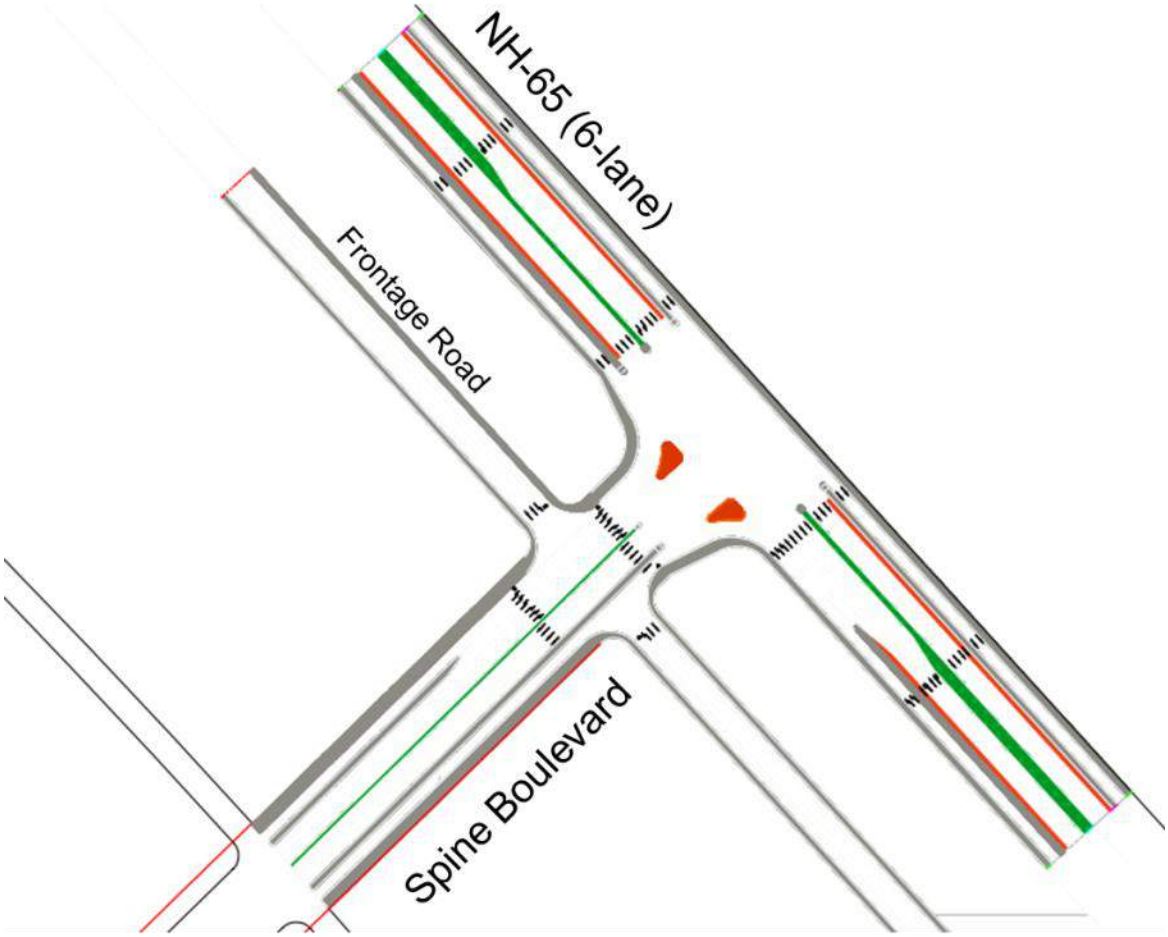


Figure 8- 18: Conceptual Design of NH-65 and Central Spine Road Junction

Figure 8- 19: Example of Grade Separate Interchange

8.7 Freight and Logistics Facilities for the IA

In order to avoid the negative impact of truck traffic on the city urban traffic, the freight movements of the IA will be mainly using the peripheral road of the IA or the roads pass through the industrial districts. A Multimodal Logistic Hub (MMLH) is proposed inside Industrial Area. The proposed location of MMLH is in the southwest corner of the city near and across the railway. The MMLH will connect with JPM IA using the dedicated local freight route as indicated in Figure below. The dedicate freight routes will allow fast and convenient freight movement to and from IA and easy access to MMLH. Trucks are not allowed in the city centre area during the daytime. Therefore, a truck access control zone shall be set up within a 2km radius from the city centre transit node.

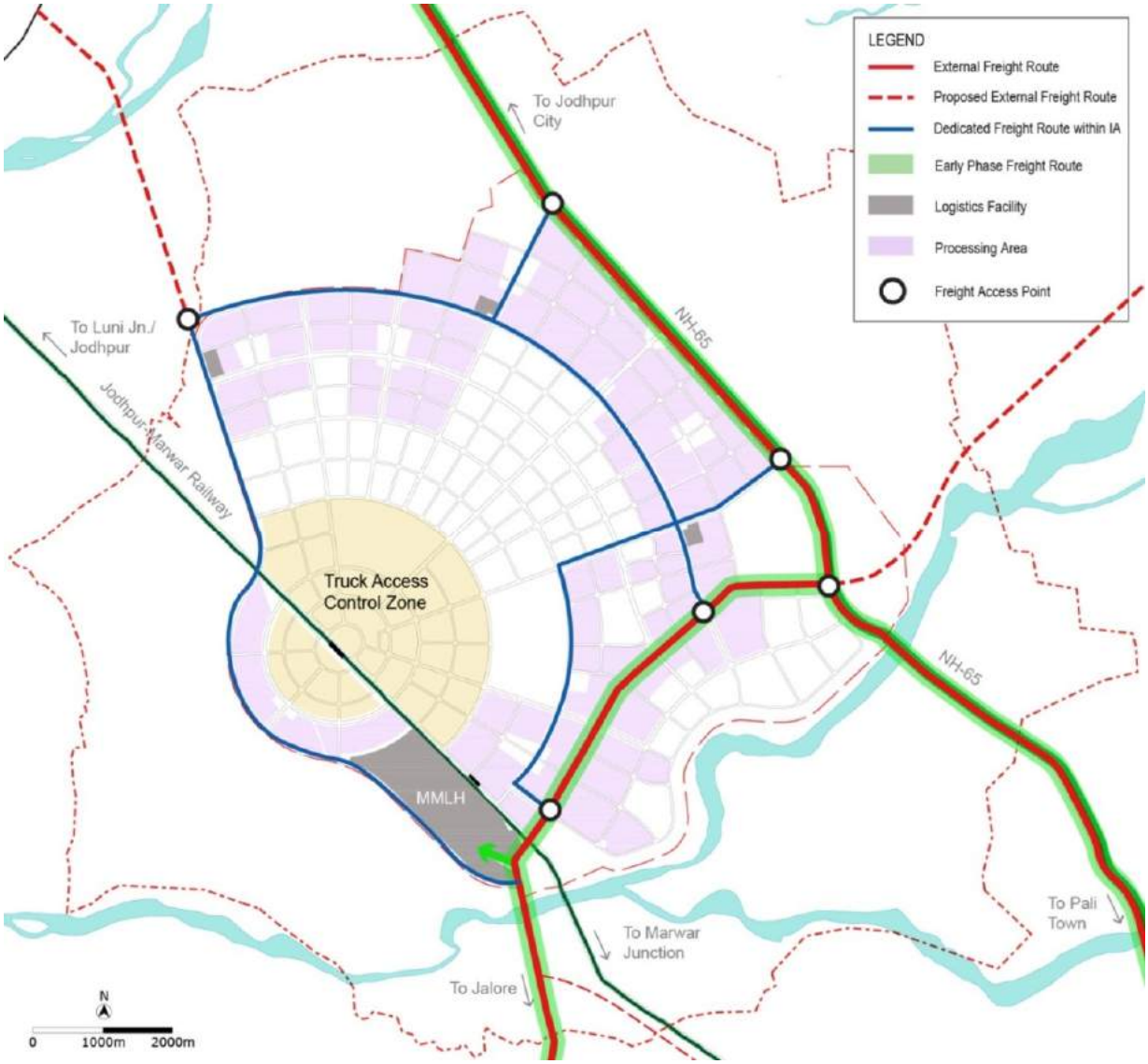


Figure 8- 20: Freight Circulation inside JPM IA

8.8 Walkability and Public Transport Strategy

Public Transport Strategy

The public transport systems will play a crucial role in connecting the JPM IA to the surrounding region and urban centres from the initial stages of development. An integrated multimodal transit system will be evolved with a mass transport system on arterial routes supplemented by feeder systems of buses on other routes.

The public transport for the IA is planned to be a three level system.

Mass Rapid Transit (MRT) System: The regional MRT system to connect the IA with Jodhpur city is under consideration as an early bird project. Based on the initial assessment, the major travel demand in the region is along NH65 between Jodhpur and Pali. The corridor is served by both means of public transport, bus and rail. Therefore, the early bird project of Mass Rapid Transit System Development proposed to improve the existing bus transport system and develop a Bus Rapid Transit System (BRT) along NH-65. Inside the IA city, a BRT system along the Spine road from the NH-65 junction to the rail station is proposed.

Once the IA starts developing along with the other improvement proposal including the doubling of tracks between Jodhpur and Marwar Junction by Indian Railways, it is proposed to operate commuter rail service between Jodhpur and Pali.

Major Bus Corridor: The major bus corridors are along major arterial trunk roads as indicated in Figure below. These bus corridors will act as a feeder system to the BRT and commuter rail system.

At the early phase, regular buses with capacity of 50 persons will run on those corridors. When the transit demand increased as the development of IA, bus lanes will be introduced. The bus lanes require some road spaces be marked exclusively for buses. The bus lane can be for whole day or only for peak hour depending on demand. Roads in these corridors have adequate width to accommodate exclusive bus lanes. The bus lanes will improve the travel speed and thus the carrying capacity of bus and the quality of public transit services.

Local Bus System: The main function of the local bus system is to collect local public transit users to the transit corridors. Local buses will run mixed with other road traffic. There is no extra road infrastructure investment. Small size buses with capacity of 30-40 persons are recommended.

Auto Rickshaws System: Auto rickshaws are one of popular modes of transport in India. Auto rickshaws are usually used for short distance as an alternative to taxis because of their low cost and efficiency. Since walking and cycling will be more difficult over longer journeys and buses are more expensive, auto rickshaws are recommended as a supplement of public transport system. The bus terminal would also accommodate these auto-rickshaws. And they will use the shared slow traffic lanes for local transport. These auto-rickshaws are a great solution for cheap, reliable and convenient public transport in the hot climate and poor local economy.

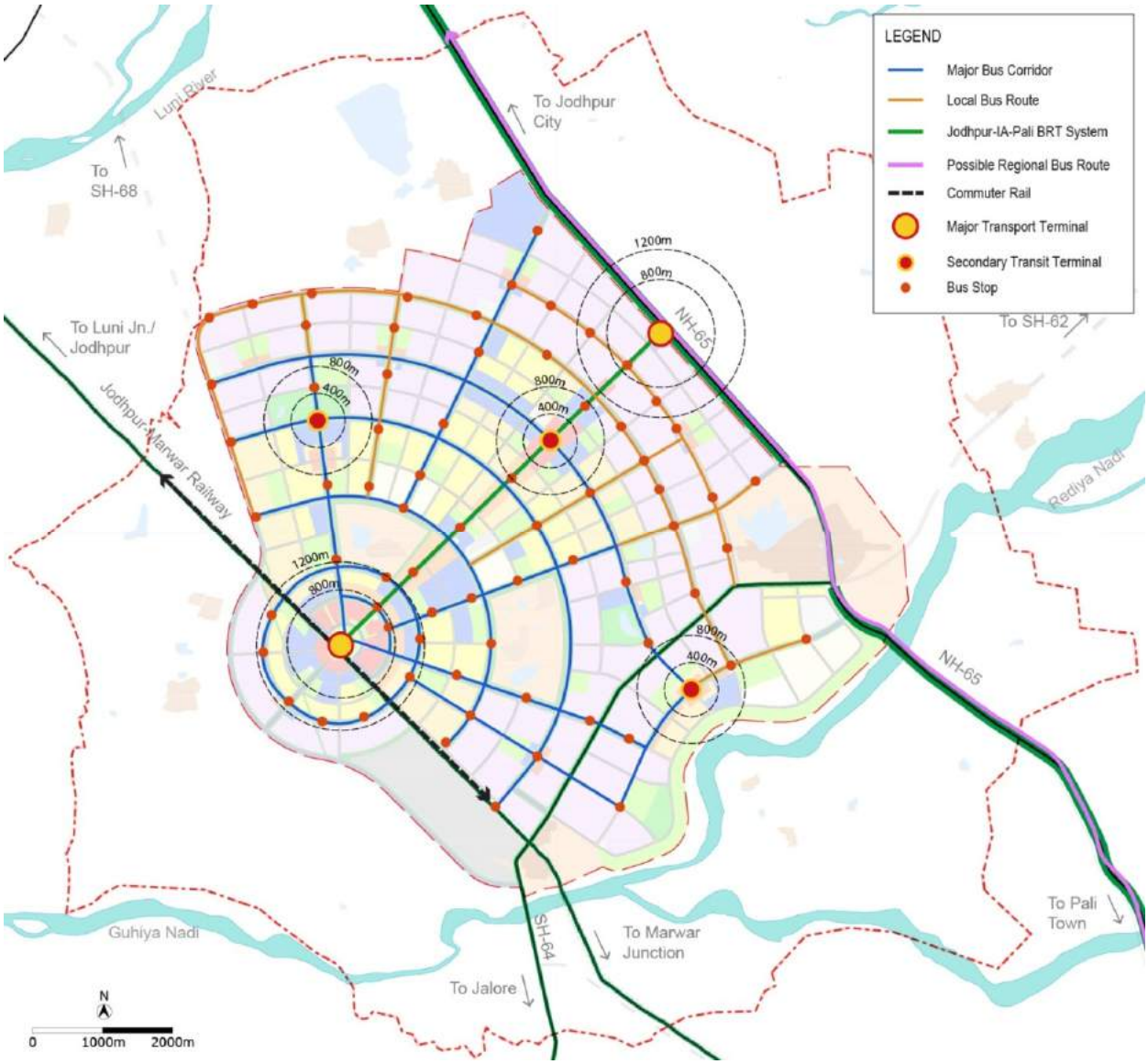


Figure 8- 21: Public Transport System

Bus Terminal: Five public transport terminals are proposed as presented in Figure above. Three of them are along the arterial road with BRT service. The terminal located at the city

centre rail station will be a multi-modal transit hub and will promote the Transit Oriented Development (TOD). TOD is a mixed-use residential and commercial area designed to maximize access to public transport, and often incorporates features to encourage transit ridership. A TOD neighbourhood typically has a center with a transit station or stop (train station, metro station, tram stop, or bus stop), surrounded by relatively high-density development with progressively lower-density development spreading outward from the center. TODs generally are located within a radius of400 to 800 meters from a transit stop, as this is considered to be an appropriate scale for pedestrians. The terminal located near NH-65 will incorporate urban public transit terminal and regional coach bus terminal to facilitate transfer between city bus system and regional bus system.

Two other public bus terminals are proposed located at east and west side of city respectively. These two terminals will have the maintenance workshops and responsible for bus maintenance and repair.

Walkability and Non-motorized Transport Strategy

One of the key features of the overall transport strategy is planning for non-motorized transport such as pedestrians and bicycles in order to provide options other than motorized vehicles for the city residents. The non-motorized facilities will follow the following principles:

- Continuity: The sidewalk and bicycle path should be continuous;
- Convenient access: The non-motorize facilities user should have easy access to any local districts;
- Safety: Non-motorized traffic should be segregated with motorized traffic;
- Friendly design to create a comfortable walking and cycling environment;
- Clearly signage to improve safety and efficiency.

Provision of a safe and comfortable non-motorized transport network that is connected to the public transit would be critical for the overall success in promoting sustainable transportation options. The plan will give priority to pedestrian and bicycle traffic. Non-motorized transport network has three parts:

- Sidewalk and cycle path: All road categories have designated sidewalks and bicycle paths as illustrated in the road cross section figures.

- Pedestrian/Cycle priority route: these routes connect the green spaces inside the IA and will greatly increase the flexibility and convenience of non-motorized transport.
- Pedestrian priority zone: At the city core area near the city rail station, a pedestrian priority zone is promoted, to form a shopping and leisure atmosphere.

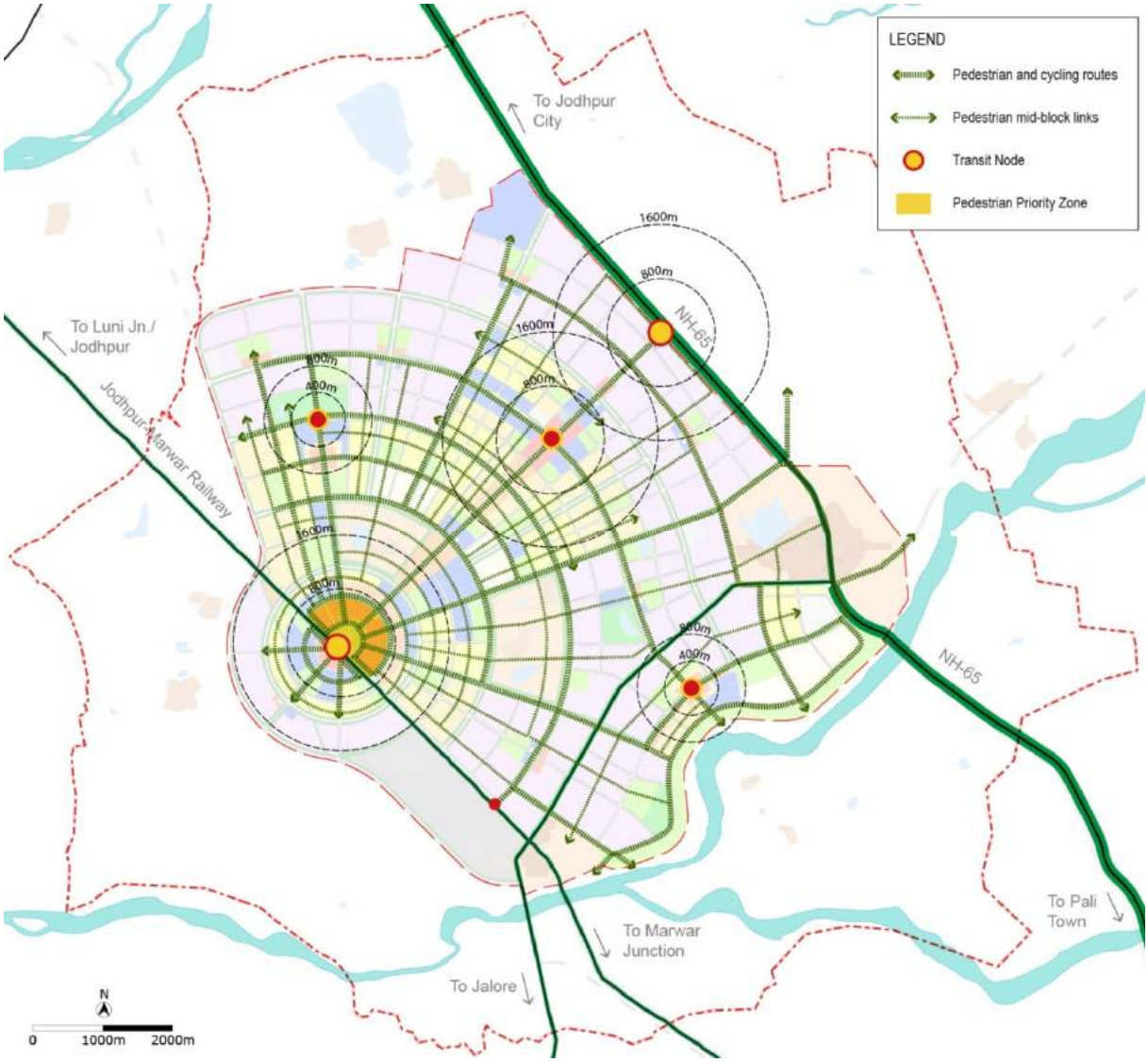


Figure 8- 22: Pedestrian and Bicycle Priority System

8.9 Traffic Management Guidelines

Pedestrian and bus zone

In order to prevent potential traffic congestion around the Central Train Station, a pedestrian and bus only zone is designated where personal cars are prohibited, only buses, pedestrians and cyclists are allowed to travel through. This is presented in the figure below along with the augmented road sections for the proposed collector roads inside the pedestrian and bus zone.

Figure 8- 23: Location of pedestrian and bus zone

Vehicle pick-up and drop-off points are located along the edges of the pedestrian and bus zone, as well as taxi and rickshaw waiting areas. It is suggested to provide shuttle buses to circulate around the zone, chauffeuring passengers from pick-up and drop-off points to the station entry/exit point.

Freight traffic management: “No-truck” signs will be used to prohibit trucks from entering the truck-forbidden area. Furthermore, traffic signage indicating the directions and routes towards major logistic destinations (e.g., MMLH) will be located along NH-65 and sub arterial freight priority roads, to prevent truck drivers unfamiliar with the city from entering the no-truck zone.

Parking: In each block, ground level or underground parking garages will be built to serve the developments within the block. On-street parking, designed to locate along local roads, provides short-term convenient parking services to visitors, acting as a strategy of optimal and

efficient utilization of land use. Local roads usually carry fewer vehicles and allow for a lower speed limit compared to roads of higher hierarchy, thus on-street parking along local roads will not cause serious traffic congestion problems or safety issues, contrarily, it can act as a traffic calming measure to separate pedestrians from vehicles and therefore enhance road safety.

Large multi-story public parking facilities will be built in public or semi-public uses of land (refer to proposed land use plan map Annexure IV).

Bike parking spaces are provided within the blocks on the ground floor and within underground parking garages. Ground level, short-term bike parking is provided on surrounding sidewalks.

Points of vehicular access to urban blocks: vehicular access points are located along collector roads and local roads; when necessary, it can be located along sub arterial roads; it is not allowed to locate along arterial roads, sub arterial freight roads, and national / state highways.

A certain distance of separation from junctions should be kept for points of vehicular access to urban blocks. Based on international standards, it is suggested that when a vehicular access is located along sub arterial roads, the distance from major junctions should be greater than 50 meters; when a vehicular access is located along local roads, there should be at least 50 meters from the junctions with arterial roads, 30 meters from the junctions with sub arterial roads, and 20 meters from the junction with collector roads. The distance between a vehicular access and a junction is calculated from the edge of the turning curb of the junction to the edge of the access path.

Vehicular access points should be greater than 30 meters from mid-block crosswalks, and greater than 15 meters from bus stops.

Traffic calming: traffic calming is a widely used strategy to mitigate the negative impacts of motor vehicle traffic and provide a safe and comfort environment for all street users. Traffic calming measures usually are used in the roads where there is no physical separation between motor lanes and footpath, and are usually not applied along arterial roads. Traffic calming measures will be applied in the pedestrian priority zone (i.e., truck access control zone) and scattered throughout the residential areas along sub arterial roads, collector roads and local roads, especially at locations where pedestrian safety is of special concern, such as near schools, hospitals, supermarkets.

Suggested locations for the application of traffic calming devices are shown in the figure 8-25. The pedestrian priority zone requires more traffic calming measures. The central spine road requires fewer traffic calming devices because first vehicles and pedestrians are separated by tree lanes along the central spine road, second, traffic calming means slowing down vehicle travel speed, thus reduce road capacity, as a major road connecting the city with the outside world, the central spine road will attract heavy vehicular traffic, and it is necessary for the road to maintain a relatively high capacity, which means fewer traffic calming measures.

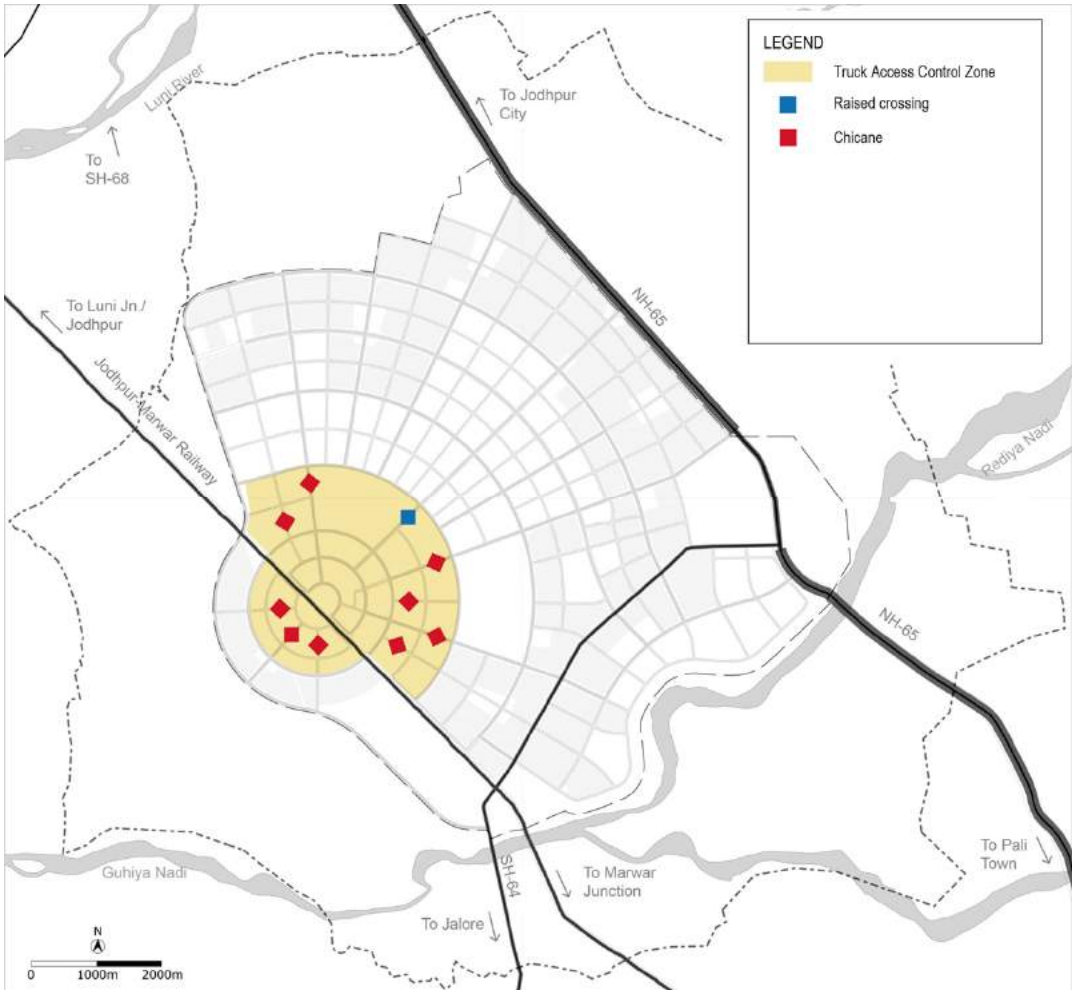


Figure 8- 24: Locations of traffic calming devices

Raised crossings are speed tables (ramped, flat-topped raised areas) marked for pedestrian crossing, built to curb height (e.g., 150 mm), or slightly lower, see figures below. These can be applied in all street contexts and are easily retrofitted into existing streets. It is suggested to be applying these measures across the pedestrian priority zone.

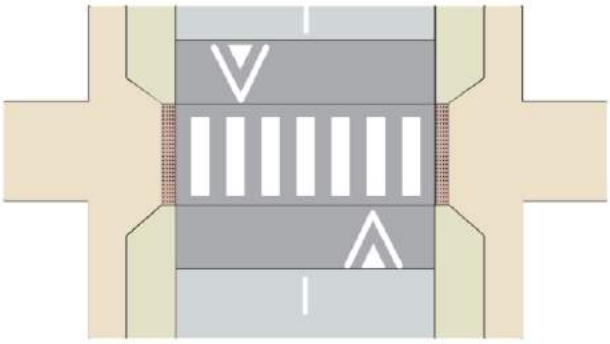


Figure 8- 25: Typical raised crossing
Source: Abu Dhabi Urban Street Design Manual

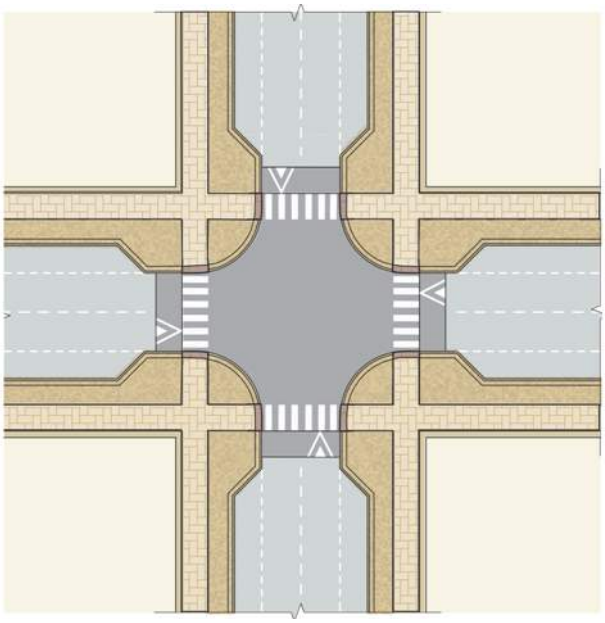


Figure 8- 26: Typical raised junction
Source: Abu Dhabi Urban Street Design Manual

Figure 8- 27: Speed table used as raised crosswalk, Abu Dhabi
Source: Abu Dhabi Urban Street Design Manual

A chicane is an artificial feature creating extra turns in a road to slow traffic for safety (see figure below)It is suggested to be applied in the pedestrian priority zone as a traffic calming device.

Figure 8- 28: Typical chicane
Source: Abu Dhabi Urban Street Design Manual

Pedestrian crossing: crossings should be provided at all signalized junction legs. Mid-block crossings can be provided near building entrances or where major pedestrian movement occurs across a road. Raised crossings are provided where traffic calming is necessary. Moreover, curb extensions are provided along local roads where there is on-street parking to maintain pedestrian visibility.

The state highway SH-64 serves as a sub-arterial freight priority road inside the IA, surrounded by industrial uses of land which may not generate heavy pedestrian traffic, therefore, pedestrians crossing SH-64 mainly relies on crosswalks at junctions.

An underpass is recommended when a large amount of pedestrians demand to cross SH-64 in the middle of a block, as ground crossings could affect the smooth flow of freight traffic. Overpasses are not an ideal option due to the height requirement of freight vehicles. The locations of pedestrian underpasses depend on actual pedestrian movement, building entrances and attraction locations.

Design and implementation of traffic calming devices are an iterative process that requires monitoring and adjustment. After streets are built, if traffic speeds or volumes are excessive, or high crash rates are recorded, traffic calming devices should be retrofitted into the problem streets.

8.10 Phasing of Transport Network and Infrastructure

The following presents an outline of the transport infrastructure requirements over the three phases:

Phase one:

- NH-65 and SH-64 shall be the main roads to serve the IA.
- Rail sidings to the MMLH should be constructed
- NH-65 shall be upgraded to at least 4-lane
- SH-64 shall be upgraded to at least 2-lane
- Upgrading of current regional bus transport system, including BRT along NH-65
- Initial construction of SH-64 extension to connect to SH-61
- Pali-Sojat Bypass

Phase two:

- SH-64 shall be upgraded to at least 4-lane
- Spine road connecting NH-65 and rail station shall be constructed
- MMLH shall be expanded to its full size
- Freight corridor connecting SH-64 and SH-64 shall be constructed
- Upgrading of unpaved road south of railway from SH-64 to Pali Bypass

Phase three:

- NH-65 shall be 6-lane
- New passenger rail station will be constructed to provide for commuter rail system
- Railway overpasses and underpasses shall be constructed
- Commuter rail from Jodhpur to IA shall be put into operation
- The road system within the development area of the master plan shall be complete
- Construction of SH-64 Bypass from south of railway to the intersection of NH-65 and the By-pass at Kharda Lake.

Chapter 9

Physical Infrastructure

9.1 Introduction

Provision of adequate and well planned physical infrastructure is critical to achieve the desired quality of life in an urban habitat. JPM IA being planned to achieve the objectives of being a world class industrial city needs to closely monitor the provision of various utilities such as water, power, sewerage and solid waste management. A key issue related to the sustainable development of JPM IA, and a minimum quality and standard of living pertains to the availability of, and accessibility to these basic infrastructure facilities. The entire study has evolved a methodology wherein phase wise population projections have been estimated following which corresponding demands of various utilities have been arrived at. This would ensure that at no point of time in the development of the JPM IA, infrastructure provision would lag behind the pace of development.

While Sewerage and solid waste management are local affairs to be managed within JPM IA, water supply and power may be Inter-State issues. Thus critical need of advance action and arrangement is required for the adequate provision of physical infrastructure. For each component a broad augmentation plan to meet the projected requirement is essential and discussed in this section.

The Draft Master Plan envisages an integrated approach that packages mutually supportive infrastructure components i.e. water-sewerage-drainage for recycling, harvesting and optimal use of water; solid waste management and disposal system sewerage, power for power generation, etc.

9.2 Water Supply

This section discusses the details of distribution of water supply within the proposed JPMIA region. Table 9-1 shows the summary of potable and non – potable water demand as per the project horizons (Year 2022, 2032, and 2042) for non – industrial users, while Table 9-2 presents the summary of non – potable Industrial water demand of the proposed JPMIA region.

Table 9-1: Summary of Water Demand of Non – Industrial Growth in JPMIA Region

Water Demand Non-Industrial Planned growth							
Description	**Unit**	**Standard**	**Proposed**	**2022**	**2032**	**2042**	**Unit**
Potable Water Demand Inhabitants	lpcd	135	113.40	11.74	27.39	50.86	MLD
Non – Potable Water Demand Commuters	lpcd	-	21.60	2.24	5.22	9.69	MLD
Total Water demand JPM IA				**13.98**	**32.61**	**60.55**	**MLD**

Table 9-2: Summary of Industrial Water Demand in JPMIA Region

Target Industrial types	2022		2032		2042	
	Industrial Output	Water Demand	Industrial Output	Water Demand	Industrial Output	Water Demand
Agro Food	2,618	202	13,962	1,078	56,138	4,336
Textile and Apparel(Generalized)	1,496	189	6,521	824	19,804	2,502
Building Material	2,117	174	11,310	930	45,565	3,746
Handicraft	653	10	3,552	53	14,593	216
Motor Vehicle & Auto Components	1,630	47	9,278	266	39,907	1,144
Computer, Electronic and Optical Products	1,978	22	11,682	131	51,969	583
Solar Energy and Equipment Related	1,059	71	6,768	453	32,164	2,151
Machinery & Equipment	2,148	83	13,926	536	66,859	2,574
Total Output	**13,699**		**76,999**		**3,26,999**	
Total (Million Litre / Year)		**798**		**4,271**		**17,252**
Total (Million Litre / Day)		**2.19**		**11.70**		**47.27**

As outlined in the *Report on Market Analysis, Gap Assessment, and Concept Plan for Water Supply and Waste Water Management System*, the non – potable water component which is typically a part of potable water demand as per CPHEEO requirement has been segregated. This will allow minimizing stress on the limited fresh water sources in and around the proposed JPMIA region. A separate distribution system shall meet the non – potable water demand of 21.60 lpcdfor gardening requirements of the residents. The same network will also cater to the Industrial water demand. Therefore, one of the major recommendations is to propose a dual piping network for water supply within the proposed JPMIA region.

The upcoming sub – sections will talk about the sources of both, potable and non – potable water supply, layout of water distribution system, design principles along with the phasing plan for developing potable and non – potable water network and other measures to conserve and minimize water losses in further detail.

9.2.1 One Water Concept

Until recently the planning of water resources was done at many levels with limited integration. For planning purposes, various sources and uses of water were considered independently. This leads to inefficiencies, not lead to sustainable, optimum use, and does not maximize the value.

The future of the Jodhpur Pali Marwar region and the proposed industrial development under JPM IA, will be significantly impacted by the availability of water and optimization of its use. These impacts include:

- Competition for the limited water supplies between domestic, industrial and agricultural uses.
- Restrictions on industrial & other development.
- Choice of industries, and other developments that best suits the constraints imposed by limited water supplies
- Cost – competitiveness of the Jodhpur Pali region with other regions within India that are not so severely impacted by availability of water and associated costs to meet demands.
- Sustainability of developments in that region

To maximize the returns on water in the Jodhpur Pali region, a “One Water” concept is essential, in which it is considered as a single, integrated resource that takes account of the following:

- Relative demands
- Relative returns from various uses.
- Reuse & recycling to make every drop count
- Total regional versus sub – regional water management

In making the a “One Water” concept, the considerations and comparisons need to be made on a true sustainability boosts, a “triple bottom line“ basis, where economic, environmental & social costs and benefits are evaluated equitably.

9.2.2 Demand Estimation

Residential Water Demand

As per CPHEEO guidelines, the recommended water supply level for designing schemes for cities with piped water supply, where sewerage system is contemplated is 135 lpcd. Providing water at this rate for the JPMIA, which is a water scarce area, is a challenge. Given the

sustainability aspirations for the JPMIA, pragmatic reconsiderations of the per capita demand have become necessary.

Understanding per capita demand

Domestic water demand computations are made following CPHEEO guidelines. Figure 9-1 shows the various components of 135lpcd.

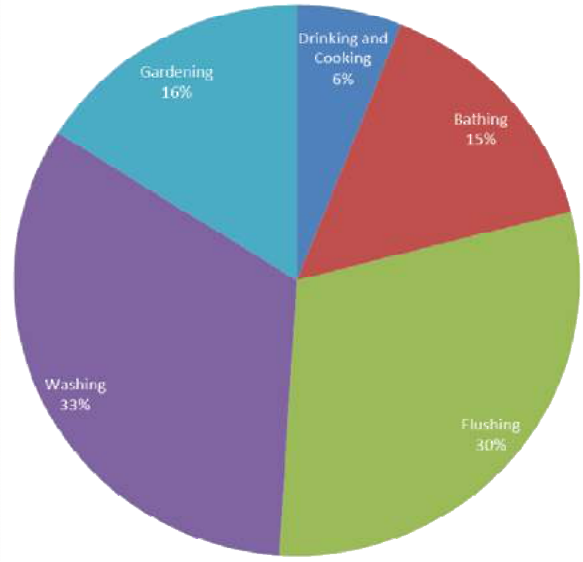


Figure 9-1 : Break-up of 135 lpcd water consumption

Source: Guidelines for preparation of water balance for Building, Construction, Township and Area Development Projects, SEIAA, 2012.

The potable water demand for 2022 has been based on a per capita demand which excludes only the gardening component i.e. 16% (21.60 lpcd - for gardening purposes) of the 135 lpcd Therefore, under the proposed scheme only the gardening water requirements for the proposed development shall be catered by a separate network supplying non-potable water under a dual pipeline system. This will allow reducing stress on fresh water resources available in and around the region.

As per the CPHEEO guidelines, modified as discussed in the earlier section, potable and non-potable water demand has been calculated for the JPMIA. The water demand for the existing Nine (9) villages was done as per 70 lpcd during the design of Jawai Pipe Line Project, PHED, June 2005 although due to the proposed development the villages will be connected to sewerage system and hence the per capita water demand has been increased to match with the requirements for an urban area as per CPHEEO.

Table 9-3: Potable Water Demand Calculations

Description	Water Supply Rate	2022		2032		2042	
		Population	Water Demand	Population	Water Demand	Population	Water Demand
Units	***lpcd***	***'000***	***MLD***	***'000***	***MLD***	***'000***	***MLD***
Local Population							
Pre-existing and Natural Growth	113.40	20	2.61	26	3.39	32	4.17
Local Workers within IA	113.40	49	6.39	122	15.91	233	30.39
Dependents of Local Workers	113.40	26	3.39	66	8.61	127	16.56
#Total Population residing in IA	113.40	95	12.39	214	27.91	392	51.12
#Total Population residing in IA (rounded)	**113.40**	**90**	**11.74**	**210**	**27.39**	**390**	**50.86**

Table 9-4: Non-Potable Water Demand Calculations

Description	Water Supply Rate	2022		2032		2042	
		Population	Water Demand	Population	Water Demand	Population	Water Demand
	lpcd	***'000***	***MLD***	***'000***	***MLD***	***'000***	***MLD***
Local Population							
Pre-existing and Natural Growth	21.60	20	0.50	26	0.65	32	0.79
Local Workers within IA	21.60	49	1.22	122	3.03	233	5.79
Dependents of Local Workers	21.60	26	0.65	66	1.64	127	3.15
#Total Population residing in IA	21.60	95	2.36	214	5.32	392	9.74
#Total Population residing in IA (rounded)	**21.60**	**90**	**2.24**	**210**	**5.22**	**390**	**9.69**

Table 9-5: Summary of Water Demand for Non – Industrial Planned Growth

Water Demand Non-Industrial Planned growth							
Description	**Unit**	**Standard**	**Proposed**	**2022**	**2032**	**2042**	**Unit**
Potable Water Demand Inhabitants	lpcd	135	113.40	11.74	27.39	50.86	MLD
Non – Potable Water Demand Commuters	lpcd	-	21.60	2.24	5.22	9.69	MLD
Total Water demand JPM IA				**13.98**	**32.61**	**60.55**	**MLD**

Population forecasts for JPMIA were utilized to estimate water demand. The water demand presented in Table 9-3, Table 9-4 and Table 9-5 are inclusive of targeted 15% distribution losses and present the estimated JPMIA potable and non – potable water demand (for gardening only) of the non – industrial areas within the development for the horizon Year 2022, 2032 and 2042.

Thus the potable water demand for the non-industrial use is expected to be approximately 51 MLD, while the non – potable water demand for the non – industrial use is 10 MLD.

Industrial Water Demand

The following section attempts at estimating industrial water demand and is based on the consultations with PMC and other Government stakeholders. Unlike potable water, there are no clear guidelines for calculating industrial water demand.

Industrial water demand is a factor of the type of industrial development and the technology underpinning the manufacturing processes. A desktop review of prevailing practices of estimating industrial demand was undertaken. The methods vary from use of empirical factors (e.g. 45 Kl per hectare per day assumed in Delhi Master plan) to elaborate Parcel – Level methodology utilizing past usage data. Consultant team also reviewed the published data from IDFC report on India Infrastructure for estimating JPMIA demand. Essentially, it is based on the reported data on industrial value added, expressed in billion USD (at 1995 constant price) and the water consumed by the total industrial sector in 2000. The estimated JPMIA industrial demand is shown in Table 9-6, which provides details of industrial water demand, calculated for the horizon Year 2022, 2032, and 2042.

Table 9-6: Industrial Water Demand Calculations

Non – Potable Water Demand for Industries					
2022		**2032**		**2042**	
Annual Production	**Water Demand (MLD)[1]**	**Annual Production**	**Water Demand (MLD)**1	**Annual Production**	**Water Demand (MLD)**1
INR (Crore)	Per day	INR (Crore)	Per day	INR (Crore)	Per day
13,700	**1.46**	77,000	**8.19**	3,27,000	**34.77**
Water Demand (MLD)[2]	**6.48**		**12.23**		**47.51**

[1] *As per India Infrastructure Report 2011 by IDFC, 35km³/year of water was consumed to produce 120 billion USD (1995 price level)worth of industrial output in India in Year 2000.This relationship has been used to estimate the JPMIA industrial water demand.*

[2] *As per Gap Assessment Report, June 2013: The previous calculations were calculated based on Shanghai Industrial Energy Efficiency Guidelines,2011, Shanghai Municipal Commission of Economy and Informatization*

However, after careful consideration the Consultant team chose the appropriate approach of arriving at industrial water demand estimation depending on the production processes, technology and phasing. After review the Consultant team has arrived at an ultimate demand of Industrial water as approximately 47 MLD. This demand is proposed to be entirely met by supply of tertiary treated effluent of the waste water treatment plant within the proposed JPMIA and augmenting the requirement of waste water from STP in Pali due to its proximity to the proposed IA. The Industrial water demand for planned growth scenario is projected in Table 9-7.

Table 9-7: Industrial Water Requirement

Target Industrial types	2022		2032		2042	
	Industrial Output	Water Demand	Industrial Output	Water Demand	Industrial Output	Water Demand
Agro Food	2,618	202	13,962	1,078	56,138	4,336
Textile and Apparel (Generalized)	1,496	189	6,521	824	19,804	2,502
Building Material	2,117	174	11,310	930	45,565	3,746
Handicraft	653	10	3,552	53	14,593	216
Motor Vehicle & Auto Components	1,630	47	9,278	266	39,907	1,144
Computer, Electronic and Optical Products	1,978	22	11,682	131	51,969	583
Solar Energy and Equipment Related	1,059	71	6,768	453	32,164	2,151
Machinery & Equipment	2,148	83	13,926	536	66,859	2,574
Total Output	**13,699**		**76,999**		**3,26,999**	
Total (Million Litre / Year)		**798**		**4,271**		**17,252**
Total (Million Litre / Day)		**2.19**		**11.70**		**47.27**

9.2.3 Sources

- Potable Water

Intake Works & Conveyance System

It is proposed to develop an intake point towards the Southern boundary of Kailana Lake, adjacent to Chopasni Water Treatment Plant Intake structure**.** The space requirement for the head works and pump station will require an approximate area of 1600 sq. m. It is also proposed to have the Water treatment Works along with the Head works and pump station. The location for these units, close to Chopasni Water Treatment Plant shall be ascertained after discussion with PHED & other related local government bodies. It is intended to convey the clear water to a holding reservoir with 4 hour of storage and of capacity 8,500 m^3 near Rohat.

This conveyance pipe is proposed along NH – 65, and shall follow a route that of the pipe presently connected to Rohat (Figure 9-2). The preliminary hydraulic analysis results requiring a pipe of 1,000 / 1,100 mm diameter to convey the projected water demand of 51 MLD from Kailana Lake to Rohat. Although there is an elevation head of approximately 60 m available between the minimum water level at Kailana Lake (251 m above M.S.L.) and the proposed location of Clear Water Reservoir (191 m above M.S.L.) in Rohat area, a detailed survey along the proposed alignment will allow the determination of requirements of pressurized flow vs. gravity.

It is estimated that the total length of conveyance of this potable water is approximately 45 Km. Consultant team proposes to use M.S. Pipe material for this water main, after comparing various pipe materials of Mild Steel (M.S.), Glass Reinforced Plastic (GRP), Pre – Stressed Cement Concrete pipes (PSCC), and Ductile Iron (D.I.) pipes. The comparison of the same is outlined by NCRPB in their technical reference section. While keeping into consideration the pipe diameter required it was arrived at making a consideration between M.S. and GRP material. However considering the physical properties of the pipe material, where M.S. pipe fares better while handling the Pressure surge as compared to GRP, M.S. pipes are found to be appropriate for this application.

Referring to the prices of M.S., as per the rates used for Jawai Pipe Line Project by PHED, it was found that the cost of laying a M.S. pipe in this geographical region will result in an approximate cost of about INR 6,000 Lakh.

Preliminary hydraulic calculation of pipe sizing is presented below, assuming a full flow:

Table 9-8: Preliminary hydraulic calculation of pipe sizing for proposed Potable Water Supply to JPMIA

Water Demand, Q				MLD	51
Flow Duration				Hr	22
Flow Rate to Convey, q				m3/hr	2,318
				m3/s	0.64
				L/s	644
Length of Main, L				m	45,000
Dia, mm	**Velocity, m/s**	**Friction Losses, m/Km**	**Total Friction Loss, m**	**Minor Losses @ 5%, m**	**Total Head Loss, m**
800	1.28	2.79	125.75	6.29	132.04
900	1.01	1.57	70.86	3.54	74.40
1000	**0.82**	**0.94**	**42.42**	**2.12**	**44.54**
1100	**0.68**	**0.59**	**26.67**	**1.33**	**28.00**
1200	0.57	0.39	17.46	0.87	18.33

The Optimization of pipe size shall be taken up during the preparation of Feasibility Report, where the selection shall be done based on a combined cost of capital cost of pumps and piping along with the operational power cost incurred from selected pumps.

Water Treatment Plant

It is proposed to treat the raw water from Kailana Lake near the intake structure itself. however the confirmation shall obtained from PHED department. It is envisaged that a space requirement of 1 Hectare of land is needed that shall include a conventional water treatment plant for the JPMIA. The requirement of Water Treatment Works for the three project horizons (2022, 2032, and 2042) has been projected as 12 MLD, 28 MLD, and 51 MLD.

The proposed process of treatment of raw water will be conventional with desilting chamber (at downstream of inlet chamber and prior to alum dosing) for pre – settling of settleable materials. The conventional units of this plant will be flash mixer, clari–flocculator, rapid sand filters, clear water sump and pump house, along with other ancillary facilities like alum, lime, chlorine dosing, chemical house, office building etc. To restrict the water losses in the new plant to 2% on an average and meet regulatory requirements of disposal of sludge from treatment works to natural water bodies, the alum sludge and filter back wash water will be separately processed. The supernatant water from these processing plants will be sent back to the inlet of the plant for treatment. Only the service water required in the plant will be permitted for disposal to keep the water loss within the prescribed limits. Chemical sludge will be treated and adequately discharged.

A modular approach is suggested in construction of the new treatment facilities and is described below.

The modular approach in construction of a new treatment plant of this scale in terms of providing units like clari–flocculators, rapid sand filters, chemical dosing equipment, pipes and specials, control units, other plants and equipment, is preferable. Thus treatment capacity requirement relates to building a treatment plant of 15 MLD capacity to meet 2022 demand of 12 MLD, and then increasing the capacity by another 15 MLD to meet 2032 demand of 28 MLD, and finally by 20 MLD for the ultimate year of 2042.

The idea behind this modular approach is that the units and equipment like flash mixers, chemical dosing system, clari-flocculators, filters, etc. will be sized and phased in with standard equipment and pipes instead of non – standard ones. In this effort, important parameters were given adequate attention and these are (1) operational flexibility, (2) standardized design, (3) system optimization, (4) ease in operation and maintenance.

Non – Potable Water

As per the concept plan, the proposed JPMIA requires non – potable water for its resident's gardening requirements (approximately 10 MLD) along with the Industrial water demand (approximately 47 MLD). This demand of approximately 57 MLD for the two components is proposed to be met through tertiary treated waste water. It is proposed to have a separate secondary treatment plants for the municipal waste water (approximately 40 MLD) generated and for the industrial waste water reject (45 MLD). Upon secondary treatment the waste streams shall then be combined for tertiary treatment for a capacity of approximately 85 MLD, and reused towards meeting the above demands of 57 MLD with surplus water that can either be supplied to other Industries located in Pali or other nearby towns.

9.2.4 Plan and Network Analysis

Potable Water Distribution System

The proposed JPMIA region topography is pretty flat terrain therefore, it would be required to boost treated water to overhead tanks and other intermediate boosting pump stations. The new clear water pump house will receive treated water from the new plant. To obtain an optimum level of operational flexibility, a single pumping station is proposed to house all new clear water pumps till the ultimate year 2042. Average daily water demand is expected to vary during operation of the pumping system.

The treated water shall then be brought to a Clear Water Storage Reservoir (CWR) and pump station located within the JPMIA region (Figure) for further distribution. This clear water pump house will be provided with an adjoining clear water sump of adequate capacity to retain the incoming treated water from treatment works for a reasonable period of time. A storage volume of 4 hours of average incoming flow is proposed for this sump. In line with this, the present sump capacity is projected as 2,000 m^3 to serve the immediate phase, and afterwards an additional sump of 8,500 m3 capacity will have to be suitably integrated in to the system. These sumps will supply water to the suction headers of the clear water pumps. Each pump set will be provided by a sluice valve on its suction side and a non – return valve and sluice valve on the delivery side apart from the other equipment and instrumentation. As far as design of the clear water sump is concerned, it is suggested that suitable baffle walls be provided to reduce short – circuiting of incoming flow to ensure its adequate retention after disinfection by chlorination. This would help in completion of the disinfection process and adequate killing of pathogens to render the treated water potable and fit for transmission to the JPMIA region.

The use of dual water distribution system, one for potable water for consumer consumption and the other for non-potable water is becoming a common practice. The primary reason is due to diminishing supplies of high – quality water resources, rapidly escalating cost for developing new water sources. It is proposed to have a separate distribution system towards meeting the potable and non – potable water demand. This dual distribution system shall be designed and developed as per the requirements laid out in “Manual on Water Supply and Treatment”. It is proposed to develop the distribution system in a “Grid Pattern with Loop” layout. Figure 9-2 shows the details of a typical system. Although, this system requires relatively more investment in developing the infrastructure such as length of pipe and valves but since the water within the distribution system is free to flow in more than one direction, stagnation does not occur, there is higher efficiency and reliability from the system and is more commonly adopted system. This type of network also results in reducing bacteriological, taste, and odor problems. In the loop network, in case of repair or break down in a pipe, the users connected to that pipe will continue to receive water from the other side of the network. In this type of pattern, since water reaches from all points, the head – losses occurring within the network are minimized. This system also provides greater flow for fire protection as the cut – off valves can be manipulated and water supply can be diverted and concentrated for fire – fighting. This system is also advantageous from water conservation perspective as dead-end systems require more flushing and thus there is more waste water generation. Hence considering all the above advantages it is better to adopt the “Grid system with loops” within the proposed JPMIA.

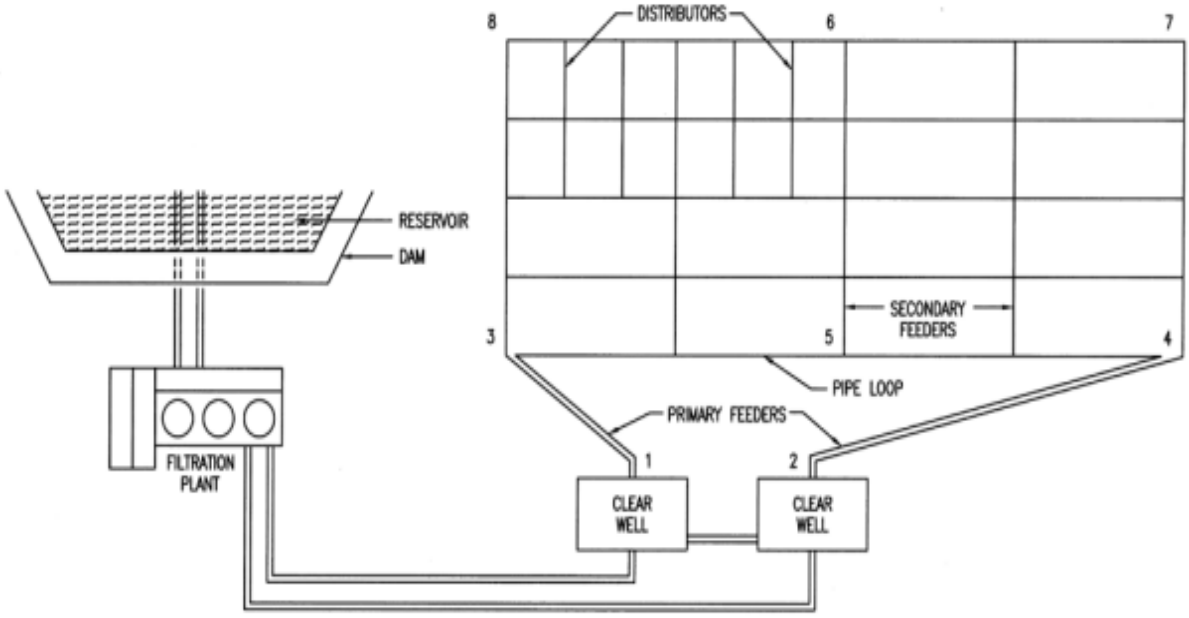


Figure 9-2: Layout of Typical Looped Water Distribution System

The upcoming text discusses the **Design Considerations** of the proposed distribution system.

1 **Coverage**: The water supply scheme will provide a comprehensive piped water network supplying 100% of the population. All pipes will thus be selected to cater for the projected water demand of 2042.

2 **Supply Service Level**: It is proposed to provide continuous supply (24 hours) for potable water, and all components of the water supply system shall be designed with this objective towards meeting the water demands within the JPMIA. The gardening and industrial demands need not be continuous, although a decision regarding the same shall be taken during the detailing stage after consultation with prospective industrial users.

3 **System of Supply**: It is recommended to convey potable water using gravity system for the residents of JPMIA. The non – potable watershall be pumped directly to various users.

4 **Peak Factors**: As per the requirements laid out in CPHEEO "Manual on Water Supply and Treatment", since the projected population of the proposed JPMIA is expected to be more than 2,00,000, the distribution system shall be designed by adopting a Peak Factor of two (2).

5 **Fire Fighting:** As outlined in the CPHEEO standards, as the population of the JPMIA is expected to be more than 50,000 it is proposed to consider the firefighting demand while designing the distribution system along with normal supply. CPHEEO recommends to a provision of $100\sqrt{p}$ where, p is population in thousands (390 in this case). This amounts to approximately 1,975 KL/day of provision. It is also proposed to have approximately 700 KL of fire – fighting requirement as a part of the service storage.

6 **Residual Pressure**: For design of transmission lines, residual pressure relates to the pressure at the inlet level of individual overhead tanks. It would be extremely essential to safeguard the transmission lines and no direct connections should be given from these pipes. These lines will exclusively feed the demand centres and all supply connections will be given only from the distribution mains. Suitable control arrangement will be suggested at the location of excess pressure, only if required. The residual pressure at end user shall be maintained as stated in CPHEEO manual:

   a. **Single storey building:** 7 m
   b. **Two storey building:** 12 m
   c. **Three storey building:** 17 m

7 **System Losses**: Taking into account proper supervision during construction, leak detection training, and improved operation and maintenance, losses plus wastage in the distribution system can be planned with District Metering Areas (DMA) to identify and minimize water losses within the norm of 15% and in controlling them to the best possible extent.

8 **Water Quality**: The quality of water supplied shall be in line with the requirements as desired as per IS 10500 and Table 2.2 of CPHEEO "Manual on Water Supply and Treatment".

9 **Hydraulic Design Formula** – The Hazen – Williams formula shall be used. The minimum diameter of pumping main shall be restricted to 100 mm. Minimum velocity of flow in pipe will be 0.6 m/s to avoid silting inside the conduit and maximum velocity will be restricted to 3.0 m/s to safeguard against possible scouring effect inside pipelines.

10 **Pipe Material**: It is proposed to use Ductile Iron pipe for the primary and secondary feeders, however, the distribution mains are recommended to be of High Density Poly Ethylene (HDPE) pipe material.

11 **Hazen – Williams C – Value** for DI Pipe – CPHEEO Manual suggests a C – value of 140 for new cement mortar lined DI pipe. This value of Hazen – Williams coefficient has been suitably reduced to cater for 10% additional losses for fittings, bends, valves and appurtenant works (10%), extra head loss for deterioration of C – value over the design period as per manufacturer's recommendation of 2% for 30 years, and 10% reserve head loss for possible reallocation of water demand than that projected in the this study. All these losses in the mains are calculated as % of total frictional loss in respective pipelines.

It is proposed to perform network analysis to evaluate the economic and water quality impacts by conducting hydraulic water quality modeling using suitable hydraulic modeling software. This modeling exercise can allow building a planned network and define operating practices, primarily related to storage volumes and pipe sizes. The chosen model can allow defining zones required, optimizing storage volumes, pipe sizes, pressure maintenance, fire flow storage, emergency storage, water quality management by assessing age of water with in the distribution system and concentration of identified pollutants.

9.2.5 Storage and distribution System

- Potable Water Distribution System

Storage within the distribution system is normally provided in one of the two ways:

1) Elevated Storage
2) Ground – level storage with high service pumping

Although there are merits to both types of storage, it is well recognized that elevated storage provides more reliable and most useful forms of water storage. Adequately sized elevated water tanks provide dedicated fire storage and are used to maintain constant system pressure and in places with irregular power supply. The consultant team proposes to have elevated storage tanks to supply potable water to various end users. Treated water will be pumped to elevated storage reservoirs using indirect pumping and the water will flow from the storage tank to the distribution system under gravity. This system of indirect pumping is not linked with the demands of the major load center on the water system. This arrangement permits the pumping station to operate at a uniform rate, with the storage Intermediate boosting stations and elevated storage tanks shall be proposed at suitable locations, once the pressure drop and the economical storage capacity is exceeded.

In the proposed JPMIA, it is proposed to have an Underground Clear Water Storage Reservoir (CWR) with storage of four (4) hours, and as per the demand of various phases of development have Over Head Tanks (OHT) with four (4) hours of storage. It is recommended to limit the size of OHTs to one (1) Million Liter. These OHT will receive their water supply from the CWR through a booster pump station. Annexure Vshows the details of the proposed main network while Annexure VIII shows the Potable Water Distribution Network.

- Non – potable Water Distribution System

The tertiary treated waste water shall be stored in a Ground Level Storage with high service pumping since the Industrial water demand is limited to number of hours and shall be required to store their daily requirements in a Ground Level Storage tanks within their development. The pumps providing the daily water demand for the Industries and Gardening requirement for residents shall be operational for a limited number of hours with a fixed rate of supply through a separate network designed specifically for such operation. There will be intermediate booster pump stations along the main network. The network shall again be designed using a “Grid pattern with Loop” concept. Annexure X shows the Tertiary Treated Water Distribution System within JPM IA

9.2.6 Phasing and Implementation Strategy

Typically an ideal way to develop a water distribution system is to construct a distribution network of pipe that would adequately serve the development of the service area. JPMIA is planned to be developed in three (3) phases. It is proposed to have the main distribution centre

within Phase 2 of the proposed development, due to its proximity to NH – 65 and relatively centralized location within the JPMIA. This distribution centre will receive water from the Water Treatment Plant and shall comprise of a Clear Water Reservoir (CWR) with four (4) hour storage capacity, chlorination system, and a dedicated pump station for each phase of the proposed JPMIA. It is proposed to provide a CWR with a total capacity of approximately 8,500 cu. m. and shall be developed in three (3) compartments, each of equal capacity; details of the same are presented below in Table 9-9. The CWR shall be developed as per the phasing requirement. The potable water shall be pumped to various Over Head Tanks (OHT) within each phase of JPMIA from this CWR. It is proposed to have OHT for each phase catering to their potable water demand. These OHT will then supply water to the various end users under gravity. It is proposed to provide various OHT in each phase; details of these are shown in Table 9-10.

Table 9-9: Details of proposed Clear Water Reservoir (CWR) in JPMIA

Total Daily Potable Water Demand:	51.00	MLD
Hours of storage:	4.00	hr
Storage Volume:	8.50	ML
	8,500	m3
Depth (assumed):	4.75	m
Area required:	1,789	m2
Assume, L = 2B		
Breadth:	30	m
Length:	60	m

Table 9-10: Details of proposed Over Head Tanks (OHT) in JPMIA

Phase	Water Demand	Hours of Storage	Volume of Storage	Number of OHT
	MLD	*Hr*	*ML*	*Nos.*
1	12	4.00	2.00	2
2	16	4.00	2.67	3
3	23	4.00	3.83	4

9.2.7 Cost Estimates

For the purpose of the Conceptual stage level of cost estimate, the capital cost for the proposed distribution system for all phases combined has been developed based on per capita of incremental population and is as shown in Table 9-11.

Table 9-11: Cost Estimate for proposed Potable Water Distribution System

Description	**Quantity**	*Unit*	**Area Required (m^2)**	**Rate**	*Unit*	**Estimate (INR)**
CWR	8,500	*KL*	2,000	8,000	*per KL*	6,80,00,000
OHT	8,500	*KL*	100 / OHT	12,000	*per KL*	10,20,00,000
Electro - Mechanical			300	20% of (CWR +		3,40,00,000

Description	Quantity	*Unit*	Area Required (m^2)	Rate	*Unit*	Estimate (INR)
				OHT)		
Network	200	*Km*		2,500	*per m*	50,00,00,000
	Total Estimated Cost					**70,40,00,000**

Similarly, Table below shows the cost estimate for the non – potable water supply system for the entire JPMIA region.

Table 9-12: Cost Estimate for proposed Non - Potable Water Distribution System

Description	Quantity	*Unit*	Area Required (m^2)	Rate	*Unit*	Estimate (INR)
Ground Level Storage	15,000	*KL*	500	8,000	*per KL*	12,00,00,000
Electro – Mechanical (Main Pump Station + Booster Stations)	6		1500	20% of Storage		2,40,00,000
Network	200	*Km*		2,000	*per m*	40,00,00,000
	Total Estimated Cost					**54,40,00,000**

9.3 Drainage System

Rainfall is the most vital input in the hydrological cycle and fluctuations in quality and distribution strongly influence surface and sub-surface water sources. Often the impact of rainfall variability is clearly evident on surface water sources within a short time, but its impact on sub-surface sources is complex and long lasting, often there is a significant time lag between rainfall incidents and its impact on ground water conditions. A careful understanding of the terrain and recharge conditions and long term studies on variations in rainfall patterns and water exploitation are needed in order to interpret changes in ground water storage.

Rajasthan lies in the semi – arid region and is the driest state of India. Lack of any perennial rivers, scanty rainfalls, and depleted ground waters, conserving rainfall run-off is the biggest priority of the region. The government of Rajasthan has also enforced policies towards making efforts to conserve the run-off by mandating construction of Rain Water Harvesting (RWH) on all plots covering more than 300 sq. m. under the Building regulation and Rajasthan Township Policy, 2010. In addition to this, under Order dated 31.05.2000 and 12.12.2005 it is also compulsory to have provision of RWH in all newly and existing construction buildings and Government Offices. In a recent effort, the Government is also considering modifying Municipal Corporation Act and making it compulsory to incorporate RWH for all new Real estate developments. Keeping this in consideration, it is recommended to follow the regulations and stress on implementing RWH as an integral component in Master Plan of JPM IA.

9.3.1 Run-off Estimation Methodology

Consultant team has analysed the rainfall gauge data available for Rohat town. Based on the analysis in the report it was identified that within the period of rainfall data between 2000 – 2012, the average rainfall in Rohat town is approximately 381 mm annually with 19 number of rain days. During the dry year (exceeding probability of 90%), the district receives 263 mm of rainfall, whereas in the wet year (exceeding probability of 90%) there is approximately 510 mm of rainfall.

Table 9-13: Assessment of Rainfall in Pali District

Description	Average (mm)	Dry Year (Exceeding 90% probability)	Wet Year (Exceeding 90% probability)
Annual rainfall (mm)	381	263	510
Annual Rain days	19	12	28

It is envisaged that the proposed development shall be a "High – Density" development with residential ground coverage area as 35%, while that of the Industries it shall be 50% of the total area. Various types of land use and their co-efficient are shown in **Table 9-14**. A detailed assessment carried out under "Benchmarking of Urban Water Supply Schemes of Rajasthan" – Conjunctive Use of Water of Pali district, September 2012 indicated that for high – density development, it is reasonable to assume 74% of rainfall to run-off from the paved areas and 10% from the green area of the watershed in Pali district, hence the same co-efficient has been adopted by the Consultant team. Using the annual run-off of 381 mm to arrive at the volume of annual run-off, it is estimated that this annual rainfall will result in approximately 1,300 cu.m. per Hectare of run-off being generated annually.

Table 9-14: Annual Run-off Estimates from JPMIA

Sr. No.	Land Use	Total Area (Ha)	Paved Area (%)	Total Run - off from Paved Area (m^3)	Total Run - off from Unpaved Area (m^3)
1	Residential	1,135	35%	11,20,007	2,81,083
2	Commercial	111	50%	1,56,477	21,146
3	Mixed Use	238	50%	3,35,509	45,339
4	Industrial	2,109	50%	29,73,057	4,01,765
5	Public / Semi-Public	111	35%	1,09,534	27,489
6	Protected Green Buffer	433	0%	-	1,64,973
7	Parks / Public Open Space	466	0%	-	1,77,546
8	MMLH and other logistics	243	20%	1,37,023	74,066

Sr. No.	Land Use	Total Area (Ha)	Paved Area (%)	Total Run - off from Paved Area (m^3)	Total Run - off from Unpaved Area (m^3)
9	Circulation (strategic roads)	763	60%	12,90,721	1,16,281
10	**Total Proposed Development Area**	**5,609**		**61,22,328**	**13,09,688**

Assuming 19 – 20 number of rainfall events in a year, this watershed is estimated to generate approximately 70 – 75 m^3/Ha of rainfall run-off.

Surface Run – Off		
Average Year (MCM/Year)	Dry Year (MCM/Year)	Wet Year (MCM/Year)
7.43	5.13	9.95

Since ground water in Rohat block is categorized as un-potable due to high salinity, hardness levels and also due to presence of fluorides, it is recommended to store and directly utilize rainwater. Therefore, this forms the basis of recommendation that storage reservoirs are created within the proposed JPMIA region rather than stressing upon the need of developing ground water recharge structures. There are several ponds located within the boundary of the proposed JPMIA region. It is well understood that urbanization makes a significant change on the catchment areas and is expected to impact the storage in these ponds, if not addressed during the planning phase itself. However, to ensure maintaining the maximum possible storage in these ponds the drainage network shall be planned to act as off-line detention basins and once the desired level is maintained the balance run-off will over flow into the main network.

Detention ponds are a Best Management Practice (BMP)implemented to reduce peak runoff rates and control water quantity. This sustainable strategy may be used as a means to avoid the expense and environmental impact common with conventional storm water management systems, such as drain inlets and culverts, which typically deliver runoff to adjacent watersheds without any filtration. Detention ponds are an effective method to remove sediment and pollutants from storm water as well as reduce peak runoff rates in an effort to prevent flooding and erosion of local waterways. If implemented with the overall landscape design, cost of detention ponds can be kept to a minimum since construction methods and materials are similar to standard landscaping practices. These ponds shall be lined, using HPDE lining or other suitable material to minimize infiltration losses. As a part of nearby community development, it would be prudent to line the existing ponds within the proposed JPMIA boundary.

Presently, the proposed region has nine (9) ponds existing within the boundary of the proposed JPMIA region (Figure) assuming an average depth of four (4) meters and covering approximately 30 Ha of area, it is estimated that these ponds have a potential storage volume of 1,25,000 m^3. A similar scheme would be adopted and similar ponds shall be developed within the new development to maximize storage of storm water run-off and it is recommended to develop additional ponds having a capacity of approximately 3,00,000 m^3 within the entire development considering proposing 20 Ha of detention ponds within each phase. Subsequent to this the balance run-off shall be disposed into the Rediya River running along the Eastern boundary of the proposed development via a main collector channel drain. This open channel is proposed running parallel to the Railway tracks in the Southern part of the development to collect the overflow from the detention ponds and conveyance network and it finally discharge into the Rediya River as shown in Annexure-IX.

As known, the urbanization results in increasing the run-off velocities and volume, adequate treatment in terms of Oil & Grease control structures with limited curbing of sediments shall also be a part of the proposed development..

a) Plan and Network Analysis

It is recommended to provide individual Rain Water Harvesting pits as per the requirements laid out in the State of Rajasthan for both residential and Industrial developments. This water can be utilized directly within the proposed development. It is recommended to develop storage of at least 25% storage of the run-off generated within each proposed development. Once the storage capacity is attained within these tanks, the overflow will then be diverted to the main storm water collection system. This network will comprise of storm water drains on both sides of the roads. A piped drain system shall be developed within the ROWs on either side to carry the run off. While developing the storm water collection system, it is proposed to utilize Rational Method is used to estimate the peak discharge using formula, Q= 10 CIA

Where,

Q = Run-off in m^3/hr
C = coefficient of runoff
I = Intensity of rainfall in mm/hour
A = Contributing area considered for runoff (in Ha)

Considering the factors such as rainfall intensity, runoff coefficients, and catchment areas within the proposed development, contributing the runoff, the runoffs shall be calculated forall the catchment areas. It is also recommended to utilize modeling tools to design and develop the network connections.

The topography of the proposed development is naturally graded with a gentle slope towards the southern part of the development. Hence, it is advantageous to design the storm drainage system to be draining in the Southern part. The proposed development shall be divided in to several catchments. To estimate the run-off from each catchment area and design appropriate storm water drainage collection system to dispose the run-off to storage basins from where the collected water can then be pumped towards meeting the demand of either industries or other non – potable uses after minimal treatment i.e., filtration.

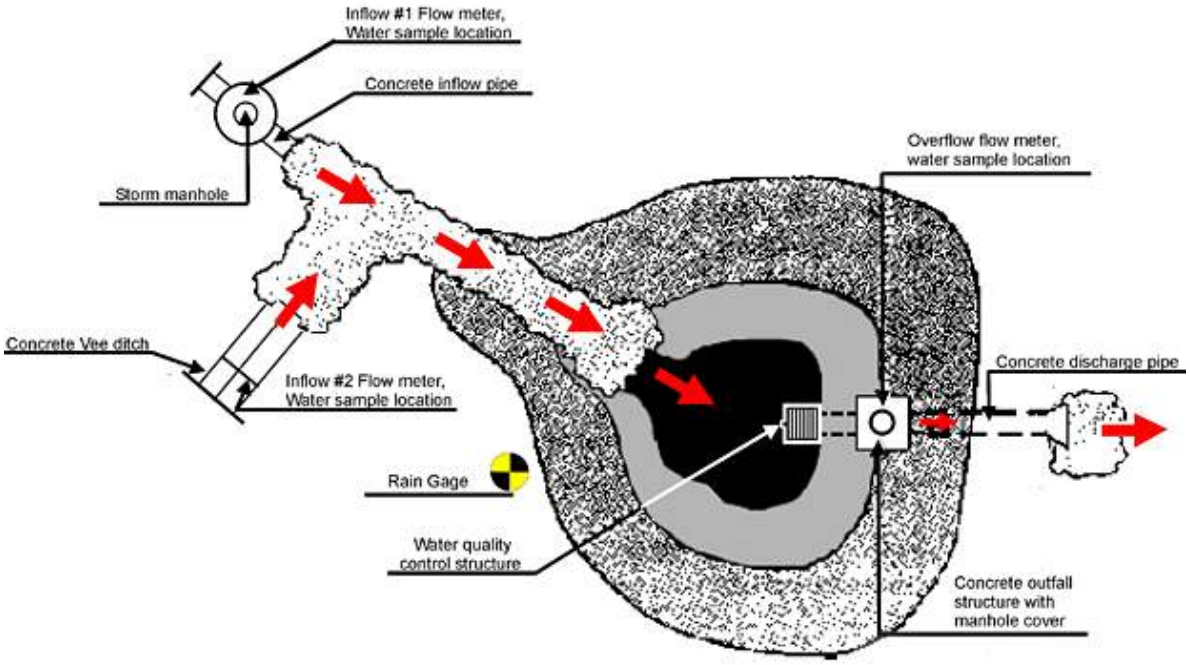


Figure 9-3: Typical Network Connectivity with Detention Pond

b) Phasing and Implementation Strategy

It is proposed to develop the storm water drainage system as per the development of phases, although keeping in consideration the integration aspect with other phases. It is estimated that approximately 400 Km of network shall be developed within the entire development with collection system existing on both sides of the various roads to collect and convey water. It is proposed to locate the detention basins within the green areas and then utilizing them towards non – potable water users and to fulfill the irrigation demand of urban agricultural to be proposed in the buffer areas of the existing villages.

9.3.2 Cost Estimates

It is estimated that the total cost of developing the storm water collection system network shall be approximately INR 300 Crore.

Table 9-15: Cost Estimates of Storm Water System in JPMIA

Sl. No.	Component	Measurement	Unit Rate	Total Cost (in Crore)
1.	Storm Water Network	400 Km	INR 6,000/m	240
2.	Ponds	32,00,000 m3	INR 200 / m^3	65

9.4 Sewerage

Managing waste water is essential as there are manifold advantages in effectively managing and treating the waste water. Firstly, treating and reusing this waste water will serve as an alternative source and thereby result in minimizing utilization of fresh water resources. Secondly, this waste water is single most important contributor to surface and ground water pollution. This water pollution poses threat to human life, aquatic life, and environment and depletes quality of even fresh water resources resulting in increasing the cost of supplying potable water. Therefore, effectively collecting and treating this waste water to the minimum required quality for its subsequent safe reuse towards non – potable industrial and agricultural reuse shall be the guiding principal of the sewerage system.

Sewerage system usually consists of i) Collection system with sewers and sewer appurtenances ii) Conveyance system with pumping stations and pumping/gravity main iii)Treatment plant and disposal system.

9.4.1 Sources of Sewage

The proposed JPMIA region will generate waste water from its residential users and Industrial development. As the characteristics of waste water can vary considerably between the municipal and industrial wastes, it is proposed to have a separate waste water collection system for both waste streams. As explained in the "*Report on Market Analysis, Gap Assessment, and Concept Plan for Development of Water Supply and Waste Water*", the potable water supply rate adopted for residential users in the proposed JPMIA region is 113lpcd, exclusive of losses. As per the CPHEEO manual, 80 % of the water supply is to be taken as the sewage generation. The sewage generation will therefore be 90 lpcd. As per the recommendations of CPHEEO and considering semi – arid conditions, the infiltration for the proposed JPMIA region can be assumed to be approximately 500 Liter/Km. and shall be considered during the detailed design of the internal collection system. The details of waste water generation projections from each phase are presented in Table 9-16. Non – potable water demand arising from horticulture requirements and that of industries is presented in Table 9-17. While, it is assumed that the entire horticulture water demand will not result in generation of waste water, industries will reject 90% of their water demand.

Table 9-16: Waste Water Generation from Residential Users

Waste Water Generation from Potable Water Supply				
Description	**2022**	**2032**	**2042**	**Unit**
Wastewater Generation by Inhabitants (@ 80% of demand)	9.39	21.91	40.69	MLD

Table 9-17: Waste Water Generation from Industrial Users

Waste Water Generation from Industries				
Description	**2022**	**2032**	**2042**	**Unit**
Wastewater Generation by Industries (@ 90% of demand)	1.96	10.53	42.54	MLD

9.4.2 Plan and Network Analysis

The following concepts and methodologies have been adopted for formulation of the detailed proposal of Conceptual Sewerage Scheme.

Sewage Collection System:

i. Sewage collection system to be kept strictly separate from the storm water drainage system.
ii. Trunk sewers, main sewers etc. to be provided to intercept all sewage flows and convey them to pumping stations for pumping to sewage treatment plants.
iii. Depth of sewers shall be kept within 6m, and pumping stations shall be minimized.
iv. The hydraulic design for proposed sewer lines and adequacy check for existing sewer lines shall be carried using appropriated modeling tools.

Pumping:

i. Pumping stations (PS) shall be employed to avoid excessive depth of sewer. Sewage Pumping Stations shall be employed to convey the sewage for treatment.
ii. Automated operation of pumps shall be provided wherever possible.
iii. Pumping mains shall be sized based on economical size calculations subject to meeting velocity criteria.

Sewage Treatment:

i. Reuse potential of the treated sewage shall be considered in all cases. Feasibility of sludge gas utilization shall also be explored.
ii. Treatment at the Municipal STP shall be to produce effluent fit for reuse for non – potable uses. Any extra treatment required for effluent reuse is better carried out by the prospective “re-user”.

iii. Sewage treatment process shall be selected based on techno-economic comparison of feasible alternatives.
iv. Modular design shall be adoption and initial construction shall be restricted to one or two modules to avoid the plant remaining unused in the initial period.

Design Criteria & Procedures:

i. The design criteria adopted for the project proposals are based on the recommendations given in the CPHEEO Manual on Sewerage and Sewage Treatment.
ii. Design years for various components of the sewerage scheme have been fixed as given below.
   - Collection System – Ultimate Year (2042)
   - Pumping Station Civil Works – As per phase requirements
   - Pumping Plants – As per phase requirements
   - Sewage Treatment Plants - To be designed in modules as per phase requirements for ultimate year (2042) and constructed stages.
iii. Proposed Sewerage system is designed for the ultimate design year 2042. Gravity sewers are proposed to carry the sewage for the entire development that finally leads to the sewage treatment plant and combined effluent treatment plant. The design considerations are based on the norms/guidelines specified by CPHEEO. The following are the design criteria that have been adopted for detailed engineering.

- **Per Capita Sewage Flow**

Domestic water supply rate has been considered while estimating the sewage flows. Sewage flows are calculated considering assumption that 80% of the supplied water will find its way to the sewers.

- **Groundwater Infiltration**

The inflow to sanitary sewers may also include certain flows due to infiltration of groundwater through joints. The quantity infiltration and inflow depends on many factors including the integrity of the joints, ground water, opened up joints etc. The infiltration considered for the design is at the rate 10% sewage flow generated.

- **Peak Factor**

Peak factor is the ratio of maximum to average flow, which depends mainly of contributory population. CPHEEO manual indicates the following peaking factors for various populations as mentioned the Table 9-18appropriate peak factor corresponding to the contributing population in the respective sewerage catchments have been adopted for designing the sewers. The peak

factor of 2.25 has been considered for the design of entire system, since the contributing population is in the range of 50,000 to 750,000.

Table 9-18: Peak Factors

Population	Peak Factors
Up to 20,000	3.00
20,000 to 50,000	2.50
50,000 to 750,000	2.25
>750,000	2.00

- **Hydraulic Design**

The Hydraulic design of the sewers shall be carried out using Sewer CAD or other equivalent modeling Software.

- **Sewer Capacities**

The available head in sewers is utilized in overcoming surface resistance and, in small part, in attaining kinetic energy of flow. The design practice is to use Manning's formula for sewers and open channel flows.

$V = [(1/n)] ([R^{⅔} S^{½}]$

R = Hydraulic mean Radius which is A/P where A is area and P is wetted perimeter

V = Velocity in meter per second

'n' = Manning's coefficient of roughness

- **Manning's Roughness Coefficient**

Manning's roughness coefficient ('n' value) varies with the type of pipe material used in sewer construction. As per CPHEEO Manual guidelines, the coefficient of roughness values for different pipe materials are indicated in following table:

Table 9-19: Coefficient of Roughness (n) for use in Manning's formula

Type of Material	Condition	n
Salt glazed stone ware pipe	Good	0.013
	Fair	0.015
Cement Concrete Pipes	Good	0.013
	Fair	0.015
Spun Concrete Pipes (RCC & PSC)		0.011

GRP Pipes		0.010
Vitrified Clay Pipes		0.010

Suitable 'n' value shall be adopted in this design.

- **Gradient of Sewers**

Gradients for the proposed sewers shall be such that the sewage flow through the pipe lines achieves self-cleansing velocities during average flows. The self-cleansing velocities are desired to avoid the settling of solid and particulate matters in the pipe line. Minimum velocity of discharge shall be adopted as 0.6m/s during peak hours. It is difficult to achieve self-cleaning velocity of 0.6 m/sec in all the stretches as steep gradient of sewers lead to more depth of cutting or warrants for intermediate pumping station. In order to clean the sewer lines by ensuring velocity of 0.8m/s, sewer line flushing shall be proposed once in a day with the help of trucks carrying water from the STP / CETP / Storm Water retention basins. The depth of flow in the pipe lines shall be limited to 80% of diameters of the pipe line and the maximum permissible higher velocity as 3m/s depending on the material of the pipe line. The ground slopes in JPMIA are very flat and the STP is proposed to be located on South – East side which is relatively at the lowest elevation gradient than the contributing area.

- **Flow Velocities**

It is necessary to size the sewer to have adequate capacity for the peak flow to be achieved at the end of design period, so as to avoid steeper gradients and deeper excavations. It is desirable to design sewers for higher velocities wherever possible. This shall be done on the assumption that although silting might occur at minimum flow, the silt would be flushed out during the peak flows.

However, the problem of silting may have to be faced in the upper reaches of laterals as they flow only partly full even at the design peak flow because of the necessity of adopting the prescribed minimum size of sewer. In such situations, flushing arrangements may be provided in those reaches.

A minimum flow velocity in the range of 0.6 to 0.8 m/sec shall be maintained in the sewers for the design peak flow and maximum flow velocity in a sewer shall be kept below 3 m/sec, as high flow velocity would result in its erosion of sewers by flowing sand and grit.

- **Minimum Cover Depth of Sewers**

A minimum cover depth of 1.00 m to the crown of the sewer (from the Finished Road Level to the pipe top) shall be maintained, wherever the sewers are proposed below the roads. The

minimum cover depth shall be provided to ensure the structural integrity of the sewer. In cases, where the sewers are to be laid along steep slopes, this requirement shall be relaxed as necessary. Depth will not be considered as constraint in the design. The maximum depth of sewer to be adopted will depend on the ground water table, type of soil and topography.

- **Depth of Flow**

The sewerage system for the ultimate flow has been designed to utilise the approximately 80% of the full bore of the pipe at peak flows.

- **Maximum Depth of Sewer**

The sewerage system has been designed such that the maximum cover of sewer will be about 6 meters below ground level.

- **Pipe Selection**

The materials used extensively for sewerage in most Indian cities are glazed stoneware and reinforced concrete pipes for gravity sewers whereas cast iron / ductile iron pipes are employed for rising / force mains of pumping stations. Glazed Stoneware pipe is a good sewer material, smooth, easy to lay and join, resistant to corrosion and erosion and are extremely durable. SW pipes are proposed for diameter upto 300 mm and depth upto 3.50 m. The sewer lines shall be provided appropriate bedding to withstand external loads. For larger diameter and greater depths, RCC NP pipes are proposed, the pipes being manufactured of SRP cement with internal sacrificial lining (12.5 mm thick) to enhance their life.

- **Manholes**

Manhole is a structure built on the sewer conduit with a removable cover to permit entry by personnel to the sewer conduit for monitoring, maintenance, and cleaning of the sewers. The manholes are also used for ventilation and venting. The manholes are also built at every junction of two or more sewers and sewers when there is a change in sewer size or gradient. The manhole also enables the sewers to be surveyed and for carrying out repairs and improvement works to the sewer conduit. It also used for operational purposes, e.g. for investigation of poor performance resulting from excessive siltation or for structural assessment of sewer conduit. The spacing of the sewers is determined by the functions as mentioned above. Spacing of manholes will be kept at a maximum of 30 meters.

- **Drop Arrangement**

Theoretically drop arrangements are provided where the drop of an incoming sewer in manhole exceeds 600 mm. The drop arrangement consists of a pipe that drops the invert of the incoming

sewer to that of the main sewer in the manhole. The diameter of the backdrop pipe should be at least as large as the incoming pipe. Drop arrangement is provided in manhole for the following reasons:

- To convey the sewage to bottom of the manhole without splashing
- To minimize the scouring action of the sewage falling from a height on the cement concrete floor of the manhole
- For the safety of the personnel who enter the manhole.

Drop Manholes are provided when the maximum difference in inverts between the shallow incoming and the outgoing sewer of a manhole is more than 60 cm. The manholes are designed based on sewer diameter and depth of manhole.

Table 9-20: Size and Spacing of Manhole

Sewer Diameter (mm)	**Max. Depth manhole diameter (mm)**		**Manhole Spacing (m)**
	Up to 2.4 m	**>2.4 m**	
150- 400	1,200	1,500	30

RCC manholes with SFRC manhole cover and frame are proposed.

i. For sewage pumping mains, the choice of pipe material is made between DI, Reinforced Cement Concrete and Mild Steel with lining and coating based on cost and availability.
ii. Generally, Vertical Shaft Submersible Motor (VSSM), centrifugal non-clog pumps shall be used for pumping of sewage. When capacity required is very large, multiple VSSM pump sets shall be installed in parallel.
iii. Within pumping stations, a provision shall be made for screening and grit removal before pumping.

9.4.3 Treatment Plants and Water Quality

Although the Urban Local Bodies are not required to treat the waste water beyond secondary stage, it is proposed to maximize re-utilization of waste water by incorporating tertiary treatment of the wastes streams and putting the treated water back into the system. The key parameters to measure the treatment of waste water are in terms of following parameters:

i. Biological Oxygen Demand (B.O.D.)
ii. Chemical Oxygen Demand (C.O.D.)
iii. Total Suspended Solids (T.S.S.)
iv. Dissolved Oxygen
v. Nutrients (Nitrogen & Phosphorus)

Typical range of parameters for municipal waste water is presented in Figure 9-4 along with the required discharge standards. It has been demonstrated through various existing treatment plants in India now that few treatment technologies i.e., Activated Sludge Process (ASP), Sequential Batch Reactor (SBR), and Membrane Biological Reactor (MBR) can effectively treat waste water to an desired quality level. ASP and SBR are more commonly used and cost – effective treatment technologies and can be designed to meet specific output quality parameters and can be employed on both municipal and industrial waste streams.

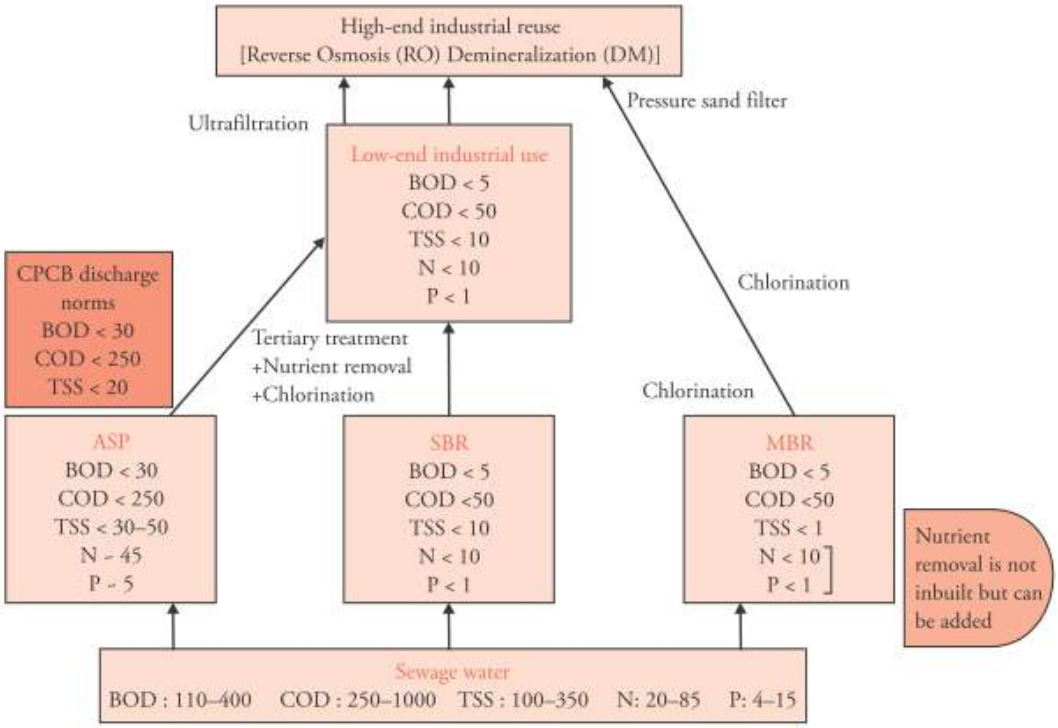


Figure 9-4: Treatment Technology and Reuse Standards[3]

9.4.4 Phasing and Implementation Strategy

The proposed JPMIA region is planned to be developed in three phases. These phases will primarily have their own network while keeping into consideration the integration requirements with other phases. Separate networks will be developed to collect the residential and industrial waste streams. As all phases are a mix of residential and industrial users, both systems need to be developed in phased manner. These networks will then accordingly discharge the waste streams to Municipal Sewerage Treatment Plant and Combined Effluent Treatment Plants for secondary treatment. It is proposed to develop a single STP for the entire development. However, it would be appropriate to develop two (2) number of CETPs, one (1) for Phase 1 and Phase 2 industrial waste generation and the other for Phase 3 CETP. The envisaged capacity

[3] *The Economics of Municipal Sewage Water Recycling and Reuse in India, , PritikaHingorani, 2011, IDFC*

of Phase 1 and Phase 2 CETP is 10 MLD, while for Phase 3 the capacity shall be 35 MLD. This would allow reducing the pumping cost of treated waste streams to the Industries.

9.4.5 Cost Estimates

It is estimated that the overall development shall have a proposed Industrial collection system of 90 Km of length of which the main interceptor shall be of approximately 15 Km of length, with the balance 75 Km as the internal collection system. The estimated cost of developing the Industrial system is shown in Table 9-21.

Table 9-21: Cost Estimate for proposed Waste Water Collection System in JPMIA

Description	Length/ Capacity	*Unit*	Area (m^2)	Rate	*Unit*	Estimate (INR)
Industrial Waste Network	90	*Km*		5,000	*per m*	45,00,00,000
Residential Waste Network	100	*Km*		6,500	*per m*	65,00,00,000
Electro - Mechanical	400	*KW*		25,000	*INR / KW*	1,00,00,000
Municipal Waste Water Treatment Plant including Tertiary	40	*MLD*				65,00,00,000
Industrial Combined Effluent Treatment Plant including Tertiary	10	*MLD*	4,000			40,00,00,000
	35	*MLD*	10,000			75,00,00,000
						291,00,00,000

9.5 Power

One of the key objectives of the Delhi Mumbai Infrastructure Corridor (DMIC) project is to create and develop world class infrastructure for the JPM IA, Power Infrastructure being one of them. Power is an important catalyst and accelerates economic growth, generation of employment, elimination of poverty and human development especially in rural areas. To achieve this objective, availability of reliable and adequate power is paramount. India having abundant supplies of natural resources, energy is available in many forms. India is one of the fastest growing countries in the world and among all the sources that fulfills its aggregate energy demand, electricity is considered as one of the important requisites for all economic and social activities.

Under the present purview of Development of Jodhpur Pali Marwar Industrial Area, a potential manufacturing hub being planned as a Greenfield township in Western Rajasthan, provision of adequate electricity and identification of reliable sources for transmission and distribution of electricity is an integral part of planning for economic goals.

The power infrastructure shall be integrated into a SMART grid which shall permit greater penetration of highly variable renewable energy sources such as solar power and wind power. “Smart grid” will impart the class of technology that will bring utility electricity delivery systems into the 21st century, using computer-based remote control and automation. These systems are made possible by two-way communication technology and computer processing that has been used for decades in other industries.

Demand forecast is paramount for planning of the power sector and utilities within JPM IA and to meet the future power requirements of various sectors of electricity consumption. An assessment of power demand as per the aggregate requirements of industry, agriculture, domestic and other sectors is necessary to identify the potential sources and forecast the infrastructure development costs.

9.5.1 Power Sector in Rajasthan

Till 19th July, 2000 the Rajasthan State Electricity Board, a vertically integrated State owned utility constituted under the Electricity (Supply) Act, 1948, was the sole supplier of Electricity to the Consumers of the State. State Government of Rajasthan’s enactment of the Rajasthan Power Sector Reforms Act 1999 w.e.f 1st June 2000led to the unbundling of Rajasthan State Electricity Board (RSEB) into five functional entities incorporated under Indian Company Act, 1956 as follows:

1. **Rajasthan Rajya Vidyut Utpadan Nigam Ltd. (RRVUNL)- Generation Company**

   This company owns and operates the Thermal Power Stations at Kota and Suratgarh, Gas based Power Stations at Ramgarh, Hydel Power Stations at Mahi and other mini Hydel Stations in the State.

2. **Rajasthan Rajya Vidyut Prasaran Nigam Ltd. (RRVPNL)- Transmission Company**

   This company owns and operates all the 400 kV, 220 kV, 132 kV and 66 kV electricity lines and system in the State and is responsible for procuring power from different agencies for sale to different distribution companies in the State.

3. **Jaipur Vidyut Vitran Nigam Ltd. – Distribution Company**
4. **Ajmer Vidyut Vitran Nigam Ltd. – Distribution Company**
5. **Jodhpur Vidyut Vitran Nigam Ltd. – Distribution Company**

Above three Distribution Companies operates and maintains electricity system below 66 kV in their respective areas. The districts and O&M Circles of erstwhile RSEB covered under these companies are given at Table 9-22

Table 9-22: Details of DISCOMs (Distribution Company) in Rajasthan

Distribution Company	Districts Covered	O&M Circles covered
Jaipur Vidyut Vitran Nigam Ltd.	Jaipur, Alwar, Dausa, Bharatpur, Karauli, Dholpur, Sawai Madhopur, Tonk, Kota, Jhalawar, Baran and Bundi	Jaipur City, Jaipur District, Alwar, Dausa, Bharatpur, Sawai Madhopur, Kota and Jhalawar
Ajmer VidyutVitran Nigam Ltd.	Ajmer, Jhunjhunu, Sikar, Nagaur, Bhilwara, Chittorgarh, Udaipur, Rajsamand, Banswara and Dungarpur	Ajmer, Jhunjhunu, Sikar, Nagaur, Bhilwara, Chittorgarh, Udaipur and Banswara
Jodhpur VidyutVitran Nigam Ltd.	Jodhpur, Sri Ganganagar, Hanumangarh, Churu, Bikaner, Jaisalmer, Barmer, Pali, Jalore and Sirohi	Jodhpur City, **Jodhpur District**, Ganganagar, Hanumangarh, Churu, Bikaner, Barmer and **Pali**

Source:Rajasthan Power Sector Vision 2020

9.5.2 Power Supply scenario in Rajasthan

RRVUNL is entrusted with development of power projects under state sector along with the operation & maintenance of state owned power stations. It is playing a lead role in giving highest priority to the power generation for rapid development of the state. As at 31st December 2013, the installed power capacity of the utility in Rajasthan presented as Table 9-23.

Table 9-23: Details of Installed capacity (MW) in the State of Rajasthan

Ownership Sector	Thermal				Nuclear	Hydro	RES (MNRE)	Grand Total
	Coal	Gas	Diesel	Total				
State	3865	553.8	0	4418.8	0	987.96	23.85	5430.61
Private	2800		00	2800	0		3459.2	6259.20
Central	1014.72	221.23	0	1235.95	573	560.36	0	2369.31
Sub Total	**7679.72**	**775.03**	**0**	**8454.75**	**573.0**	**1548.32**	**3483.05**	**14059.12**

Source: Installed capacity (in MW) of power utilities in the States/UTS regions including allocated shares in joint & central sector utilities as on 31.12.2013, http://www.indiaenergyportal.org/energy_stats.php

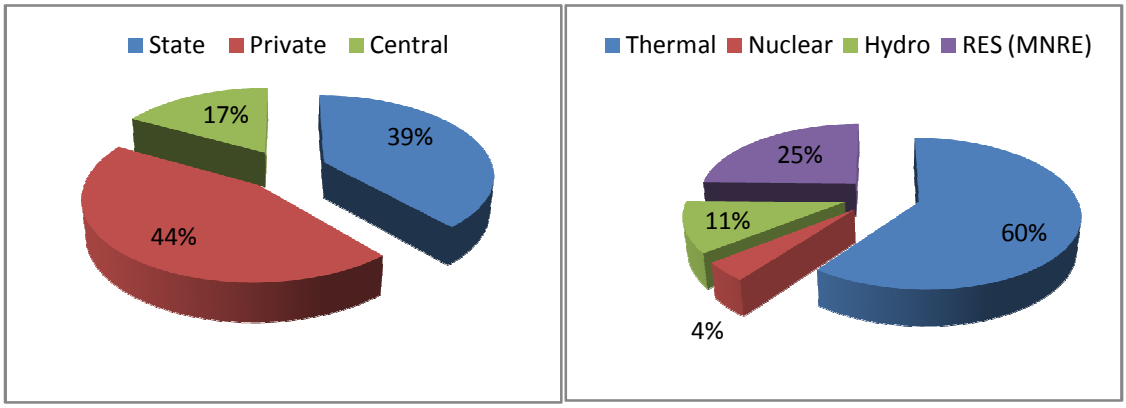


Figure 9-5: Power Generation Scenario in Rajasthan by Owner and Type of Generation

On-going Projects of RRVUNL

New on-going projects under the generation segment to cater to growing demand are listed below in Table 9-24.

Table 9-24: Recently Completed and On-going generation projects in Rajasthan

S no	Name of Unit	Capacity	Commissioning schedule
1	Kalisindh TPS Unit 1	600MW	Sept 2013 Completed
2	Chhabra TPS Phase 2 (Unit3)	250MW	Sept 2013 Completed
Total		850MW	
1	Kalisindh TPS Unit 2	600MW	March 2014
2	Chhabra TPS Phase 2 (Unit4)	250MW	March 2014
3	RamgarhExtn. Project stage III STG	50MW	Feb 2014
4	Ramgarh gas thermal power project stage IV GT	110MW	Oct 2014
5	Ramgarh gas thermal power project stage IV STG	50 MW	March 2015
6	Coal Based Suratgarh Supercritical TPS unit 7 and 8 (Stage V)	2X660=1320MW	Sept, Dec. 2016
7	Coal Based Chhabra Supercritical TPS unit 5 and 6 (Stage II)	2X660=1320MW	Sept, Dec. 2016
Total		3700MW	

Source:http://www.rvunl.com/

New Power projects to be commissioned in XII plan (2012-2017)

As a part of the XII five year plan, the generation capacity at the following power plants will be enhanced to meet future demands.

Table 9-25: New Power Projects proposed in XII Five Year Plan

Super Critical Projects – Coal Based Power Plant	
Suratgarh TPS unit 9,10 (Supercritical)	2X660=1320MW
Kalisindh TPS unit 3,4 (Supercritical)	2X660=1320MW
Banswara TPS unit 1,2 (Supercritical)	2X660=1320MW
Gas based Projects	
Kota Gas Power Project	3x110=330MW
Chhabra Gas Power Project	3x110=330MW
Dholpur Gas Power station (Stage II)	3x110=330MW
Total	**4950MW**

Source:http://www.rvunl.com/

As per RVPNL, the main emphasis of RVPN will be on construction of the Evacuation System of Generating Projects, which is likely to be added during 12th Five Year Plan. The work on evacuation system for Chhabra Super Critical TPS (Unit 5 &6), Kalisindh TPS (Unit1&2), Suratgarh Super Critical TPS (Unit7&8), Kawai Super Critical TPS and Ramgarh GTPS is under progress. The work for New Solar and Wind Power projects will also start soon. Commissioning of these works will be matching with the commissioning of Generating Projects.

The evacuation schemes of other generation projects envisaged in 12th Plan shall also be identified and approved on finalization of commissioning dates by RVUN.

Besides above, the construction of 220kV & 132kV Sub-Stations and its associated lines and augmentation of capacity of existing GSS on the basis of load growth and requirement of Discoms shall also be carried out during 12th Plan. RVPNL have adopted new technology i.e. use of EHV cables, Construction of GIS/ Hybrid GSS and Automation/ SCADA system in construction of Grid Sub-Stations in 11th Plan, which will continue in 12th Plan. In 12th Plan, installation of capacitor banks, expansion in IT activities, renovation and maintenance of existing Grid Sub-Stations will also be carried out by replacing obsolete apparatus.

Renewable energy

Rajasthan Renewable Energy Corporation Limited (RRECL) was formed by merging erstwhile Rajasthan Energy Development Agency (REDA) and the Rajasthan State Power Corporation Ltd (RSPCL) in August 2002. RRECL has a vision *"To lay the foundation for generation of clean electrical power in Rajasthan"* and a mission *"To emerge as a leading and sustainable company committed to promotion and generation of electricity through Renewable Sources of Energy, in Rajasthan".*

Snapshot of renewable energy projects installed in the state of Rajasthan is shown below:

Table 9-26: List of renewable energy projects in Rajasthan

Renewable energy projects	Capacity in MW
Wind Power Projects	2072
Biomass Power Projects	91
Solar Power projects	198

Source: http://en.wikipedia.org/wiki/Wind_power_in_India

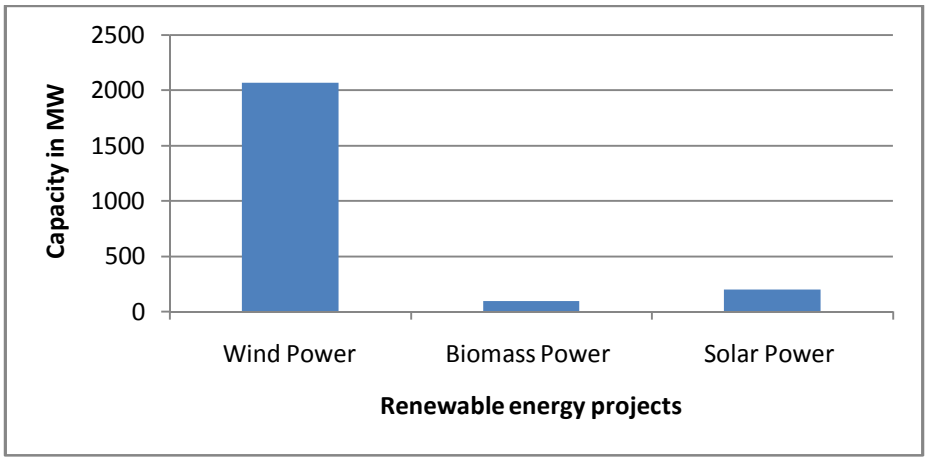


Figure 9-6: Details of renewable energy projects

Source: http://en.wikipedia.org/wiki/Wind_power_in_India

In particular, the state of Rajasthan has come out with Rajasthan Solar Policy 2011. The policy aims at developing Rajasthan as a global hub for solar power of 10,000-12,000 MW capacity in next 10-12 years to meet the energy requirements of Rajasthan and India. To achieve grid parity in next 7-8 years, the state will encourage the solar power developers to establish manufacturing plant of their technology in Rajasthan. Four solar parks are proposed in the state of Rajasthan, one in Jodhpur spread over 10,000 hectares is being developed first in phases. Parks in other three places at Jaisalmer, Bikaner and Barmer districts are being planned to make Rajasthan a solar power hub.

Further at the national level, India is fast becoming one of the world's most attractive markets for renewable energy investments. Various policy measures such as Jawaharlal Nehru National Solar Mission (JNNSM) feed-in-tariff, Accelerated Depreciation (AD), Generation Based Incentives (GBI), Renewable Purchase Obligations (RPO) and Renewable Energy Certificates (REC's) have fostered rapid growth of renewable energy deployment in the country.

Total Electricity Consumption in Rajasthan

The per-capita consumption of electricity in Rajasthan is 927 kWh (kilowatt hour) as per the latest survey (2011–12). Latest available data till 2011–12 shows that India's per capita electricity consumption was 883.6 kWh per capita[10]. Per-capita consumption of electricity shows growth above 9 per cent in 2010−11 and 2011−12.

International comparisons show that India's per capita electricity consumption is lower than its peers **(Table 9-27).** One may interpret from this that Rajasthan's consumption is slightly higher than the national average which is below the less developed and BRIC countries.

Table 9-27: International Comparison on Electric Power Consumption

Indicators	India	Rajasthan	USA	UK	Brazil	Russia	Mexico	China
Electric Power Consumption (kWh per capita)	883.6	927.4	13246	5516	2438	6486	2092	3298

Source: World Bank report, 2011-2012

Non-Conventional, Renewable Energy Sources

Solar:

Rajasthan is uniquely placed to tap solar energy and is comparable to highest solar radiation in the world (Deserts of California, Nevada, Colorado and Arizona). The State is endowed with 300-330 clear sunny days and average daily solar incidence of 5-7 kWh/m^2.

With a strong solar resource potential, the State has stimulated interest among several developers to commit a pipeline of generation projects. Rajasthan has highest allocation of projects (both Solar Photovoltaic - PV and Concentrated Solar Power - CSP) under Phase I of National Solar Mission.

Installed Capacity	-	200MW
Solar Potential in Rajasthan	-	10000 to 12000MW

Wind:

Rajasthan is emerging as an important destination for new wind farms; it is currently amongst the top three states in terms of installed capacity. There has been encouraging growth in development of wind power projects in the State in the recent past, primarily due to prevailing incentives and benefits offered in the afore-mentioned policies.

Installed Capacity	-	2072MW
Wind Potential in Rajasthan	-	5400MW

Biomass:

The biomass power business focuses primarily on the development and operation of multi-fuel biomass-based power plants that generate electricity from agro-residues and waste from agriculture crops, forestry and related industries, such as rice, mustard and soya bean husks, straw, cotton and maize stalks, coconut and ground nut shells, wood chips, poultry litter, and bagasse.

Installed Capacity	-	106MW

9.5.3 Power Supply Scenario in JPM IA Region

As shown in Figure 9-14, three power lines of different voltages run through, to, or near the JPMIA. These include a 220kV line that runs several km northeast of the selected site and a 132kV line that runs roughly parallel to the north of NH-65 (approx 1-1.5km away). This 132kV line crosses the NH-65 to the North West of the JPM IA site and across the Luni River. A lower voltage Transmission line of 33kV also serves the area and has a sub-station in the vicinity of Rohat village.

There are proposals for a series of sub-stations for the 33kV lines in proximity to the proposed JPM IA. Nearest 33kV GSS are proposed at Dhabar, Beethoo and Sonailakha in Pali District and Khara Bera Purohitan in Jodhpur District. However, these are specifically proposed to

serve the power demands in the rural areas. Further, RVVNL aims to reduce the T&D losses by segregating the Urban/ Industrial feeders from the Rural feeders.

In view of these RVVNL objectives and proposals, it would not be wrong to say that Transmission of power from the Generation sources to JPM IA should be the prime concern for Development of JPM IA. To address this issue where Power Transmission is to be provided to the JPM IA Greenfield Township, an assessment of the Power requirement at JPM IA is essential and shall be deduced from the supply demand scenario in the existing Power infrastructure of the region.

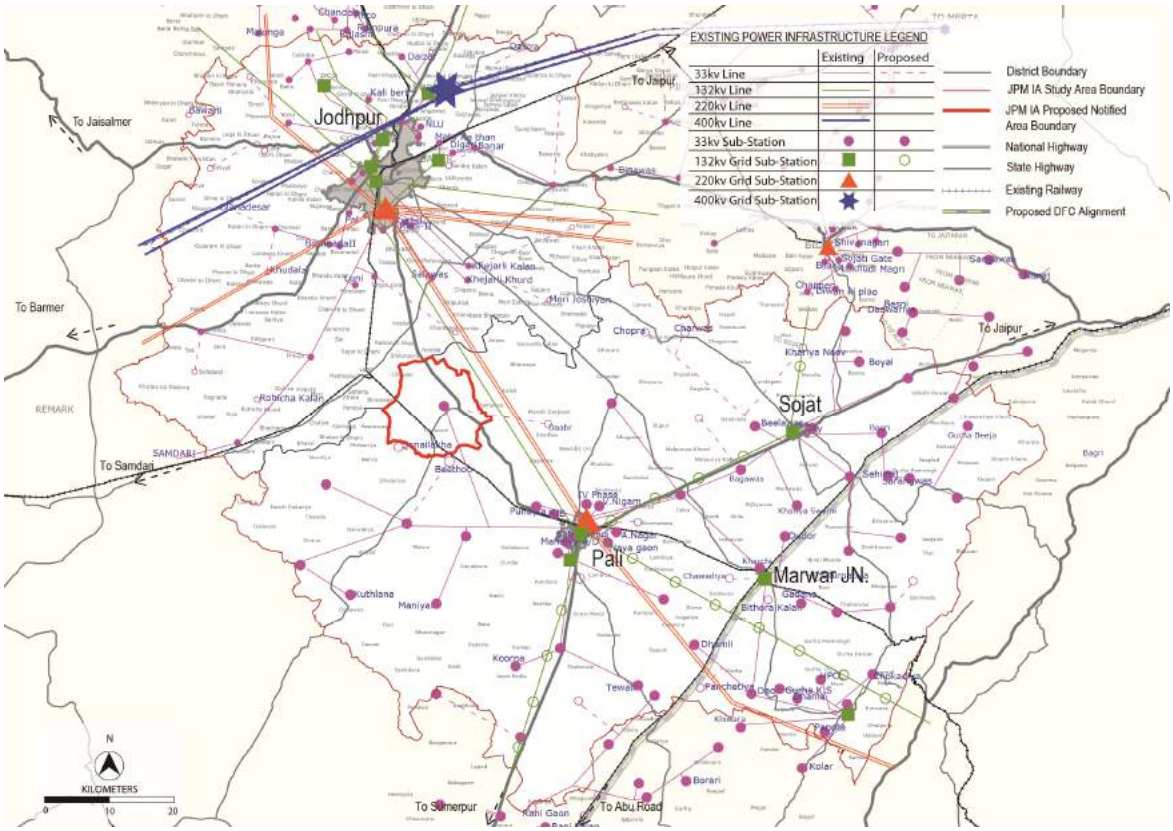


Figure 9-7: Utilities infrastructure of the region with location of Notified Area circled

Source: Adapted from 'Power Map of Jodhpur & Pali District', DISCOM, Jodhpur Vidut Vitran Nigam Limited, 2012

a. Jodhpur District Scenario

The main sources of supply of power to Jodhpur are Kota Atomic Power Station, Bhakra Beas Project, Rana Pratap Sagar and Jawahar Sagar Dams. Jodhpur is connected by 132 kV lines with Bhilwara and Pali. 220 kV lines connect it with Bhilwara and 220 kV Kota-Beawar line is extended upto Jodhpur district. Till March 2012, electrification of the district has been done to all 706 villages in the district have been electrified. All the four towns of the district have been electrified.

Presently there are one 440 kV GSS, eight GSS of 220 KV, twenty three 132 KV GSS and there are two hundred and eighteen 33/11 kV sub stations. The details of arrangement of transmission of power as on 31.3.2012 are presented in Table 9-28:

Table 9-28: Existing Power Supply Infrastructure in Jodhpur District

Type of GSS	No. of GSS	Aggregate Capacity MVA
400 kV GSS	1	630
220 kV GSS	8	1924.5
132 kV GSS	23	1240
33 kV GSS	218	867

Source: DIC Industrial Potential Survey 2012-2013 and Jodhpur DISCOM

Details about location, capacity of sub stations, etc have been provided in Table 9-30

b. Pali District Scenario

The district does not have any power generating station. It gets power from Bhilwara, Bilara and Beawar, through 220kV and 132 KV transmission lines. There are two 220 KV GSS,10GSS of 132 KV and 150 33 KV GSS in the district. By 31st March, 2011 the entire 940 village in the district had been electrified.

Table 9-29: Existing Power Supply Infrastructure in Pali District

Type of GSS	No. of GSS	Aggregate Capacity MVA
400 kV GSS	NIL	NIL
220 kV GSS	2	285
132 kV GSS	10	340.5
33 kV GSS	150	564.51

Source: DIC Industrial Potential Survey 2012-2013 and Jodhpur DISCOM-Pali Circle

Table 9-30: List if GSS in Jodhpur and Pali Districts and installed capacity of Voltage Transmission

S.NO.	NAME OF DISTRICT	NAME OF THE GSS	VOLTAGE RATIO(KV)	CAPACITY (MVA)	NO OF TRANSFOR MERS	AGG. CAPACITY (MVA)
400 KV GSS						
1	JODHPUR	MANDORE	400/220/33	315	2	630
			220/132	100	1	100
					3	**730**
220 KV GSS						
1	JODHPUR	BHOPALGARH	220/132	100	1	100
2			220/132	50	1	50
			132/33	25	1	25
			132/33	12.5	1	12.5
3	JODHPUR	BILARA	220/132	100	2	200
			132/33	25	2	50
4	JODHPUR	JODHPUR	220/132	100	3	300
			132/33	25	2	50
			132/11	20	2	40
5	JODHPUR	PHALODI	220/132	100	2	200
			132/33	25	3	75
6	JODHPUR	TINWARI	220/132	160	1	160

S.NO.	NAME OF DISTRICT	NAME OF THE GSS	VOLTAGE RATIO(KV)	CAPACITY (MVA)	NO OF TRANSFORMERS	AGG. CAPACITY (MVA)
7			220/132	100	2	200
			132/33	25	3	75
			132/11	6	2	12
8	JODHPUR	DECHU	220/132	100	1	100
9	JODHPUR	BORANADA	220/132	100	1	100
			132/33	50	1	50
			132/33	25	1	25
8	PALI	BALI	220/132	100	2	200
			132/33	12.5	2	25
9	PALI	PALI	220/132	100	2	200
			132/33	12.5	1	12.5
					39	**2262**
132 KV GSS						
1	JODHPUR	BALESAR	132/33	25	1	25
2	JODHPUR	BANAR	132/33	50	1	50
			132/33	25	1	25
3	JODHPUR	BAORI	132/33	25	3	75
			132./33	12.5	1	12.5
			132/11	12.5	1	12.5
4	JODHPUR	BHOPALGARH	132/33	25	1	25
			132/33	20	1	20
			132/11	12.5	1	12.5
5	JODHPUR	BORUNDA	132/33	25	1	25
			132/33	12.5	1	12.5
			132/11	12.5	1	12.5
6	JODHPUR	CHAMU	132/33	25	1	25
			132/33	12.5	1	12.5
7	JODHPUR	CHOPASANI	132/33	50	1	50
				25	1	25
8	JODHPUR	DECHU	132/33	25	2	50
9	JODHPUR	JODHPUR NPH	132/33	25	4	100
			132/11	20	1	20
			132/11	12.5	1	12.5
10	JODHPUR	SURPURA / MANDORE	132/33	25	1	25
			132/33	12.5	1	12.5
11	JODHPUR	MATHANIA	132/33	25	2	50
12	JODHPUR	OSIAN	132/33	50	1	50
			132/33	25	1	25
13	JODHPUR	P.S. 8	132/33	12.5	1	12.5
14	JODHPUR	P.S.(V)	132/33	25	2	50
			132/33	12.5	1	12.5
15	JODHPUR	PIPAR CITY	132/33	25	1	25
16	JODHPUR	SOYLA	132/33	25	2	50
17	JODHPUR	SURSAGAR	132/33	25	2	50
18	JODHPUR	LOHAWAT	132/33	25	2	50
19	JODHPUR	AAU	132/33	25	2	50
20	JODHPUR	MATORA	132/33	50	1	50
				25	1	25
21	JODHPUR	KALAU	132/33	25	2	50

S.NO.	NAME OF DISTRICT	NAME OF THE GSS	VOLTAGE RATIO(KV)	CAPACITY (MVA)	NO OF TRANSFORMERS	AGG. CAPACITY (MVA)
22	JODHPUR	SANWREEJ	132/33	25	1	25
	JODHPUR	BAP	132/33	25	1	25
23	PALI	FALNA	132/33	12.5	1	12.5
			132/33/11	12.5	1	12.5
24	PALI	JAITARAN	132/33	25	1	25
			132/33	12.5	1	12.5
25	PALI	JOJAWAR	132/33	25	1	25
			132/33	12.5	1	12.5
26	PALI	KHARCHI	132/33	12.5	2	25
27	PALI	PALI	132/66/33	9	1	9
			132/33	25	2	50
			132/11	10	1	10
			132/11	6	1	6
28	PALI	PIPALIYA KALAN	132/33	12.5	1	12.5
29	PALI	RANI	132/33	20	1	20
			132/33	12.5	1	12.5
30	PALI	SOJAT CITY	132/33	12.5	2	25
			132/11	8	1	8
31	PALI	SUMERPUR	132/33	25	1	25
				12.5	1	12.5
32	PALI	TAGORE NAGAR	132/33	25	1	25
					73	**1580.5**

9.5.4 Power Demand Assessment

The additional demand in JPM region is evident due to the proposed development of JPMIA. In order to better estimate the quantum of Power utilities, transmission and distribution networks from the source and within IA, Power demand has been estimated up to the horizon year 2042. Further, the Development phasing strategy guides the overall process of demand estimation as it relies heavily on forecasts indicating the landuse distribution, industrial output figures and population projections for each phase.

The estimation of infrastructure needs in a Greenfield Township is often challenging to achieve the highest standard of accuracy as large scale developments are intricately dynamic in nature. In the view of the high degree of uncertainty with regard to the type, profile and phasing of target manufacturing industries in the JPMIA, the load estimation can only be an approximation at this stage. The targets may need to be aligned with the phasing and government policies in the future as well as the scale and actual industrial requirements during the development phases. Broadly, the power load has been categorized into three different heads anticipating the power demands as per the designed land uses and projected population at JPM IA:

- Industrial Loads: Heavy, Medium, Light and Small scale industries;

- Social Infrastructure loads: Residential, institutional and commercial including hotels;
- Mixed loads: Utility centres, substations, street lighting; transport, etc.

9.5.5 Industrial Load

The methodology to forecast industrial load is based on econometric projections which uses economic indicators to identify the infrastructure requirements. Herein, the industrial output figures of each target industry type have been used to derive the power requirement to produce that Output value. Each phase having a set of industries, based on the detailed Quantitative analysis covered under the Market Analysis, Gap assessment study for JPMIA, is estimated to achieve certain manufacturing output. This provides a basis for estimation of power consumption in the industrial areas. These details are provided below:

Table 9-31: Power Demand for Industrial Load for each Development Phase

Target Industrial types	2022		2032		2042	
	Industrial Output	Power Demand (MW)	Industrial Output	Power Demand (MW)	Industrial Output	Power Demand (MW)
Agro Food	2618	1646.2	13962	8779.4	56138	35300
Textile and Apparel(Generalized)	1496	1692.1	6521	7375.8	19804	22400
Building Material	2117	3531.0	11310	18864.5	45565	76000
Handicraft	653	107.4	3552	584.2	14593	2400
Motor Vehicle & Auto Components	1630	939.4	9278	5347.3	39907	23000
Computer, Electronic and Optical Products	1978	574.7	11682	3394.3	51969	15100
Solar Energy and Equipment Related	1059	1422.4	6768	9090.2	32164	43200
Machinery & Equipment	2148	1657.8	13926	10747.7	66859	51600
Total Output	**13699**		**76999**		**326999**	
Total Power Demand / Year		**11571.0**		**64183.4**		**269000**
Total Power Demand / Day		**31.70**		**175.84**		**736.99**

Note: Shanghai Standards have been adopted to calculate industry wise Industrial Power Demand

9.5.6 Social Infrastructure Load

Social infrastructure of the non-Industrial land uses have different characteristics as compared to industrial uses and need electrical power to majorly fulfill energy requirements for lighting, heating/ cooling and operating light appliances. Social Infrastructure Load therefore consists of mainly Residential and Commercial loads, the latter also include the Public and semipublic utilities.

a. Residential Load

This has been calculated using projected JPM IA population and per household consumption based on the UDPFI standards which recommend average energy consumption per household as 2kW. However, it is understood that the residential areas within the new city would also have power connections ranging from 1kW to 5kW, as is evident from pattern of power consumption in existing Indian cities.

Considering house hold size of 4.5, total number of households for the projected population of 3.92 lac comes out to be approximately 87111. The electricity consumption would be approximately 174 MW for the horizon year 2042. High Transmission and Distribution losses are major constraints towards Demand side Management especially in Rajasthan where T&D losses are as high as 35% which is even above the National average of 24%. Global best practices indicate that T&D losses can be restricted between 5 to 10%. Considering T&D losses at 10%, the overall Power Demand for Residential sectors is arrived at around 192MW per day. Phase I and Phase II power demands to meet residential load are estimated to be about 46 and 105 MW respectively.

Table 9-32: Forecast for Residential Component of Social Infrastructure Power Load

Description	**Unit**	**2014**	**2022**	**2032**	**2042**
Total Population residing in IA	*thousand*	16	95	214	392
Total Number of Households	*4.5 per HH*	3556	21111	47556	87111
Residential Power Load@ *average of 2kW per household, UDPFI Guidelines*					
Power Demand	**MW**	**7**	**42**	**95**	**174**
T&D losses in India	MW *@24%*	1.7	10.1	22.8	41.8
T&D losses in India	MW *@35%*	2.5	14.8	33.3	61.0
T&D losses as per Global best practices	MW *@5-10%*	**0.7**	**4.2**	**9.5**	**17.4**
Residential Load with 10% T&D Losses		**8**	**46**	**105**	**192**

b. Commercial Load

This subhead includes the power requirement of other facilities of the JPM IA which includes Commercial and Public semi- public land uses. Towards this forecast, the relation between built up area and power load per built up area is applied.

Table 9-33: Forecast for Residential Component of Social Infrastructure Power Load

Description	**Unit**	**2022**	**2032**	**2042**	**TOTAL**
Area of Commercial Land Use	*Sq.km*	0.62	1.23	0.65	**2.5**
Area of Public Semi Public Land	*Sq.km*	0.16	0.72	0.27	**1.15**

Description	Unit	2022	2032	2042	TOTAL
Use					
Total	***Sq.km***	**0.78**	**1.95**	**0.92**	**3.65**
Total Load @30 W/ Sq.ft/ month	MW/ day	19.3	44.7	21.8	**85.8**
T&D losses as per Global best practices	MW *@5-10%*	1.93	4.47	2.18	**8.58**
Commercial Load with 10% T&D Losses		**21.23**	**49.17**	**23.98**	**94.38**

Note: Max FAR for Commercial areas is proposed to be 2.5 and that for Public Semi Public is 1.5.
Source: Guidelines to Design Electrical Network, NPCL

9.5.7 Mixed Load

Mixed Load which includes the power infrastructure required for Utility centres, substations, street lighting; transport, etc. is estimated considering it to be 20 percent of the Social Infrastructure Load.

The detailed assessments of Power Demand as stated above can be summarized in Table 9-34:

Table 9-34: Phase wise Power Demand Estimation for JPM IA

S.No.	Power Load Type	Power Demand (MW)		
		2022	2032	2042
A	Industrial Load	32	176	737
	Diversity Factor of 0.5	**16**	**88**	**368**
	Power Demand for Industries	**16**	**88**	**368**
B	a. Residential Load	42	95	174
	Diversity Factor of 0.8	34	76	139
	b. Commercial Load	19	64	86
	Diversity Factor of 0.8	15	51	69
	Power Demand for Social Infrastructure	**49**	**127**	**208**
C	**Mixed Load @ 20% of B**	**10**	**25**	**42**
1a	Total A+B+C	75	240	618
1b	**TOTAL POWER LOAD for JPM IA** with Distribution Losses @ 10%	**82**	**265**	**679**
2a	***Power Load in MVA*** *with Power Factor of 0.9*	**91**	**294**	**755**

Source: Consultant Forecasts

Note: The total demand which includes industrial load, social infrastructure load and mixed load encompassing industrial and non-industrial demands is arrived at about 670 MW. Based on this consumption pattern, 70 % of the total demand would be needed for the industrial load, 23% for social infrastructure load and remaining 7% for mixed load.

Significant reductions in energy use needs to be targeted through designing each facility according to GREEN Building guidelines which have also been adopted as sustainability principles for the Concept Master Planning of JPM IA. Also a major portion of the non-industrial demand shall be aimed to be met by non-conventional sources like wind, solar etc.

Higher level of efficiencies and integration of diverse sources including the renewables shall be achieved by the development of the system along with a SMART Grid.

9.5.8 Utility planning for Power Infrastructure

From the data gathered during site visit, it is inferred that there is currently no supply/demand gap for power in the existing Jodhpur-Pali area. However, with the proposed industrial area and other infrastructural developments associated with EBP's will demand about 750 MVA, supply/demand scenario needs focus and suitable solutions have to be proposed to meet the identified power demand.

The power transmission and distribution network in the industrial area of the DMIC should be designed with modular and flexible approach not only to cater to the estimated load of 670 MW, but also to absorb the wide variations in load value. Considering the peak load and the future or sudden requirement of power, a demand of 750MVA is considered as pragmatic and hence recommended. Ideally, this demand necessitates one400kV main receivingGSS with two transformers of 315 MVA each and one of 150 MVA. Thus the transformation capacity at 400kV GSS to subtransmission level will be 780 MVA. However, power demand is projected for a thirty year Development period and is incremental over three 10 year term phase wise development of JPM IA. It is also disadvantageous going with 400 kV GSS as nearest 400 kV GSS is at Surpura (Jodhpur District) located at about 70 km distance from the proposed JPM IA site. Installing 400 kV GSS station in the first phase would incur costs which is not justified by the Phase I and Phase II power demands.

It is proposed to implement development of power infrastructure for JPM IA in three stages wherein the Phase wise Power demand can be better addressed by adding/ upgrading voltage transmission capacity in the 220 kV or 132 kV GSS. The bulk power transmission voltage level within the JPM IA will be 33kV and the subtransmission voltage will be 11KV. The lower voltage levels will reduce transmission and distribution losses and equipment costs. The strategy is outlined in following sub sections.

Phase- I and II

Power demand in the initial stage of development will of the order of 74 MW amounting to about 91MVA. To service this demand rounded to 100 MVA, a new state of the art 220/132/33kV GSS (Air insulated or Gas insulated to be decided as appropriate) is proposed at Rohat in the first stage. It is proposed to utilise the 220 kV GSS at Kankani (already proposed by RVPNL) via a double circuit 220 kV HT line from Kankani to JPMIA site. New transmission towers for the HT Line from Kankani to Rohatalong NH-65 will be based on narrow base multi- circuit design to optimize Right of Way (ROW). Initial transmission capacity of the new substation shall be

100 MVA with a provision to expand upto350 to 400MVA through additional transformers. The details are summarized as below:

1. Transformer 1: 220/132 kV, 50 MVA capacity

2. Transformer 2: 220/33 kV, 50 MVA capacity

The outgoing primary distribution lines will be of 132 kV and 33 kV from various busbars at the 220 kV GSS near Rohat. 132 kV busbar would provide 132 kV feeders to meet Industrial and Mixed Loads where individual Substations would be able to step down the high voltage power for industrial requirements. While 33 kV busbars shall provide 33 kV feeders to residential sectors at the 33 kV Sub stations planned as per the residential sectors.

This is done as industrial and residential demands have different characteristics. Industrial demand is based on high density Loads due to high resistance motors while residential demand is based on service reliability at end consumers. Secondary Distribution Network will consist of 11 kV transmission lines generating out from 33/11 kV sub stations. Finally Pole- mounted Distribution transformers having 11/.4 kV sub-transformation capacities would provide power at 440 V, threephase supply to residential consumers. There can be a similar secondary network for Industrial areas as well as alternate arrangement within the premises of large industrial units having their own substations to sub transform voltage from 33 kV to 440V. The distribution network of 33 kV and 11 kV transmission lines is proposed to be laid underground, while the 132 kV lines shall be kept as overhead cables with minimum ROW along the arterial roads.

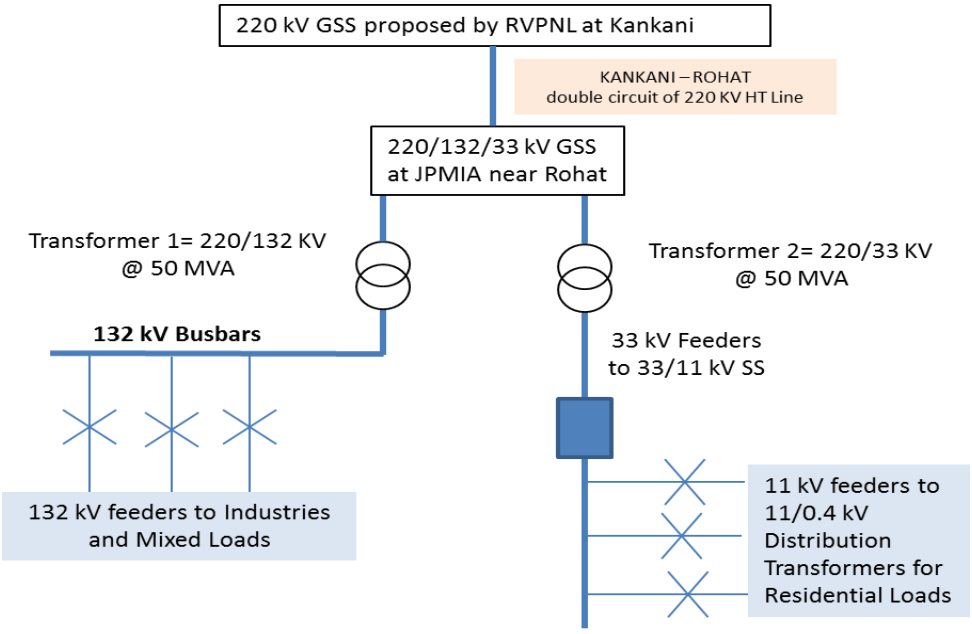


Figure 9-8: Proposed Single line diagram for Power distribution in Phase I

Note: Additional Transformers would be required for Phase II requirements.

Power demand in the second stage of development will increase to 265 MW approximated to 294 MVA. To service this cumulative Phase I and Phase II demand of about 300 MVA, augmentation of Power Transmission at the same 220 kV GSS is proposed.

Figure 9-8 shows the single line concept for Power distribution in Phase I and Phase II.

Phase III

Power demand in the third stage of development will increase to 667 MW approximated to 755 MVA. Considering the overall power demand until 2042, the 220 kV GSS will become overloaded and additional 220/132/33 kV GSS is proposed. Additional demand would be around 465 MW. The capacity design ofadditional transformers to subtransmission level in Phase III will be around 500 MVA taking into account the peak load and the future or sudden requirement of power. To service this increased demand of 500 MVA, the two GSS would equally have power sub transformation capacity of 400 MVA each.

The Power supply Infrastructure and Electricity Distribution Network is shown in Annexure-VII**.**

9.5.9 Power sources

a. Conventional Power

Recent investigations show that in the Jaisalmer and Barmer area high quality natural gas is available. Detailed investigation is recommended to explore possibilities of using this resource for power generation. One of the options could be to set up a dedicated combined cycle captive power plant (with a capacity of at least 200MW) for the DMIC industrial area and use the SPV to evacuate the power generated. However it is needed to detail out the requirements in terms of water, land etc for determining viability. Other option is to get guaranteed share of atleast 5% (amounts to 450MVA) from proposed new power plants to be commissioned during XII year (2012-2017) plan. However, the timing of the new projects should match the plans for the industrial area.

b. Renewable energy sources

The state of Rajasthan has huge potential to harness solar and wind energy. With special emphasis on the solar technology, the Rajasthan state government has come out with a Solar Policy 2011. The policy aims at developing Rajasthan as a global hub for solar power of 10,000-12,000 MW capacity over the next 10-12 years to meet energy requirements of Rajasthan and India. Four solar parks are proposed in the state of Rajasthan. One of the parks

proposed in Jodhpur district is spread across 10,000 hectares and is being developed in phases. Other districts identified as potential solar hubs are Jaisalmer, Bikaner and Barmer. It seems logical to use the renewable energy (Solar energy) resource to cater to at least 75% of the DMIC Industrial area power demand. This target is viable given the state's potential for renewable energy and short gestation period. Exploring this option to meet the industrial power demand can be one of the later early bird projects.

Apart from this, the JPM IA site located in the Pali District just adjacent to the Jodhpur- Pali district border, has huge potential to generate localized Solar parks within the JPM IA. In this regard, two concepts are proposed which can be further studied for techno economic feasibility and viability.

- Rooftop Solar Panels, especially on industrial sectors.
- Solar farm over the Radia Nadi.

Potential for Solar Power generation from the rooftops of industrial areas within JPM IA is as below:

Industrial Land use	Ground Coverage	Roof area under Solar Panels	Area (sq.km)	Area (m2)	State Solar Radiance (kWh/m2/day)	MWh
20.1	50%	10%	1.005	1005000	5	5025

c. Energy minimization

Development and investment in conventional and renewable power is wasted unless efforts are also made to minimise the use of energy. The concept of green building shall be encouraged and implemented through the Sustainable Development guidelines *(will be formulated with Development Plan for JPM IA)*. This will focus on Demand Side Management by increasing the efficiency of the resource use (Energy, water and materials) while reducing buildings impacts on human health and the environment. Measures to reduce energy will include high targets for solar water heating, solar lighting and natural ventilation.

d. Smart Grid

Smart Grid is a new age concept for the efficient use of transmission and distribution networks. In order to be applicable for the DMIC industrial area, the solutions should be modular in nature and highly reliable. The key differentiator in smart grid will be advanced information based technology (ICT network) to increase the network efficiency, reliability and flexibility. The application of smart grid philosophy and technologies would be important to assist with the

integration of various power generation systems and management of demand side. Implementation of smart grid technology can be one of the early bird projects.

Summary

Rajasthan‘s current power supply and demand situation is nearly balanced. However, the pace of generating capacity should match the pace of development to sustain the forecast growth. Based on our review, we believe that the power requirements of the DMIC industrial area can be met with a range of options.

Fossil fuels in India are limited, with coal deposits forecast to last only for next four decades and oil and gas reserves are similarly limited. Today, the renewable energy industry has reached maturity and commercial viability. Although solar power is not yet fully competitive with conventional power, the cost of conventional energy is increasing and the gap is likely to close sooner. Further, renewable energy technologies offer possibility of distributed generation at or near the point of use, which will reduce peaking loads and save on the cost of upgrading and maintenance of transmission and distribution networks.

Our recommended option would be to maximise the use of renewables given the thrust on solar energy from the state government. The DMIC industrial area power demand can be met with a combination of conventional and renewable energy mix, with the latter meeting at least 75% of the demand. We also recommend the constitution of an SPV for transmission and distribution of power as it offers flexibility in wheeling the power from other sources at competitive price. Smart Grid technology once implemented will enable optimal network utilization and enhance operational efficiency of transmission and distribution networks and reduce AT&C losses.

9.6 Gas grid

The provision of energy in the form of gas is one of the prerequisites of the Industry. It is proposed to have a LPG/CNG network throughout the JPM IA primarily for use by the industrial units and also the residential population. We are proposing to tap the GAIL network in the vicinity of the JPM IA with the required infrastructure as per the IS standards and applicable safety norms

9.6.1 Components of the Gas Network

- Tapping Infrastructure for GAIL pipeline
- Network including Pumps, booster stations, meter and residential delivery systems

- Fire Safety system

9.7 Solid Waste Management

9.7.14R's

One of the principles of Sustainability of the JPM IA is the management of the wastes in the Township. The JPM IA will encourage the four principles (4R) reduce, reuse, recycle and recover, which helps to make city clean and more liveable.

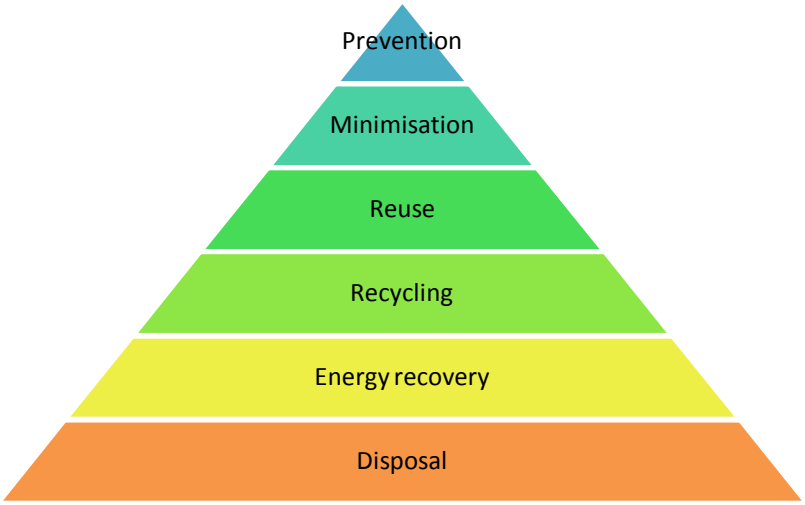


Figure 9-9:4R principle and its process ladder

- **REDUCE** - the amount of waste generated; by eliminating waste at source through better planning and design.
- **REUSE** something again that you would normally throw away. Increase creativity on site – Reuse materials waste whenever possible; this is both cost-effective and reduces waste to landfill.
- **RECYCLE** the waste through a mechanical process to change its form. This is only recommended when reducing and reusing are not possible. Ensure a good separation of waste into "one-material fractions" that can be more easily recycled
- **RECOVER** is to convert waste into resources (such as electricity, heat, compost and fuel) through thermal and biological means. Resource Recovery occurs after reduce, reuse and recycle have been attempted.

The solid waste management for the proposed JPM IA will primarily revolve around the quantity and quality of solid wastes. The quantity will decide the magnitudes of the problems of storage, transportation and disposal operations which have to be undertaken for disposal or any such other purposes whereas the quality will hint at the precautions to be carried out in any such operations. The Solid waste that will be generated in JPM IA can be broadly divided into seven major categories as per source of generation viz. Residential / Domestic Waste, Commercial Waste, Institutional waste, Industrial Waste, Construction and Demolition waste, Hazardous and Sewage Waste.

9.7.2 Domestic Solid waste

As per JNURM Soild waste management toolkit the average waste produced by per capita is as shown in the below table:

Table 9-35: Average per capita waste generation

Population range (in Million)	Averagepercapita value (kg/capita/day)
< 0.1	0.21
0.1 - 0.5	0.21
0.5 - 2.0	0.25
1.0 - 2.0	0.27
2.0 - 5.0	0.35
> 5.0	0.50*

As per the population forecast JPM region will have total population of 0.39 million in 2042 as shown in the following table:

Table 9-36: JPM IA population forecast

Description	Unit	2012	2022	2032	2042
Local Population					
Pre-existing and Natural Growth	thousand	16	20	26	32
Local Workers within IA	thousand	0	49	122	233
Dependents of Local Workers	thousand	0	26	66	127
#Total Population residing in IA	thousand	16	95	214	392
#Total Population residing in IA (rounded)	thousand	-	90	210	390

Total population is less than 1 million and as per JnNURM toolkit the waste generation for less then Million population is 0.21kg per capita per day. As per JnNURM, the total waste generation in JPM IA would be as follows:

Table 9-37: Total waste generation in JPM region

Year	JPM IA Population	Kg Waste/capita/day	Waste Generation (in Kg)
2012	16000	0.21	3360
2022	90000	0.21	18900
2032	210000	0.21	44100
2042	390000	0.21	81900

MSW characteristics depend on the type of activity from which it is produced; such as households, commercial shops, hotels & restaurants, markets and mass storage units, institutions and offices etc. Waste composition basically indicates the physical characteristics and chemical characteristics of waste. Typical physical and chemical characterization waste for Indian Cities has been found as follows:

Table 9-38: Physical characterization of waste for various sizes of Indian cities

Physical Characterstics	Population Range in Millions				
	0.1 to 0.5	0.5 to 1.0	1.0 to 2.0	2.0 to 5.0	>5.0
Paper	2.91%	2.95%	4.71%	3.18%	6.43%
Rubber leather and Synthetics	0.78%	0.73%	0.71%	0.48%	0.28%
Glass	0.56%	0.35%	0.46%	0.48%	0.94%
Metals	0.33%	0.32%	0.49%	0.59%	0.8%
Total Compostable matter	**44.57%**	**40.04%**	**38.95%**	**56.67%**	**30.84%**
Inert	43.59%	48.38%	44.73%	49.07%	53.9%

9.7.3 Industrial Solid waste

Assessment of industrial solid waste greatly varies depending on the nature of the industry, their location and mode of disposal of waste. Further, for arriving at an appropriate solution for better management of industrial solid waste, assessment of nature of waste generated is also essential. In line with our sustainability principles the proposed industry mix has been arrived at on the basis of market analysis and a key to attaining our sustainability goals is the R&D in the platform industries. It is envisaged that research will be undertaken for management of industrial waste in a set of process which will utilize the waste produced in a particular industry to produce useful products.

A two-tier approach should be thought of for waste management, e.g., (a) prevention & (b) control of environmental pollution. Prevention aims at minimization of industrial wastes at source, while the latter stresses on treatment and disposal of wastes.

9.7.4 Sustainability

The key to sustainability is solid waste management is the 4Rs and an integrated approach which integrates the different steps of the overall process and develops seamless interfaces between the steps.

Integrated Solid Waste Management takes an overall approach to creating sustainable systems that are economically affordable, socially acceptable and environmentally effective. An integrated solid waste management system involves the use of a range of different treatment methods, and key to the functioning of such a system is the collection and sorting of the waste. It is important to note that no one single treatment method can manage all the waste materials in an environmentally effective way. Effective management schemes therefore need to operate in ways which best meet current and future social, economic, and environmental conditions of the Industrial Area.

The JPM IA Master plan will provide a mechanism and targets for delivery of zero/minimum waste, including waste-water treatment where the treated effluent from the sewage treatment plants will be supplied for industrial use and other non-domestic use.

Solid Waste Management will be one of the most essential services for maintaining the quality of life and for ensuring better standards of health and sanitation in the proposed JPM IA. To achieve maximizing efficiency and effectiveness of this service, it is essential to provide radical solutions to this problem through a methodological approach for 'Solid Waste Management' (SWM) and devise cost effective system which may ensure adequate level of SWM services in the proposed industrial township, through collection, transportation, treatment and disposal of waste in an environmentally acceptable manner, following the Supreme Court Committee's recommendations as well as Municipal Solid Waste (Management & Handling) Rules 2000.

9.7.5 Components of the Solid Waste Management System.

Neighbourhood collection system

This includes the door to door collection system in the form of Garbage bins, curb side collection system and neighborhood level collection center

Transportation System

This includes the transportation by Garbage Compactor Trucks at City level smaller vehicles at neighborhood level. This shall also include the handling equipment at the disposal sites.

Compost Plant

Phase wise compost plants are proposed in all the three phases which shall deal with the compostable wastes from the Residential areas. The plants shall have the segregation, recycling and composting units. The details shall be part of the development plan

Waste recovery Plant

The treatment of industrial waste shall generally be dealt with the by the individual industrial unit for medium and large scale industries. For the small industrial units a facility on the same lines as a Common Facility Center shall be provided. This unit shall essentially be a Waste recovery unit which shall include the recycling and processing units. Possibility of a Cogeneration plant is also being explored in Phase III of the development of the JPM IA.

Landfill site

A suitable landfill site is proposed at the city level for the waste which is neither compostable nor recyclable and with minimal economic value. The land fill shall be located with detailed site analysis with respect to landuse, topography, water bodies etc. Proper landfill management practices shall be included which includes the prevention of leachate, generation of methane, and ultimate use of the exhausted landfill site as parks etc.

9.8 ICT and Smart City System

The development of a world class industrial township hinges on the provision of world class infrastructure. One of the most important components being the provision of Communication and Internet infrastructure, JPM IA has been proposed to be a SMART city with the hallmarks of integration of all city services, infrastructures using ICT technologies. Smart cities are defined by their innovation and their ability to solve problems and use of ICTs to improve this capacity and JPM IA is planned to be one.

9.8.1 Components of the ICT and Smart City system

- Fixed Line Telephone system including the exchanges
- Mobile Telephone system including servers and cell phone towers
- Optical fiber cable network
- Wide Area Networks
- Local Area Networks
- Cable Television and FM network
- Security system Network including cameras etc

Chapter10

Development Promotion and Control Regulations

10.1 Introduction

The objective of the Development Promotion and Control Regulations is to promote and regulate development controls for building(s) within use premises in accordance with the development policies and landuse proposals contained in the Master Plan for Jodhpur-Pali-Marwar Industrial Area. These regulations will be effective throughout the Jodhpur-Pali-Marwar-Industrial Area.

The Development Promotion and Control Regulation are being envisaged to regulate the development building proposals in Jodhpur-Pali-Marwar Industrial Area. The regulations will act as mechanism to grant permissions for creation of infrastructure facilities for the city and also to implement the broad landuse policies of Master Plan. These regulations will act as promotional as well as control the development to achieve the planned growth.

The approval of landuse shall be granted by competent authority as per provisions of these regulations. It is a systematic Development Promotion Control Regulation to ascertain the use activity at two levels.

The approval of landuse shall be granted by competent authority as per provisions of these regulations. It is a systematic Development Promotion Control Regulation to ascertain the use activity at two levels.

- Conversion of use zones in to use premises (layout)
- Permission of use activities on use premises. The Development Promotion/Control Regulations differentiates between the use zone and use premises.

10.2 The Title and Extent

These may be called the Development Promotion/Control Regulations Jodhpur Pali Marwar Industrial Area.

It covers the entire Jodhpur-Pali-Marwar Industrial Area defined as Jodhpur-Pali-Marwar Industrial Area notified under sub-section (1) of section (3) of Rajasthan Urban Improvement Act 1959 (Rajasthan Act No. 35 of 1959)

10.3 Definitions

In this code unless the context otherwise requires:

- Land Use Plan means the Master Plan for JPMIA-2042 indicating use zones.

- Zonal Development Plan means a plan for one of the zones of JPMIA containing detailed information regarding provision of social infrastructure; parks open spaces and circulation system etc.

- Local area plans means the plan of a sub zone to be prepared and approved by the concerned local body.

- Layout plan means a plan indicating configuration and size of all use premises. Each use zone may have one or more than one layout plan depending upon the extensiveness of the area under the specific use zones and vice versa. A layout plan shall have at least two use premises apart from recreational, utilities and transportation and a minimum area of 1 hectare below which it is termed as site plan or sub division plan.

- Permitted use premises means allowed use premises without any condition.

- Permissible use premises means allowed use premises with certain condition by the competent authority.

- Mixed land use means provision for non-residential activity in residential premises.

- Special uses means uses which have special purposes in JPMIA Complex as defined in the Land Use Plan of the JPMIA.

10.4 Sanction of Plans

Layout Plans, Site Plans and Building Plans shall be approved by competent authority/local bodies.

10.5 Designated Use Zones

The notified area of JPMIA is divided into following use zones, which are as follows:

- Residential Use Zone

- Commercial Use Zone

- Industrial Use Zone

- Public-Semi-Public

- Transportation

- Mixed Use
- Recreational
- Utilities
- Green Buffer
- Peripheral Control Belt

10.6 Location and boundaries of Use Zones

Any one of the use zone may be located at one or more than one places as shown in the Land Use Plan.

The boundaries of various pockets of use zones are defined in land use plan by features like roads etc.

10.7 Location and Boundaries of Use Premises

The location and boundaries of each use premises shall conform to as specified in the layout plan with reference to important benchmark like road or other physical features.

Any change in the location, boundaries and predominant use of use premises due to any reason and duly approved shall be incorporated in layout plan.

10.8 Sub Division of Use Zones In Use Premises

The objective of this development code is to guide the preparation of layout plans for various land use zones and service plans corresponding to these layout plans for provision of physical infrastructure like water supply, sewerage, drainage etc. shall conform to the prescribed norms.

10.9 Permission of Use Premises In Use Zone

May be as part of approval of layout plan or as a case of special permission by the competent authority.

Note:

- The layout plan already approved by the Authority or any other local authority concerned in accordance with the law shall be deemed to be approved under these Development Promotion and Control Regulations.

- An area in respect of which there is no approved layout plan shall be governed by the provisions of the Master Plan.

- The permission under these regulations shall be granted for the land use only, the building permission shall have to be obtained by the plot owner/developer etc. as per provisions and building parameters applicable.

- The competent authority shall formulate detailed rules procedures parameters, charges payable etc. for granting permission under these regulations.

- In case of doubt, the permissibility of use premises shall be decided by the competent authority.

10.10 Permitted and Permissible Use Premises In Various Use Zones

10.10.1 (A)Permitted Use Premises in Residential Use Zones

S. No.	Activity	Minimum Area (Ha)	Road Width	Definitions	Use Premises
1	Auditoriums	0.15 (for a sitting capacity upto 500 seats)	30 mt. and above	A premises having an enclosed space to seat audience and stage for various performances like Concerts, Play, Recitals, Functions etc.	Auditorium Watch & Ward Residence (upto 30 sq.m)
2	A. Banks B. ATMS	0.75 to 0.1	12 mt & above	A premise for office to perform banking function and operations	Bank, Watch, & Ward Residence (upto 30 sq.m), Commercial, Office, and Canteen
3	Barat Ghar	0.2	18 mt. & above	A premises used for marriage and other social functions	Barat Ghar, Soft Drink, & Snack Bar (upto 15 sq.m)
4	Boarding and Lodging house	0.05	18 mt. & above	" Boarding house" is a premises in which rooms are let out on a long term basis as compared to hotels; 'lodging house' is a premises used for lodging of less than 50 persons	Boarding house and lodging house watch and ward residence (upto 30 sq.m) personnel service shops of Barber, Launderer, Soft drink & Snack stall (upto 15 sq.m)
5	Bus Stop	2.5 mt X 0.5 mt	18 mt. & above	Road side shade for passenger awaiting city buses	Bus stop for every 500 to 750 mt. interval 30 to 40 mt. away from road crossing.
6	Community Centre	0.29	18 mt. & above	A premise having an enclosed space for various social and cultural activities of a residential area.	Community hall, Watch and ward residence (upto 30 sq.m), Soft drink and Snack stall.
7	Convenience Shopping Centre	0.10	12 mt. & above	A group of shops not exceeding 50 in number in residential area serving a population of 5000 persons.	Retail, Repair and Personnel service shop, Restaurant, clinic.
8	Cycle rickshaw/cycle cart stand	1.5 mt. x 1.5 mt per unit	As per parking zone of the scheme		

S. No.	Activity	Minimum Area (Ha)	Road Width	Definitions	Use Premises
9	Dharamshala	0.05	12 mt & above	A premises providing temporary accommodation for short duration on no□profit basis.	Dharamshala, Personnel service shop of barber & Launderer, Soft drink & Snack bar (upto 15 sq.m.).
10	Exhibition and Art Gallery	1.0 to 2.0	18 mt. & above	A premises with facilities for exhibition and display of paintings, Sculptures, Murals, Ceramics, handicrafts or products of a specific	Library, watch and ward residence (upto 30 sq.m), Canteen, Exhibition and Art Gallery, Auditorium.
11	Group Housing	0.50	18 mt. & above	A premises comprising of residential flats with basic amenities like Parking, Park, Convenience shops, Public utility etc	Residential flat, Retail shop of confectionery, Grocery & General merchandise, Books & Stationary, Chemist, Barber, Laundry, Tailor, Vegetable shop (on Ground floor with an area upto 20 sq.m. each). Crèche and day care centre, on ground floor with an area upto 50 sq.m.
12	Guest House	0.05	18 mt. & above	A guest house is premises for housing the staff of Government, Semi-Government, Public undertaking and private limited company for short duration.	Guest house watch and wad residence (upto 30 sq.m.) personnel service shops of Barber, Launderer, Soft drink & Snack stall (upto 15 sq.m.).
13	Gymnasium	0.05	12 mt & above		
14	Health Centre upto 30 beds	0.20 to 0.30	12 mt & above	A premise having facilities for treatment of indoor and outdoor patients having up to 30 beds. The health centre may be managed by a public or a charitable institution on non-commercial basis.	Health Centre watch and ward residence (upto 30sq.m), Chemist shop (upto 15 sq.m each)

S. No.	Activity	Minimum Area (Ha)	Road Width	Definitions	Use Premises
15	Hostel	0.05	18 mt & above	Premises in which rooms attached to 'institutions' or otherwise are let out on a long term basis;	Hostel watch and ward residence (upto 30 sq.m), Personnel service shops of Barber, Launderer, Soft drink & Snack stall (upto 15 sq.m).
16	I.T unit in residential plot	0.02 & more	12 mt. & above	A Premise in which I.T unit is being run.	I.T unit office watch and ward.
17	A. Integrated Residential school with hostel facility B. Integrated school without hostel facility C. School for Handicapped Children	As per norms of educational dept. 2.0 to 3.0 0.20	18 mt & above 18 mt & above 12 mt. & above	A premise having educational and playing facilities for students up to xii standard. It shall have boarding facilities for students and may have residences for faculty members.	Residential flat (for maintenance staff), Institutional hosted, Retail shops of 15 sq.m. each (Confectionery, Grocery & General merchandise, Books & Stationery, Chemist, Barber, Launderer, Vegetable), Canteen, Bank extension counter, Auditorium, Indoor games hall, Swimming pool, Playground, Post office counter facility.
18	Library	0.05 to 0.1	12 mt. & above	A premise having a large collection of books for reading and reference for general public or specific class	Library, watch & ward Residence (up to 30 sq.m.), Canteen, Exhibition and Art gallery, Auditorium.
19	Local shopping centre	0.40	12 mt. & above	A group of shops not exceeding 75 numbers in residential area serving a population of 15,000 persons.	Retail, Repair and Personnel service shop, Informal sector unit, Commercial office, Cottage and Service industry, Clinical Laboratory, Clinic & Polyclinic, Restaurant, Soft drink & Snack stall, Post office and Bank extension counter, Nursing home and Guest house.

S. No.	Activity	Minimum Area (Ha)	Road Width	Definitions	Use Premises
20	Nursery & kinder garter school	0.10	12 mt. & above	A premise with facilities for training and playing for children preparatory to the school.	Nursery and kindergarten school watch & ward residence (upto 30 sq.m).
21	Nursing Home	0.20 to 0.30	12 mt. & above	A premise having medical facilities for indoor and outdoor patients having up to 30 beds. It shall be managed by a doctor or a group of doctors on commercial basis.	Nursing home, watch & ward Residence (upto 30 sq.m. each), Chemist shop (up to15 sq.m. each).
22	Old Age Home	0.1	12 mt. & above	A premise with residential and related facilities for old age persons.	Old age home, Residence/flat for Caretaker and watch & ward. Personnel service shop, Dispensary, Club, Community hall.
23	Park	-	-	A premise used for recreational leisure activities. It may have on it related landscaping, Parking Facilities, Public toilet, Fencing etc. it will include synonyms like Lawn, Open space, Green, etc.	Park, Soft drink & Snack stall (on the park with & above 1.0 hectare area).
24	Plant Nursery	0.05	12 mt. & above	It is a premise with facilities for rearing and sale of young plants.	Nursery, watch & ward Residence (upto 30 sq.m.).All structures shall be temporary in nature.
25	Plotted Housing	As per scheme	-	A premises for one or more than one dwelling unit and may have on it one main building block and one accessory block for garage/garages and servant quarters.	Residence mixed use activity as per the recommendation in the section on mixed land use.
26	Police Post	0.05	12 mt. & above	A premise having facilities for a local police post of a temporary nature or on smaller scale as compared to a police station.	Police post, Essential staff housing.

S. No.	Activity	Minimum Area (Ha)	Road Width	Definitions	Use Premises
27	Primary School	0.20 to 0.40	12 mt. & above	A premise having educational and playing facilities for students up to v standard.	Primary school, Watch & ward residence (upto 30 sq.m.), Books and Stationery shop (up to 15 sq.m.), Soft drink & Snack stall.
28	Professional Offices	0.05	12 mt. & above		
29	Public utilities and building except services and storage yard	As per concerned Dept. norms		(i) Overhead tank- A premises having an overhead tank for storage and supply of water to its neighbouring areas. It may or may not include a pump house. (ii) Underground tank-A premises having an underground tank for storage and supply of water to its neighbouring areas. It may or may not include a pump house. (iii) Oxidation pond- A premises having a tank used for the oxidation process for sewage and other waste. (iv) Septic tank- A premises having an underground tank for collection of sewage and its consequent disposal. (v) Sewage pumping station-A premises with a pumping station used for pumping sewage on to a higher gradient. (vi) Public toilet and urinal- A premises having latrine and urinals for use of public. It may or may not include drinking water facility. (vii) Electric sub -station - A premises having electrical installation and transformer for	Public utility premises-Overhead tank, Underground tank, Oxidation pond, Septic tank, Sewerage pumping station, Public toilet urinal, Electric substation, Solid waste collection centre, Dhobi ghat.

S. No.	Activity	Minimum Area (Ha)	Road Width	Definitions	Use Premises
				distribution of power. (viii) Solid waste collection centre A premises used for collection of garbage for it's onwards transportation to sanitary landfill/disposal.	
30	Recreational Clubs	0.10	18 mt. & above	A premise having facilities for recreational activities including indoor games	
31	Religious Premises	0.05	12 mt. & above	A premise dedicated to accommodations and service of god or other objects of religious nature. It may have different nomenclature in different religions like temple (all faiths), Mosque, Church, Gurudwara, Ashram.	(i) Temple, (ii) Mosque, (iii) Church, (iv) Gurudwara, (v) Synagogue, (vi) Ashram, (vii) Bathing tank, (viii) Dargah and (ix) Charitable dispensary and Library.
32	Research and Development Centre	0.10	18 mt. & above	A premise providing facilities for research and development for any specific field.	Research & Development centre, Watch & ward Residence (upto 30 sq.m.), Residential flat (for maintenance staff) Hostel, Canteen, Bank extension counter, Library, Post office extension facility.
33	Residence cum work plot (Shop cum Residence)	As per scheme	12 mt. & above	A premises providing residential accommodation for one family (one household) and its workspace restricted to ground floor.	Residence, ground floor area may be used as work space for Retail shop, Household industry and Personnel service shop.
34	Residential Flat	0.10	12 mt. & above	A residential accommodation for one family (one household) which may occur as a part of group housing or independently.	Residence, Professional activity

S. No.	Activity	Minimum Area (Ha)	Road Width	Definitions	Use Premises
35	Secondary School	1.0 or as per Requirement of educational department	12 mt. & above	A premise having educational and playing facilities for students up to x standard. It shall include middle schools which are upto viii standard for the purpose of this code.	Secondary, Senior secondary and Integrated school, Watch & ward Residence (upto 30 sq.m.), Books & Stationery and Chemist shop (upto 15 sq.m.), Soft drink & Snack stall, Canteen, Bank extension counter, Auditorium, Indoor games hall, Swimming pool, Post Office Counter Facility.
36	Senior Secondary School	2.0 or as pe requirement of educational deptt.	12 mt. & above	A premise having educational and playing facilities for students up to xii standard.	Secondary, Senior secondary and Integrated school, Watch & ward residence (upto 30 sq.m.), Books & Stationery and Chemist shop (up to 15 sq.m.), Soft drink & Snack stall, Canteen, Bank extension counter, Auditorium, Indoor games hall, Swimming pool, Post office counter facility.
37	Social Welfare centre without Auditorium	0.10	18 mt. & above	A premise with facilities for welfare and promotion of community development.	Social welfare centre, Watch & ward Residence (upto 30 sq.m.), Canteen, Exhibition -cum -sale counter.
38	Taxi and Auto Stand	2 mt x 2 mt	As per parking zone of the scheme		
39	Technical Training Centre	0.10 (as per norms of the Technical Education deptt.)	18 mt. & above	A premise with facilities for training in discipline of technical nature. It includes technical school and industrial training institute, etc.	Technical training centre, Residential flat (for maintenance staff), Books, Stationery shop, Chemist ship (up to 15 sq.m. each), Canteen,

S. No.	Activity	Minimum Area (Ha)	Road Width	Definitions	Use Premises
					Bank extension counter, Auditorium, Post office counter facility.
40	Water Pumping Station	As per PHED Norms		In Facility Area	
41	Weekly Market	0.10	18 mt. & above	An area used once in a week by a group of informal establishments in the form of a market. These markets shift from one area to another on different days of the week.	Weekly market, Informal sector trade, Soft drink & Snack stall (all structures will be either temporary or mobile, only for one day in a week).
42	Yoga Centre	0.05	12 mt. & above	A premises having facilities for self-attainment, achieving higher quality of mind and body, Spiritual and religious discourse etc.	Yoga centre, Meditation, Spiritual and Religious discourse centre- Yoga centre, Meditation, Spiritual and Religious discourse centre, Watch & ward residence (upto 30 sq.m.), Hostel, Soft drink & stall.
43	Banquet Hall		18 mt. & above		

(B) Permissible Use Premises in Residential Use Zones

S. No.	Activity	Minimum Area (Ha)	Road Width	Definitions	Use Premises
1	Bakeries and Confectionaries	30 sq.m	18 mt. & above		
2	Burial Grounds/ Cremation site	The site for Burial grounds/ Cremation site shall be identified at such locations which are not in proximities to residential areas.9		It is a premise with facilities for burying of dead bodies.	Burial ground, Cremation ground, Cemetery and electric crematorium burial ground, Cremation ground, Cemetery and electric crematorium, Retail shops of wood, Flowers and related materials, Watch & ward Residence (up to 30 sq.m.)
3	Bus Depot without workshop	As per the requirement of RSRTC	As per requirement of RSRTC	A premises used by a public transport agency or any other such agency for parking maintenance and repair of buses. This may or may not include a workshop.	Bus depot, Workshop, Watch & ward residence (up to 30 sq.m.), Soft drink & Snack stall, Administrative office.
4	Children Traffic Park	1.0 to 2.0	18 mt. & above	A premise in the form of park with facilities for Introducing and educating children about traffic and signalling.	Children traffic park, Watch & ward residence (upto 30 sq.m.), Soft drink & Snack stall, Museum, Auditorium.
5	A. Cinema Hall B. Multiplex	0.15 0.20	30 mt. & above 30 mt. & above	A premise with facilities for projection of movies and stills with a covered space to seat audience.	
6	Clinical laboratory	0.01 to 0.02	12 mt. & above	A premise with facilities for carrying out various tests for confirmation of symptoms of a disease.	
7	Household Industry	30 sq m and above			
8	Motor Cycle repairing work shop garages	45 sq.mt	12 mt. & above	In convenient shopping centre.	

S. No.	Activity	Minimum Area (Ha)	Road Width	Definitions	Use Premises
9	Multipurpose shop	60 sq.mt	12 mt. & above		
10	Municipal state and central govt. office	As per requirement of the concerned deptt.	12 mt. & above	A premises used for the office of the central/state government.	Central government office, Local government office & Public undertaking office-Central government, State government, Local government & Public undertaking office. Watch & ward residence (up to 30 sq.m.), Retail shop, chemist, Books and Stationery, Consumer store (up to 20 sq.m. each on ground floor), Canteen, Bank extension counter, Post office extension counter.
11	Museum	0.10 to 0.15	18 mt. & above	A premise with facilities for storage and exhibition of objects illustrating antiques, Natural History, Art, etc.	Museum, Exhibition centre and Art gallery, Auditorium and Open air theatre, Museum, Exhibition centre and Art gallery, Auditorium and open air theatre, Watch & ward residence (up to 30 sq.m.), Canteen.
12	Music Dance and Drama Training Centre	0.10	18 mt. & above	A premises having facilities for imparting training and coaching for Music, Dances and Dramatics.	Museum, Exhibition centre and Art gallery, Auditorium and Open air theatre□museum, Exhibition centre and Art gallery, Auditorium and Open air theatre, Watch & ward Residence (up to 30 sq.m.), Canteen.

S. No.	Activity	Minimum Area (Ha)	Road Width	Definitions	Use Premises
13	Open air theatre	0.10	18 mt. & above	A premises having facilities for audience seating and a stage for performance and is open to sky.	Open air theatre, Watch & ward residence (up to 30 sq.m.), Canteen.
14	A. Orphanage without school B. Orphanage with school	0.05 0.1 to 0.15	12 mt. & above 18 mt. & above	A premise with facilities for boarding of children who are bereaved of parents. It may or may not have educational facilities.	Boarding house, school, watch and ward (up to 30 sq.m.)
15	Petrol and diesel Pump without service station	20 mt x 20 mt. or as per norms of MOST.	24 mt. & above	A premise for sale of petroleum products to consumers.	Petrol pump, Soft drink & Snack Stall, Automobile repair shop.
16	Printing Press	0.02	12 mt. & above	A premise with facility of machinery for printing & publishing Books, etc.	Hall for providing press. Watch & ward, Toilet etc.
17	Restaurants	0.05 to 0.07	24 mt. & above	A premises used for serving food items on commercial basis including cooking facilities. It may have covered or open or both for sitting arrangement.	Restaurants
18	Socio-cultural institute	0.1	18 mt. & above	A premises with facilities for activities of socio□ cultural nature run by a public, Voluntary or individual on primary non-commercial basis.	Social and Cultural institute, Watch & ward residence (upto 30 sq.m.), Soft drink & Stall, Restaurant, Bank extension counter facility, Canteen, Auditorium, Library, Music, Drama training centre, Museum, Exhibition centre and Art gallery.
19	Storage of LPG Gas Cylinders	0.10	18 mt. & above (500 mt. away from residential plot/ petrol pump)	A premise where cylinders of cooking gas or other gas are stored.	Storage, Godown, & Warehousing, Watch & ward residence (upto 30 sq.m.), wholesale outlet, administrative and sales office.
20	Transit visitors camp	0.10	18 mt. & above		

10.10.2 Permissible and non permissible uses in Mixed Use

(i) Manufacturing industries will not be allowed in High Density Mixed Use.

(ii) Any trade or activity involving any kind of obnoxious, hazardous, inflammable, non compatible and polluting substance or process shall not be permitted.

(iii) Commercial Activity in the form of retail shop as per (ii) shall be permitted in plots abutting notified mixed use zone. Retail shops shall be permitted on plots abutting streets notified for mixed land use only on the ground floor as per the applicable building bylaws.

(iv) Shops operating from basement on such streets may continue, subject to relevant provisions of building bylaws, structural safety, clearance. The following activities shall not be allowed under mixed use such as:

Retail shop of building materials, timber, timber products (excluding furniture), firewood, coal, any fire hazardous and other bulky material, marble, iron, astral (grave, cement and sand)

(v) Following items or activities may be allowed on ground floor only, in residential premises as listed below.

a. Vegetables / fruits/ flowers.
b. Bakery items/ confectionary items.
c. Kirana / General store / Departmental store.
d. Dairy product
e. Stationary / books/ gifts / book binding.
f. Photo state/ Fax / STD/ PCO.
g. Cyber café / Phone call booths.
h. LPG Booking office/showroom without LPG cylinders.
i. Atta Chakki.
j. Barber shop / Hair dressing saloon / Beauty Parlour.
k. Laundry / Dry cleaning / Ironing.
l. Sweet shop/ Tea stall without sitting arrangement.
m. Chemist shop / Clinic / Dispensary / Pathology lab.
n. Optical shop.
o. Tailoring shop
p. Electrical /Electronic repair shop
q. Photo studio
r. Hosiery/Readymade garments /Cloth shop.
s. ATM.
t. Cycle repair shop.

(vi) On Residential plots abutting minimum 18’ ROW, following activities shall also be permitted.

a. Pre-primary School (including nursery / Montessori crèche).
b. Nursing Home.
c. Clinic, dispensary, pathology lab and diagnostic centre.
d. Guest house (including lodging house) irrespective of number of rooms
e. Bank

f. Fitness centre (including gymnasium, yoga / meditation centre).
g. Coaching centres / tuition centre other than those imparting structured courses leading directly to the award of a degree or diploma or conducting classes such as a regular school.

Note:

A. The above mentioned activities shall also be subject to any other specific terms and conditions as may be prescribed in the relevant acts / rules applicable to them.
B. Pre-primary school and fitness centre shall be restricted only to the ground floor up to the permissible ground coverage.
C. It shall be the responsibility of the plot owner to make arrangement for parking as per the bylaws so that the parking does not encroach / spill over on public land.
D. No encroachment shall be permitted on street or public land.
E. Development control norms as per building by laws applicable for the particular residential use will continue to be applicable even if the plot or dwelling unit is put to mixed use.
F. If the notified street is a master plan road, and if a service road is available or provided for by local bodies, then the mixed use premises should be approached from such service road and not directly from the main carriageway.
G. If any commercial activity is proposed on plotted development, front set back should not have boundary wall so that it can be used for additional parking.
H. Common parking areas would be earmarked on notified mixed use streets taking it to an account that the additional load on traffic and parking consequent' s up on notification of the street under mixed use policy.
I. Where there is only one dwelling unit in a residential plot there can be only one type on mixed use (i.e. retail shop or professional activity or one of the other activities listed in (v)
J. Where there are more than one dwelling unit in a residential plot, each of the dwelling units will be permitted to have only one type of mixed use activity i.e. (either retail shop or professional activity or any one of the other activity as listed in (v)
K. In group housing only professional activity and small shops as listed in (v) shall be permissible. Retail shops specifically provided in the layout plan of group housing would be permissible.
L. The case of mixed use within the plot, the building regulations may specify and to that extent the above shall be created as modified.

10.10.3 (A) Permitted Use Premises in Commercial Use Zone

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
1	Auditoriums	0.10	18 mt. and above	A premises having an enclosed space to seat audience and stage for various performances like Concerts, Play, Recitals, Functions etc.	Museum , Exhibition centre and Art gallery, Auditorium and open air theatre, Watch & ward Residence)
2	Auto/Thela/ Rickshaw stand	2 mt.X 1.5	Mt. Per auto 2mt. Per thela & 2mt. * 1.5 mt. Per rickshaw	A premise providing space for parking of Auto/Rickshaw with or without parking fee.	
3	Bakeries & confectionaries	0.03	12 mt. & above	Premises having an eclectic own/Bhatti for making bakery items & three marketing.	
4	Bank	0.07 to 0.1	18 mt. & above	A premise used for office to perform banking function and operation.	Bank watch & ward residence (up to 30 sqm. m) Commercial office and Canteen.
5	Community hall/ Baratghar	0.1	18 mt. & above	A premises used for marriage and other social functions	Baratghar, soft drink & snack bar (up to 15 sq. m.)
6	Boarding house & lodging house	0.05	18 mt. & above	Boarding house is a premises in which rooms are let out on a long term basis as compared to hotels: Lodging house is a premises used for lodging of less than 50 persons	Boarding house & lodging house, watch and wad residence (Upto 30sq .m) Personnel service shops of barber, Launderer and soft drink & snack stall (Upto 15 sq.m)
7	Bus Terminal	1.0	30 mt. & above	A premises used by public transport agency to park the buses for short duration to serve the population. It may include the related facilities for passengers	Bus Terminal. Soft drink & SNACK stall, Administrative office, Other Offices
8	Cinema	0.15	30 mt. & above	A premise with facilities for projection of movies and stills with a covered space to seat audience	Cinema, watch & ward residence (Upto 30 sq.m). Administrative office ,soft drink & snack stall, Museum, Auditorium

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
9	College: A. Technical College B. Medical	 As per AICTE norms As per Norms	 30 mt. & above 30 mtr & above	A premise having educational and playing facilities for students of under graduated and post graduated courses under a university. It includes all professional disciplines.	College, Residential flat (for maintenance staff),institutional hosted, Retail shops of 15 sq.m each(Confectionary, grocery & General Merchandise, Books & Stationery, Chemist, Barber, Launderer, Vegetable),canteen, bank
10	Commercial office	0.05	12 mtr & above	A premises used for offices of profit making organisation	Commercial office, retail & personnel Service shop, Restaurant, bank, Post & Telegraph office
11	A. Gas Godown Including Supply office B. Gas Booking Office	0.6 3 mt. X 3 mt.	18 mtr & above 9 mtr & above	A premises having storage facilities for gas cylinder (200 mt. Away from residential Plot) A shop/ office for booking of gas cylinder without any storage.	Gas Godown, watch & ward Residence (Upto 30 sq. m) , Care taker Office
12	General Business	0.30 to 0.50	18 mt & above		
13	Go downs & ware hosuing (Non-Inflammable)	0.025 to 0.05	18 mt & above	A premise for Whole sale trade is a premise from where goods and commodities are sold and delivered to retailers. Such premises include storage and godown and loading and unloading facilities	Whole sale trade-Whole sale shop, Go down & Storage, commercial office (Restricted to 25 5 of the total floor area)
14	Govt./ Institutional Office	0.10	18 mt & above	A premises used for the office of union /State Government	Central government, State government, local government & Public undertaking office. Watch & ward residence (upto Sq. m),retail shop, Chemist, Books and Stationery, Consumer store (upto to 20 sq.m each on ground floor), canteen, bank Extension Counter , Post office Extension Counter

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
15	Group Housing/ Residential Plot	0.5(GH) 0.02 to 0.05 (RP)	12mt & above	A premises comprising of residential flats with basic amenities like parking, park, convenience shops, public Utility, etc.	Group housing- Residential flat, retail shop of Confectionery, grocery & general Merchandise, Books & Stationary, Chemist, barber, laundry, tailor, Vegetable shop (on ground floor with an area up to 20 sq. m each). Crèche and day care centre, on ground floor with an area upto 50 sq.m.
16	Guest houses	0.05	18 mt & above	A guest house is premises for housing the staff of Government, Semi Government, Public Undertaking and private limited company for short duration; 'Boarding house' is a premises in which rooms are let out on a long term basis as compared to hotels 'Lodging house' is a premises used for lodging of less than 50 persons	Hostel, Guest house, boarding house and Lodging house, watch and ward residence (Upto 30 sq.m). Personnel service shops of barber, launderer , Soft
17	Health centre Upto 20 beds	0.20 to 0.30	18 mt & above	A premise having facilities for treatment of indoor and outdoor patients having upto 30 beds. The health centre may be managed by public or a charitable institution on non-commercial basis. It Includes family welfare centre.	Health Centre Watch & ward residence (upto 30 sq.m each), chemist shop (upto 15 sq.m each)
18	Hotels	0.15	24 mt & above	A premises used for lodging of 15 persons or more on payment with or without meals	Hotel, Retail & Personnel service shops & Commercial office restricted to 5 % of the total floor area, Restaurant
19	Library	0.05	12 mt & above	A premise having a large collection of book for reading and reference for general public or specific class.	Library, watch & ward residence (upto 30 sq.m each). Canteen, Exhibition and art gallery, Auditorium

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
20	Medical Clinic	0.02	12 mt & above	A premise with facilities for treatment of outdoor patients by a doctor. In Case of a polyclinic, it shall be managed by group of Doctors.	Clinic
21	Motor Driving Training Centre	0.1	18 mt & above	A premise having facilities for training of driving automobiles	Motor Driving Training Centre, Watch & ward residence (upto 30 sq.m), Soft drink & Snack stall
22	Night Shelter	0.05 or more	12 mt & above	A premises providing night accommodation to individuals without any charges or with token charges it may be run by local government of voluntary agencies	Night Shelter
23	Nursing Home	0.10 to 0.20	18 mt & above	A premise having facilities for indoor and outdoor patients having upto 30 beds . it shall be managed by a doctor or a group of doctors on commercial basis	Nursing Home, Watch & ward residence (upto 30 sq.m), Chemist shop (upto 15 sq.m each)
24	Park/ Open Space	-	-	A premise used for recreational leisure activities. It may have on it related Landscaping, Parking facilities, public toilet, Fencing etc. It will include synonyms like lawn, open space, green, etc	Park, Soft Drink & Snack Stall (on the park with & above 1.0 hectare area).
25	Parking Sites	As per Scheme	As per parking zone of the scheme	A premises used for parking of vehicles. The public parking lots may be run on commercial or non-commercial basis	Parking
26	a. Petrol pump with service station b. Without service station	36 mtr X 36 mt. 20 mt. X 20 mtr	24 mtr & above	A premise for sale of petroleum products to consumers. It may include servicing of automobiles	Petrol pump, Soft Drink & Snack Stall, Automobile repair shop

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
27	Police Station/ Police Post	0.02 to 0.05	12 mtr & above	A premise having facilities for the offices of local police station.	Police Station, Essential staff housing,. Police post, Essential staff housing
28	Post office	0.02 to 0.05	12 mtr & above	A premise with facilities for postal communication for use by the public	Post office, Post & telegraph office, Watch & ward residence (upto 30 sq.m),Canteen
29	Railway freight Go down	As per dept. Norms		A premise for storage of goods transported by the railways	
30	Technical Training Institute	0.1	18 mtr & above	A premise with facilities for training in discipline of technical nature. It Includes technical school and industrial training institute ,etc.	Technical training center, residential flat (for maintenance staff), Books & stationary shop, Chemist shop (Upto 15 sq. m each), Canteen, Bank Extension counter, Auditorium, Post Office counter facility
31	Research and Development	0.1	18 mtr & above	A premise providing facilities for research and development for any specific field	Research and Development, Watch & ward residence (upto 30 sq.m), Residential flat (for maintenance staff) hostel, canteen, Bank extension counter , Library , Post office extension facility
32	Restaurants	0.05 to 0.07	24 mt & above	A premise used for serving food items on commercial basis including cooking facilities. It may have covered or open or bath for sitting arrangement	Restaurants
33	Retail Shops	3 mtr X 3 mtr	12 mt & above	A premise for sale of commodities directly to consumer with necessary storage	Retail shop, Repair shop, Personnel service shop.
34	Road/rail/air/ Transport booking office	30 sq. mtr per counter	12 mt & above	A premise for ticket booking facilities for Road/rail/air / transportation	Booking office

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
35	Service Center & Service Industry	0.05	18 mt & above	A premise essentially having repair shops for automobiles , electrical appliances, building material, etc. to provide essential services to neighbouring residential areas	Retail, Repair & personnel service shop, Cottage industry, Gas Godown, commercial office.
36	Stock Exchange / Financial Institution	0.10	18 mt & above	A premise having facilities for stock trading and financial activities	Stock Trading, Foreign exchange & Trassing activities banking facilities, brokers offices etc.
37	Technical Training Centre	0.10 (As per norms of Technical education deptt.)	18 mt & above	A premise with facilities for training in discipline of technical nature. It Includes technical school and industrial training institute ,etc.	Technical training center, residential flat (for maintenance staff), Books & stationary shop, Chemist shop (Upto 15 sq. m each), Canteen, Bank Extension counter, Auditorium, Post Office counter facility
38	Telephone Exchange	0.1	12 mt & above	A premise having facilities for central operation of telephone system for a designated area	Telephone Exchange, Watch & ward residence (upto 30 sq.m), Canteen
39	Ware Housing & Covered storage	0.05 to 0.1	18 mt & above	A premise for whole-sale trade is a premise from where goods and commodities are sold and delivered to retailers. Such premises includes storage and godown and loading and unloading facilities	Whole-sale shop, godown storage, commercial office (Restricted to 25% of the total floor area).

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
40	Weekly Market	0.10	18 mt & above	An area used once in a week by a group of informal establishments in the form of a market. These Markets shift from one area to another on different days of the week. Informal unit: retail/Service unit, stationary or mobile working without roof including small khokhas on road side.	Weekly Market, Informal sector trade, Soft Drink & Snack Stall (all structures will be either temporary or mobile , only for one day in a week)
41	Whole Sale Trade	0.02 to 0.03	12 mt & above	A premise for Whole Sale Trade is a premise from where goods and commodities are delivered to trailers. Such premises include storage and godown and loading and unloading facilities.	Whole sale shop, godown & storage, commercial office (Restricted to 25% of the total floor area).Notes:- (I) Park, Parking, Public Conveniences, Public utility are permitted in all premises wherever needed. (II)In case of clubbing of premises , uses of all the premises clubbed are allowed (III) In case of doubt, the permissibility of use premises/use activity shall be decided by the concerned committee of the Jaipur Development Authority constituted under section 10 of the act. (Iv) A structure which can be shifted from one palce to another or removed as per case may be shall be considered as temporary structure
42	Work place/ Offices	0.10	18 mt & above	A premises used for offices of profit making organisation	Commercial offices, retail & Personnel service shop, Restaurant, Bank, Post & Telegraph office.
43	Banquet Hall		18 mt. & above		

(B) Permissible Use Premises in Commercial Use Zone

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
1	Bus Terminal	As per requirement of RSRTC	18 mt. & above	A premises used by a public transport agency for parking maintenance and repair of Buses. This may or may not include a workshop.	Bus depot, workshop, watch & ward Residence (up to 30 sq. m.) soft drink Snack stall Administrative office.
2	Children's Traffic Park	.01 to 0.2	12 mt. & above	Premises in the form of park with facilities for introducing and educating children about traffic and signaling.	Children Traffic park, watch & ward Residence (up to 30 sq.mt. soft drink Snack stall , Museum, Auditorium.
3	Coal/Wood/ Timber Yard	0.1	18 mt. & above	Open space for storage & trading of Coal/Wood/Timber.	Trading & facilities for storage of Coal /Wood /Timber watch & ward Flat up to 30sq.m.
4	Coal storage / chilling plant	0.1 to 0.15	30 mt. & above	A premises where perishable commodities stored in covered space using mechanical and electrical devices to maintain the required temperature, etc.	Cold storage, Watch & Ward Residence (up to 30 sq. m.), Caretaker office.
5	Community hall	0.20	18 mt. & above	A premise having an enclosed space for various social & cultural activities of a residential area.	Community hall, Watch & Ward Residence (up to 30 sq. m.) soft drink Snack stall.
6	Cultural Information Centre	0.10	18 mt. & above.	A premises with facilities for cultural and information services for an institution, state and country.	Cultural and Information centre Watch & Ward Residence (up to 30 sq. m.) Hostel, Canteen, Bank extension counter facility. Auditorium (up to 500 v sitting capacity) Library, Exhibition and Art Gallery.
7	Exhibition centre and Art Gallery	1.0 to 2.0	18 mt. & above	A premises with facilities for exhibition and display of paintings, Sculpture, Murals, ceramics, Handicrafts or products of a specific class.	Exhibition centre and Art Gallery Watch & Ward Residence (up to 30 sq. m.) Canteen
8	Gas Installation & gas works	0.05	12 mt. & above	Premises with facilities of storage for Gas cylinder and Gas welding work.	

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
9	Hospitals	1.5 to 2.5		Premises providing medical facilities of general or specialized nature for treatment of outdoor and indoor patients.	Hospitals, Residential flat (employees and service personal) Institutional hostel, Medical college, Retail shop (confectionary, Grocery & General merchandise, Books and stationary, Barber, Launderer, vegetables).
10	Hotel / Transit visitors houses	05.05 0.10	12 mt. & above	Premises in which rooms attached to Institutions or otherwise are let out on a long term basis.	Hotel, Commercial office , Retail & Personal service shop , Restricted 5% of the total floor area, Restaurant
11	Junk Yard	0.05	12 mt. & above	A premises for covered and semi- covered or open storage including sale & purchase of waste goods, Commodities and Materials.	Junk Yard, Watch & Ward residence , Sales office
12	Motor garage and workshop	0.02 to 0.5	12 mt. & above	Premises for servicing and repair of automobiles.	Workshop, Watch & Ward residence (up to 30 sq. m.) soft drink Snack stalls Administrative office.
13	Non-obnoxious light industries	As per norms of industries deptt.			
14	Open air theatre	0.1	18 mt. & above	A premises having facilities for audience seating and a stage for performance and is open to sky.	Open air theatre, Watch & Ward residence (upto 30 sq. m.)
15	Plant nursery	0.05 to 0.1	12 mt. & above	It is a premise with facilities for rearing and sale of young plants.	Nursery, Watch & Ward residence (up to 30 sq.m.)
16	Religious Building	0.05 to 0.1	12 mt. & above	Premises dedicated to accommodations and service of god or other objects of religious nature. It may have different nomenclature in different religions like temple (all faiths), mosque, church, gurudwara, Ashram.	(i)Temple (ii) Mosque (iii) Church (iv) Gurudwara (v) Synagogue (vi) Ashram (vii) Bathing tank , (viii) Dargah and (ix) Charitable dispensary and Library

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
17	Research & Development	0.1	18 mt. & above	Premises providing facilities for research and development for any specific field.	Research & Development centre, Watch & Ward Residence (up to 30 sq.m.) Residence flat (for maintenance staff) Hostel Canteen, Bank extension, counter, Library, Post Office extension facilities.
18	Vocational training institute	0.1	18 mt. & above	Premises with training facilities for short – term courses for discipline, preparatory to employment in certain profession and trade. It includes training cum work centre.	Vocational training institute, Watch & Ward Residence (up to 30 sq.m.) Hostel, Books & stationary shop (up to 15 sq. m.) Canteen, Library.
19	Voluntary health service	0.05	12 mt. & above	Premises having medical facilities for treatment of outdoor patients and other like blood bank, etc. by voluntary institutions. This service may also take the form of temporary camp with charitable motive.	Voluntary health service, Watch & Ward residence (up to 30 sq.m.) Administrative office, Dispensary, Canteen.
20	Ware Housing /storage	0.10	18 mt. &	A premise for storage godown and ware housing means premises for exclusive use of storage of goods and commodities in a manner as per the requirements of respective commodities. The premises includes the related loading and unloading facilities for the purpose of goods and commodities by road transport or rail transport as the case may be;	Storage, godown & ware housing, Watch & ward Residence (up to 30 sq.m.), Wholesale outlet,
21	Sewerage treatment plant	As per Municipal corporations norms.			

10.10.4 (A) Permitted Use Premises in Industrial Use Zone

Industrial use zone					
S. no.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
1	Bus depot & Work shop	0.15 (As per requirement of operator)	24 m & above	A premises used by a public transport agency or any other such agency for parking maintenance and repair of buses this may or may not include a workshop.	
2	Bus terminal	As per requirement of operator	24 m & above	A premises used by public transport agency to park the buses for short duration to serve the population. It may include the related facilities for passengers	
3	Bus Stops	As per requirement	12 m & above	A premise for bus stops including laybyes for upto 3 buses	
4	Cold storage and Ice factory	0.1	30 m & above	A premises where perishable commodities are stored in covered space using mechanical and electrical devices to maintain the required temperature, etc.	
5	Dispensary	0.02	12 m & above	A premise having facilities for medical advice and provision of medicines managed by public or charitable institutions.	
6	Gas godowns	As per petroleum norms	24 m & above	A premise where cylinders of cooking gas or other gas are stored.	
7	Guest house	0.05	18 m & above	A guest house is premises for housing the staff of Government, Semi-government, Public undertaking and Private limited company for short duration and limited to 1000sqm floor area	
8	Loading un-loading	As per requirement	12 m & above		

Industrial use zone					
S. no.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
	spaces				
9	Park	1.00 Ha (Neighbourhood Park) 5.00 Ha (Community Park)	18 m & above	A premise used for recreational leisure activities. It may have on it related landscaping, parking facilities, public toilet, fencing etc. It will include synonyms like Lawn, Open space, Green, etc.	
10	Parking	As per requirement	12 m & above	A premises used for parking of vehicles. The public parking lots may be run on commercial or non-commercial basis.	
11	Petrol & diesel pump without service stations	as per norms	18 m & above	A premise for sale of petroleum products to consumers	
12	Petrol & diesel pump with service stations.	36 m x 36 m	30 m & above	A premise for sale of petroleum products to consumers. It may include servicing of automobiles.	
13	Public utilities	As per concerned department norms (except public parks, play grounds)	18 m & above	i) Overhead tank- a premises having an overhead tank for storage and supply of water to its neighbouring areas. It may or may not include a pump house. ii) Underground tank- A premises having an underground tank for storage and supply of water to its neighbouring areas. It's may or may not include a pump house (iii) Oxidation pond- A premises having a tank used for the oxidation process for sewage and other waste. (iv) Septic tank- A premises having an underground tank for collection of sewage and its consequent disposal. Sewage	

Industrial use zone					
S. no.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
				pumping station-A premises with a pumping station used for pumping sewage on to a higher gradient.(xi) Public toilet and urinal- A premises having latrine and urinals for use of public. It may or may not include drinking water facility.(xii) Electric sub-station - A premises having electrical installation and transformer for distribution of power.(xiii) Solid waste collection centre - A premises used for collection of garbage for its onwards transportation to sanitary landfill/disposal. (xiv) Dhobi Ghat- A premises used for cleaning and drying of clothes/linen by washer man.	
14	Restaurants	0.05	18 m & above	A premises used for serving food items on commercial basis including cooking facilities. It may have covered or open or both for sitting arrangement.	
15	Storage and depot of non-perishable and non inflammable commodities and incidental use	0.1 or more	18 m & above	A premise for storage, Godown and ware housing means premises for exclusive use of storage of goods and commodities in a manner as per the requirements of respective commodities. The premises include the related loading and unloading facilities for the purpose of carriage of the goods and commodities by road	

Industrial use zone					
S. no.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
				transport or rail transport as the case may be.	
16	Ware housing	0.1	30 m & above	Storage in building structures including cold storages	
17	Wholesale business establishment	0.02	18 m & above	A premise for whole - sale trade is a premise from where goods and commodities are sold and delivered to retailers. Such premises include storage and godown and loading and unloading facilities.	
18	Auto/thela/ Rickshaw stand	2 m x 10 m (except circulation area)	18 m & above	Premises for Auto/Thela/Rickshaw for Parking the same during non committing time.	
19	Banks	**2500 Sqm** (Bank with locker, ATM and other banking facilities	12 m & above	A premise for office to perform banking function and operations.	
20	ATMS	0.025	9 m		
21	Flatted group industry	0.1	18 m & above	A premise having a group of small industrial units having upto 50 workers with non-hazardous performance. These units may even be located in multi-storeyed building.	
22	Govt./semi Govt, private business establishment	0.1	12 m & above		
23	Industry specific type	As per deptt. Of industry norms	18m & above	A premises for an industrial unit within a group of such units for manufacturing of specific products like electronic goods, etc.	
24	Junk yard	0.05	18 m & above	A premise for covered, Semi-covered or Open storage including sale and Purchase of waste goods, Commodities	

Industrial use zone					
S. no.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
				and materials.	
25	Medical centres	0.02	12 m & above	Including first aid centers	
26	Motor garage & work shop	0.05	18 m & above	A premise for servicing and repair of automobiles	
27	Railway freight godown	As per Railway norms		A premises for storage of goods transported by railways.	
28	Religious buildings	0.05	12 m & above	A premise dedicated to accommodations and service of god or other objects of religious nature. It may have different nomenclature in different religions like Temple (all faiths), Mosque, Church, Gurudwara, and Ashram.	
29	Research & development centre	0.075	18 m & above	A premise providing facilities for research and development for any specific field.	
30	Services stations	0.1	18 m & above	Premises essentially having repair shops for Automobiles, Electrical appliances, Building material, etc. to provide essential services to neighbouring residential areas.	
31	Fire Post	0.6 Ha (with essential residential accommodation)	30 m & above	A premises with lesser degree of facilities or fire fighting. The post may be attached to specific premises with fire prone activities.	
32	Fire Station	1 Ha with Residential accommodation	30 m & above	A premises with facilities for fire fighting for a catchment area assigned to it. It may include residence of essential staff	
33	Disaster management centre	1 Ha along with suitable open area 2 Ha if soft parking, temporary shelter, parade	18 m & above	Area including building and open space parking etc for community use during Disasters	

Industrial use zone					
S. no.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
		ground etc. included			
34	Sewage disposal works	As per the requirement of the concerned deptt.	30 m & above		
35	Vocational training institute	0.1	18 m & above	Premises with training facilities for short - term courses for discipline, preparatory to the employment in certain profession and trade. It includes training-cum-work centre.	
36	Wholesale business establishment	0.02	18 m & above		
37	Workshops /Garages	0.05	18 m & above	A premise for servicing and repair of automobiles.	

10.10.5 (A) Permitted Use Premises in Public and Semi Public Use Zone

Public and semi Public Use Zone					
S. No.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
1	A. Recreational club B. Community Recreational club	0.05 0.20	18 m & above 18 m & above	A premise used for gathering of group of persons for social and recreational purposes with all facilities.	
2	Adult education centre	0.02	12 m & above	A premises having the facilities of formal education and training to adult with flexible timings.	
3	Anganwari	0.02	12 m & above	Anganwari as a space provision of residential housing / neighborhood level is a centre for provide service for children of six years age, pregnant woman , Feeding mother etc. under the integrated child development scheme (ICBS)	
4	Auditorium	0.15(for a sitting capacity up to 500 seats	30 m & above	A premises having an enclosed space to seat audience and stage for various performance like concerts ., play , Recitals, Functions, etc.	
5	Banks	**2500 Sqm**(Bank with locker, ATM and other banking facilities	12 m & above	A premise for office to perform banking function and operations.	
6	ATMS	0.025	9 m		
7	Banquet hall	0.2	30 m & above	A premises to hold small public gathering Community functions, Marriage etc.	
8	Botanical Garden	As per requirement	30 m & above	A premises in the form of a garden with plantation for research and exhibition.	
9	Civil defence home ground	As per requirement	30 m & above	A premises having facilities for office and other facilities or civilian organization for internal defence.	
10	Clinic	0.02	12 m & above	A premises having facilities for treatment of outdoor by a doctor. In	

Public and semi Public Use Zone					
S. No.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
				case of a polyclinic, it shall be managed by a group of doctors.	
11	Clinic Laboratory	0.02	12 m & above	A premise with facilities for carrying out various tests for confirmation of symptoms of a disease.	
12	College 1. Medical college 2. Engg. College 3. General college	1. As per norms of medical council of India 2. As per AICTE norms 3. AS UGC norms	30 m & above	A premises having educational and playing facilities for students of under graduated and post graduated courses under a university. It includes all professional disciplines	
13	Commercial & Secretarial Training centre	0.1	18 m & above	A premises having training facilities for Stenography , Correspondence , Record keeping etc.	
14	Conference hall / centre	0.2	24 m & above	A premises having all facilities for a conference meeting, symposium, etc., where a number of different countries may also be participating.	
15	Convention centre	as per requirement	30 m & above	A premises having all facilities for International / National conference, Meetings , Symposium etc.	
16	Creche and day care center	0.05	9 m & above	A premises having nursery facilities of infants during day time. The centre may be managed by an individual or an institution on commercial or non - commercial basis.	
17	Cremation / Burial ground	0.9	12 m & above	A premise with facilities of performing last rites of dead bodies by burning/ burial.	
18	Cultural and Information centre	0.25	18 m & above	A premises with facilities for cultural and information services for an institution, State and Country.	
19	Dharamshala	0.05	18 m & above	A premises providing temporary accommodation for	

Public and semi Public Use Zone					
S. No.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
				short duration on no-profit basis;	
20	Disaster management centre	1 Ha along with suitable open area 2 Ha if soft parking, temporary shelter, parade ground etc. included	18 m & above	Area including building and open space parking etc for community use during Disasters	
21	Dispensary	0.02	9 m & above	A premises having facilities for medical advice and provision of medicines managed by public or charitable institutions.	
22	District Police office and Battalion	as per requirement	24 m & above	A premises having facilities for the offices and paramilitary forces.	
23	Dobhighat, machine laundry public utility premises	Sites which have appropriate arrangement for water and drainage facilities and it shall be ensured that the water bodies are not polluted as a result of such activities.	12 m & above	A premises use for cleaning and drawing of cloths and liner and PU.	
24	Exhibition centre and Art gallery	0.1	18 m & above	A premises with facilities for exhibition and display of paintings, Sculptures, Murals, Ceramic, Handicrafts or products of a specific class.	
25	Fire post	0.6 Ha (with essential residential accommodation)	30 m & above	A premises with lesser degree of facilities or fire fighting. The post may be attached to specific premises with fire prone activities.	
26	Fire station	1 Ha with Residential accommodation	30 m & above	A premises with facilities for fire fighting for a catchment area assigned to it. It may include residence of essential staff	
27	Fire training	3	30 m & above	A premises having	

Public and semi Public Use Zone					
S. No.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
	institute			facilities of training for emergency uses in case of fire building collage etc.	
28	Forensic science laboratory	0.05 -0.75	12 m & above	A premises containing facilities for application of medical knowledge to legal problems.	
29	General and head post office with administrative office with. without delivery office	0.25	18 m & above	A premises with facilities for postal and telecommunication to and from a no of post offices attached to it.	
30	Guest House	0.05	18m & above	A guest house is premises for housing the staff of Government , semi- Government public undertaking and private limited company for short duration;	
31	Health Centre (including family welfare centre)	0.20 - 0.30	18 m & above		
32	Hospital (i) 500 beds & above (ii) 201 to 500 beds (iii) 101 to 200 beds (iv) up to 100 7 beds	Total Area = 6.00 Ha a) Area for hospital = 4.00 Ha b) Area for residential accommodation= 2.00 ha	30 m & above	A premises providing medical facilities of general or specialized nature for treatment of indoor and outdoor patients.	
33	Health Centre up to 20 beds	0.20 - 0.30	12 m & above	A premises having facilities for treatment of indoor and outdoor patients having up to 20 beds. The health centre may be managed by a public or a charitable institution on non - commercial basis. It includes family welfare centre.	
34	Hostel (for student of medical college and staff)	0.05	18 m & above	A premises in which rooms attached to ' Institutions' or otherwise are let out on a long term basis;	
35	Hotel management institute	**Other professional colleges)** a) Area of site for student strength up	30 m & above	A premises with training facilities for hotel management discipline it shall be ran by public / private body. It includes training come work centre.	

Public and semi Public Use Zone					
S. No.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
		to 250 students = 2.00 Ha b) Additional area of site for every additional 100 students or part thereof up to total strength of 1000 students = 0.50 Ha c) Area of site for strength of college from 1000 to 1500 students= 6.00 Ha			
36	Indoor games stadium	0.25	30 m & above	A premises for indoor stadium with play area and spectator seating including related facilities for players.	
37	A. Integrated residential school with hostel facility B. Integrated residential school with out hostel facility	a) 3.90 Ha b) Area per School = 3.50 Ha a) School building area = 0 b) Playfield Area = 2.50 Ha c) Parking Area = 0.30 Ha	18 m & above 18 m & above	A premises having educational and playing facilities for student's up to XII standard. It shall have boarding facilities for students and may have residence for faculty members.	
38	Library	0.05	12 m & above	A premises having a large collection of books for reading and reference for general public or specific class.	
39	Library college (medical profession and like)	0.05 - 0.1	12 m & above	A premises having a large collection of books for reading and reference for general public of specific class.	
40	Motor driving school	0.1	18 m & above	A premise having facilities for training of driving automobiles.	
41	Motor garage and workshop	0.05	18 m & above	A premise for serving and repair of	

Public and semi Public Use Zone					
S. No.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
				automobiles.	
42	Multipurpose community hall	0.2	18 m & above	A premises having an enclosed space for various social and cultural activities of a residential area.	
43	Museum	0.1 to 0.15	18 m & above	A premises with facilities for storage and exhibition of object illustrating antiques, Natural history , art , etc.	
44	Music, Dance & Drama training centre	0.1	18 m & above	A premises having facility for importing training and coaching music dance & dramatics.	
45	Night shelter	0.05 or more	12 m & above	A premises providing night accommodation to individuals without any charges or with taken charges. It may be run by local government or voluntary agencies.	
46	Nursing home / Maternity home / Poly -clinic	0.10 - 0.20	18 m & above	A premises having facilities for indoor and outdoor patients having up to 30 beds. It shall be managed by a doctor or a group of doctors.	
47	Observatory & Weather office	0.1	18 m & above	Is a premise with facilities for research and development of data relating to weather and forecasting thereof.	
48	Old age home / care centre for physically / mentally / challenged/ working woman / men Hostel	0.1	12 m & above	A premises having the facilities caring and training boarding and loading of the elderly physically / Mentally / challenged / Working Woman / Men.	
49	Open Air Theatre	0.5	18 m & above	A premises having facilities for audience seating and a stage for performance and is open to sky.	
50	Orphanage	0.05	12 m & above	A premises with facilities for boarding of children who are bereaved of parents. It may or may not have educational facilities.	
51	Outdoor games stadium	2	18 m & above	A premises for outdoor games with pavilion building and stadium structure to seat	

Public and semi Public Use Zone					
S. No.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
				spectators including related facilities for players.	
52	Planetarium	0.20 - above	18 m & above	A premises with necessary facilities and equipment for studying and Country.	
53	Play Ground	0.1	9 m & above	A premises used for outdoor games. It may have on it landscaping , Parking facilities , Public toilet , etc.	
54	Police line	as per requirement	30 m & above	An area having facilities for work and residential accommodation of paramilitary forces.	
55	Police post	0.16 ha (Area inclusive of residential accommodation)	12 m & above	A premises having facilities for a local police post of a temporary nature or on smaller scale as compared to a police station.	
56	Police Station	0.16 ha (Area inclusive of residential accommodation)	18 m & above		
57	Post & Tele graph office (booking & delivery)	As per requirement	12 m & above	A premise with facilities for Postal and telecommunication for use by the public	
58	Post and telegraph office	85 Sqm to 2500 Sqm	12 m & above	A premises with facilities for postal and telecommunicate-ion	
59	Post office counter without delivery	0.05	9 m & above	A premise with facilities of post office counters only (without post delivery).	
60	Public utility buildings	As per concerned department norms (except public parks, play grounds)	12 m & above	i) Overhead tank- a premises having an overhead tank for storage and supply of water to its neighbouring areas. It may or may not include a pump house. (ii) Underground tank-A premise having an underground tank for storage and supply of water to its neighbouring areas. It may or may not include a pump house. (iii) Septic tank - A	

Public and semi Public Use Zone					
S. No.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
				premise having an underground tank for collection of sewage and its consequent disposal. (iv) Sewage pumping station-A premise with a pumping station used for pumping sewage on to a higher gradient. (v) Public toilet and urinal-A premise having latrine and urinals for use of public. It may or may not include drinking water facility. (vi) Electric sub -station - A premises having electrical installation and transformer for distribution of power. (vii) Solid waste collection centre- A premises used for collection of garbage for its onwards transportation to sanitary landfill	
61	Radio and Television station	0.20 - 0.30	18 m & above	A premise with facilities for recording, broadcast and transmission of news and other programs through the respective medium. It may include some hostel accommodation for guest artists, transmission facilities like towers.	
62	Recreational club/ Recreational club at community level	0.50 0.20	18 m & above	A premises used for gathering of group of persons for social and recreational purpose with all facilities.	
63	Religious / premises/building	0.05	12 m & above	A premises dedicated to the service of the objects of religious nature it may have different nomenclature in different religions / faiths.	
64	Research & Development centre	0.075	18 m & above	A premises providing facilities for research and development for any specific field.	
65	Residential flat and residential plot -	As a part of the campus	24 m & above	Residential accommodation for one	

Public and semi Public Use Zone					
S. No.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
	group housing (for staff and employees)	in public / semi – public use.		family (one household) which may occur as a part of group housing or independently .(for the use of staff &employees of the Public & Semi - Public use).	
66	Restaurant	0.5	12 m & above	Restaurant "Road transport booking office ' - A premises used for the offices of a road transport agency.	
67	Retail and repair shop (convenient shopping)	50sq. m	18 m & above	A premises equivalent of a retail shop , repair of household goods, Personal service shop electronic gadgets, Automobiles , Cycles, etc.	
68	Road / Rail / Air ticket Booking & reservation office.	25 sq. m per counter	12 m & above	A premise used for the offices of a road transport agency.	
69	Satellite and telecommunication centre	0.20 - 0.30	18 m & above	It is a premise with facilities for research and development of satellite and telecommunication technology.	
70	Schools 1. Nursery 2. Primary 3. Secondary 4. Senior Secondary	0.10 0.20- 0.40 (As per norms of education deptt.)	9- 12 m 12 m 18 m 18 m	• A premises having nursery facilities for infants during day time. The centre may be managed by an individual or an institution on commercial or non-commercial basis. • A premises having educational and playing facilities for students up to V standard. • A premises having educational and playing facilities for students up to VIII standard. • A premises having educational and playing facilities for student's up to XII standard	
71	Social and Cultural institute	0.1	18 m & above	A premise with facilities for activities of socio - cultural nature run by a public, Voluntary or individual on primary non - commercial basis.	
72	Social welfare	0.05	12 m & above	A premise with training	

Public and semi Public Use Zone					
S. No.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
	centre			facilities for hotel management discipline it shall be ran by public / private body. It includes training come work centre.	
73	Specialized hospital	Total Area = 3.70 Ha c) Area for hospital = 2.70 Ha d) Area for residential accommodation=1.00 ha	30 m & above	Hospital for specialized diseases such as highly infections or contagious diseases.	
74	Swimming pool	0.15-0.20	18 m & above	A premise with related facilities for swimming and spectators seating which shall vary with size, standard and purpose.	
75	Telephone Exchange	As per requirement	18 m & above	Is a premise having facilities for central operation of telephone system for a designed area	
76	Traffic and Police control room	As per requirement	30 m & above	A premises of temporary structure having facilities for the managing of traffic and low and order related issues.	
77	Transmission tower / wireless station	As per requirement	18 m & above	Is a premises used for installation of a tower for communication purpose.	
78	University	10.00 to 60.00 Ha area a) Residential (if included) = 25% of total land area b) Sports and Cultural Activities = 15% of total land areac) Parks and landscape including green belt= 15% of total land area. (MPD)	30 m & above	A premises having an educational institution designed for instruction examination or both of students in many branches of advanced learning conferring degrees in various faculties , and often embodying colleges and similar institutions	
79	Veterinary hospital	As per	30 m & above	A premises providing	

Public and semi Public Use Zone					
S. No.	**Activity**	**Minimum Area (Ha)**	**Road Width**	**Definitions**	**Use Premises**
	for pet animals & birds	requirement		treatment for indoor and outdoor sick animals.	
80	Veterinary Institute	as per norms	24 m & above	A premise having educational and playing facilities for students of under graduate & post graduate courses along with research facilities under a university.	
81	Voluntary health service	0.05	12 m & above	A premise having medical facilities for treatment of outdoor patients and other like blood bank, etc. by voluntary institutions. This service may also take the form of temporary camp with charitable motive.	
82	Yoga & Meditation Centre	0.05	12 m & above	A premises having facilities for self-attainment, Achieving higher quality of mind and body, Spiritual and religious discourse etc.	
83	Zoological garden / Aquarium	as per requirement	30 m & above	A premise in the form of a garden or park or aquarium with a collection of animals, species and birds for exhibition and study. It shall include all related facilities.	

10.10.6 (A)Permitted Use Premises in Recreational Use Zone – District Park

Recreational Use Zone – District Park					
S.no.	**Activity**	**Minimum Area (ha)**	**Road Width**	**Definitions**	**Use Premises**
1	Bus Stops	As per requirement	12 m & above	A premise for bus stops including laybyes for upto 3 buses	
2	Children traffic parks	as per requirement	18 m & above	A premises in the form of a park with facilities for introducing and educating children about traffic and signaling.	
3	District park	as per requirement	12m & above	District level landscaped park	
4	Sectoral Park	as per requirement	18 m & above	Sector level landscaped park	
5	City Park	as per requirement	30 m & above	City level landscaped park	
6	Dairy booth	as per requirement	9m & above	Premises with basic facility for the supply of daily groceries to the local population.	
7	Forest	as per requirement	12m & above	It is a thick natural flora. It includes city forest which may have part natural flora and part man made flora.	
8	Fire post	as per requirement	30 m & above	A premise with lesser degree of facilities or fire fighting. The post may be attached to specific premises with fire prone activities.	
9	First Aid centres for Players & staff	0.1	12 m & above	A premise ving facility for treatment of players. The health centre may be managed by a public or a charitable institute on non-commercial basis.	
10	Library	as per requirement	12 m & above	A premise ving a large collection of books for reading and reference for general public or specific class.	
11	Open air theatre	0.3	30 m & above	A premises ving facilities for audience seating and a stage for performance and is open to sky.	
12	Orchard/Vegetable Garden	as per requirement	12 m & above	It is a premise with thick growth of fruit trees. It may also include garden with fruit trees.	
13	Petrol filling station	510 Sqm	30 m & above	A premise for sale of petroleum products to consumers. It may include servicing of	

Recreational Use Zone – District Park					
S.no.	**Activity**	**Minimum Area (ha)**	**Road Width**	**Definitions**	**Use Premises**
				automobiles.	
14	Police post	0.16 (Area inclusive of residential accommodation)	12 m & above	Premises facilities for a local police post of a temporary or permanent nature or on smaller scale as compared to a police station but residential accommodation limited to 1000sqm floor area	
15	Picnic huts	as per requirement	12 m & above	Premises for short duration stay for recreational or leisure purpose of a family, located within a tourist and/or recreational centre.	
16	Plant nursery	as per requirement	12 m & above	It is a premise with facilities for rearing and sale of young plants.	
17	Play ground	as per requirement	12 m & above	Premises used for outdoor games. It may ve on it Landscaping, Parking facilities, Public toilet, etc.	
18	Public utilities	As per concerned department norms (except public parks, play grounds)	12 m & above	i) Overhead tank- a premises having an overhead tank for storage and supply of water to its neighbouring areas. It may or may not include a pump house. (ii) Underground tank-A premise having an underground tank for storage and supply of water to its neighbouring areas. It may or may not include a pump house. (iii) Septic tank - A premise having an underground tank for collection of sewage and its consequent disposal (iv) Sewage pumping station-A premise with a pumping station used for pumping sewage on to a higher gradient. (v) Public toilet and urinal-A premise having latrine and urinals for use of public. It may or may not include drinking water facility.	

Recreational Use Zone – District Park					
S.no.	**Activity**	**Minimum Area (ha)**	**Road Width**	**Definitions**	**Use Premises**
				(vi) Electric sub -station - A premises having electrical installation and transformer for distribution of power. (vii) Solid waste collection centre- A premises used for collection of garbage for its onwards transportation to sanitary landfill	
19	A. Recreational club	0.2	18 m & above	A premises used for gathering of group of persons for social and recreational purposes with all facilities.	
20	Regional Ecological park/Amusement Park	100	30m & above	Recreation facilities including mechanical rides	
21	Restaurant / cafeteria	0.05-1.00	18m & above	A premises used for serving food items on commercial basis including cooking facilities. It may have covered or open or both for sitting arrangement	
22	Special recreation and Special educational areas	0.4	30 m & above	A premise with facility for special recreation and Special education.	
23	Specialised parks/ Maidan for Multiuse	as per requirement	30 m & above	A premises with a park or ground for a designated use like public meeting grounds, fun park, wonder land etc.	
24	Sports training centre	2	30 m & above	A premise with facilities for welfare and promotion of community development.	
25	Stadium (Indoor)	As per norms of sports deptt.	30 m & above	A indoor premises with facilities for welfare and promotion of community development	
26	Stadium (Outdoor)	As per norms of sports deptt.	30 m & above	A premise with facilities for welfare and promotion of community development.	
27	Swimming pool	0.15-0.20	18 m & above	A premise with related facilities for swimming and spectators seating which shall vary with size, standard and purpose.	
28	Trade fair ground	10 .0	30 m &	City level Exhibition	

Recreational Use Zone – District Park					
S.no.	**Activity**	**Minimum Area (ha)**	**Road Width**	**Definitions**	**Use Premises**
			above	ground	
29	Zoological garden	10	30m & above	A premise in the form of a garden or park or aquarium with a collection of animals, species and birds for exhibition and study. It sll include all	

(B)Permitted Use Premises in Recreational Use Zone – Ecological Park

Recreational Use Zone – Ecological Park					
S.no.	**Activity**	**Minimum Area (ha)**	**Road Width**	**Definitions**	**Use Premises**
1	Bus Stops	As per requirement	12 m & above	A premise for bus stops including laybyes for upto 3 buses	
2	City Park	as per requirement	30 m & above	City level landscaped park	
3	Forest	as per requirement	12m & above	It is a thick natural flora. It shall include city forest which may have part natural flora and part man made flora.	
4	Fire post	as per requirement	30 m & above	A premise with lesser degree of facilities or fire fighting. The post may be attached to specific premises with fire prone activities.	
5	Library	as per requirement	12 m & above	A premise having a large collection of books for reading and reference for general public or specific class.	
6	Open air theatre	0.3	30 m & above	A premises having facilities for audience seating and a stage for performance and is open to sky.	
7	Orchard/Vegetable Garden	as per requirement	12 m & above	It is a premise with thick growth of fruit trees. It may also include garden with fruit trees.	
8	Police post	0.16 (Area inclusive of residential accommodation)	12 m & above	Premises facilities for a local police post of a temporary or permanent nature or on smaller scale as compared to a police station but residential accommodation limited to 1000sqm floor area	
9	Picnic huts	as per requirement	12 m & above	Premises for short duration stay for recreational or	

Recreational Use Zone – Ecological Park					
S.no.	**Activity**	**Minimum Area (ha)**	**Road Width**	**Definitions**	**Use Premises**
				leisure purpose of a family, located within a tourist and/or recreational centre.	
10	Plant nursery	as per requirement	12 m & above	It is a premise with facilities for rearing and sale of young plants.	
11	Play ground	as per requirement	12 m & above	Premises used for outdoor games. It may ve on it Landscaping, Parking facilities, Public toilet, etc.	
12	A. Recreational club	0.2	18 m & above	A premises used for gathering of group of persons for social and recreational purposes with all facilities.	
13	Regional Ecological park/Amusement Park	100	30m & above	Recreation facilities including mechanical rides	
14	Restaurant / cafeteria	0.05-1.00	18m & above	A premises used for serving food items on commercial basis including cooking facilities. It may have covered or open or both for sitting arrangement	
15	Special recreation and Special educational areas	0.4	30 m & above	A premise with facility for special recreation and Special education.	
16	Specialised parks/ Maidan for Multiuse	as per requirement	30 m & above	A premises with a park or ground for a designated use like public meeting grounds, fun park, wonder land etc.	
17	Sports training centre	2	30 m & above	A premise with facilities for welfare and promotion of community development.	
18	Stadium (Indoor)	As per norms of sports deptt.	30 m & above	A indoor premises with facilities for welfare and promotion of community development	
19	Stadium (Outdoor)	As per norms of sports deptt.	30 m & above	A premise with facilities for welfare and promotion of	

Recreational Use Zone – Ecological Park					
S.no.	**Activity**	**Minimum Area (ha)**	**Road Width**	**Definitions**	**Use Premises**
				community development.	
20	Swimming pool	0.15-0.20	18 m & above	A premise with related facilities for swimming and spectators seating which shall vary with size, standard and purpose.	
21	Trade fair ground	10 .0	30 m & above	City level Exhibition ground	
22	Zoological garden	10	30m & above	A premise in the form of a garden or park or aquarium with a collection of animals, species and birds for exhibition and study. It sll include all	

10.10.7 Permitted Use Premises in Transportation

S. no.	Activities
1	Bus bays
2	Auto stand
3	Bus Shelters
4	information Kiosk
5	MRT stations
6	MRT Yards
7	Parking Areas
8	Multi-level car parking
9	Fuel/Filling stations
10	Service stations
11	Transport office
12	Workshops and garages
13	Automobiles spares and services
14	Godowns
15	Loading and unloading platforms (with or without cold storage facility)
16	Weigh bridges
17	Bus terminals
18	BRT Corridors
19	Road transport uses
20	Ware houses
21	Integrated Freight Complexes MMLH
22	storage depots
23	Truck Terminals
24	Railway station
25	Rail Circulation
26	Yards
27	Depots
28	Special warehousing
29	Cargo terminals
30	Road Circulation
31	All ancillary (Complimentary) use for above categories

10.7 Permitted Use Premises in Green Buffer (G-1)

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
1	Bird Sanctuary	-	-	A premise used form of a large park or forest for preservation and breeding of birds with all related facilities	Bird sanctuary, Watch & ward Residence (up to 30 sq.m), Residential flat (for maintenance staff), Retail shop, Restaurant
2	Botanical garden	1.0	18 mtr. & above	A premise in the form of a garden with plantation for research and exhibition	
3	Forest	-	-	Is a thick natural flora, it shall include city forest which may have part natural flora and part man made flora	
4	Government reserved area	-	-	A premises of government land for reserved use	Government reserved area
5	Orchard & nursery	-	-	A premise with facilities for rearing and sale of young plants	Nursery, Watch & ward Residence (upto 30 sq.m.), all structures shall be temporary in nature
6	Police post	0.5 or may be more	12 mtr. & above	A premise having facilities for a local police post of a temporary nature or on smaller scale as compared to a police Station	Police post, Essential staff housing
7	Regional park	100 (Diapering of the availability of land)	18 mtr. & above		
8	Water bodies				
9	Wireless and transmission	0.10	12 mtr. &		

(B) Permitted Use Premises in Green Buffer (G-2)

S.no.	Activity	Minimum Area (ha)	Road Width	Definitions	Use Premises
1	Bus Stops	As per requirement	12 m & above	A premise for bus stops including laybyes for upto 3 buses	
2	Children traffic parks	as per requirement	18 m & above	A premises in the form of a park with facilities for introducing and educating children about traffic and signaling.	
3	Sectoral Park	as per requirement	18 m & above	Sector level landscaped park	
4	City Park	as per requirement	30 m & above	City level landscaped park	
5	Dairy booth	as per requirement	9m & above	Premises with basic facility for the supply of daily groceries to the local population.	
6	Forest	as per requirement	12m & above	It is a thick natural flora. It shall include city forest which may have part natural flora and part man made flora.	
7	Fire post	as per requirement	30 m & above	A premise with lesser degree of facilities or fire fighting. The post may be attached to specific premises with fire prone activities.	
8	Open air theatre	0.3	30 m & above	A premises ving facilities for audience seating and a stage for performance and is open to sky.	
9	Orchard/Vegetable Garden	as per requirement	12 m & above	It is a premise with thick growth of fruit trees. It may also include garden with fruit trees.	
10	Petrol filling station	510 Sqm	30 m & above	A premise for sale of petroleum products to consumers. It may include servicing of automobiles.	
11	Police post	0.16 (Area inclusive of residential	12 m & above	Premises facilities for a local police post of a temporary	

S.no.	Activity	Minimum Area (ha)	Road Width	Definitions	Use Premises
		accommodation)		or permanent nature or on smaller scale as compared to a police station but residential accommodation limited to 1000sqm floor area	
12	Picnic huts	as per requirement	12 m & above	Premises for short duration stay for recreational or leisure purpose of a family, located within a tourist and/or recreational centre.	
13	Plant nursery	as per requirement	12 m & above	It is a premise with facilities for rearing and sale of young plants.	
14	Play ground	as per requirement	12 m & above	Premises used for outdoor games. It may ve on it Landscaping, Parking facilities, Public toilet, etc.	
15	Public utilities	As per concerned department norms (except public parks, play grounds)	12 m & above	i) Overhead tank- a premises having an overhead tank for storage and supply of water to its neighbouring areas. It may or may not include a pump house. (ii) Underground tank-A premise having an underground tank for storage and supply of water to its neighbouring areas. It may or may not include a pump house. (iii) Septic tank - A premise having an underground tank for collection of sewage and its consequent disposal (iv) Sewage pumping station-A premise with a pumping station used for pumping sewage on to a higher gradient.	

S.no.	Activity	Minimum Area (ha)	Road Width	Definitions	Use Premises
				(v) Public toilet and urinal-A premise having latrine and urinals for use of public. It may or may not include drinking water facility. (vi) Electric sub - station -A premises having electrical installation and transformer for distribution of power. (vii) Solid waste collection centre- A premises used for collection of garbage for its onwards transportation to sanitary landfill	
16	Regional Ecological park/Amusement Park	100	30m & above	Recreation facilities including mechanical rides	
17	Special recreation and Special educational areas	0.4	30 m & above	A premise with facility for special recreation and Special education.	
18	Specialised parks/ Maidan for Multiuse	as per requirement	30 m & above	A premises with a park or ground for a designated use like public meeting grounds, fun park, wonder land etc.	
19	Sports training centre	2	30 m & above	A premise with facilities for welfare and promotion of community development.	
20	Zoological garden	10	30m & above	A premise in the form of a garden or park or aquarium with a collection of animals, species and birds for exhibition and study. It sll include all	

10.10.8 Permitted Use Premises In Peripheral Control Belt

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
1	Art and craft training centre	1.0 to 1.5	12 mt & above		
2	Bird/ Veterinary hospital	0.05	12 mt & above		
3	Bus Depot	0.5	12 mt & above	A premises used by a public transport agency or any other such agency for parking maintenance and repair of buses this may or may not include a workshop.	Bus depot, Workshop, Watch & ward, Residence (up to 30 sq.m.), Soft drink & Snack stall and Administrative office.
4	Cattle market	4.0	12 mt		
5	Cold storage/milk chilling plan			A premises where perishable commodities are stored in covered space using mechanical and electrical devices to maintain the required temperature, etc.	Cold storage, Watch & ward residence (up to 30 sq.m.), caretaker office.
6	Dairy farm/plant	1.0 to 1.5	12 mt & above	It is a premise with facilities for rearing and processing of dairy products. It may have temporary structure for sheds of animals and birds.	Dairy farm, Watch & ward residence (up to 30 sq.m.).
7	Drive in Cinema			A cinema with facilities for projection of movies and stills for car audience including an auditorium for other audience.	Drive-in-cinema, Watch & ward residence (up to 30 sq.m.), Administrative office, Restaurant, Soft drink & Snack stall.

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
8	Extractive Industry			An industrial premises used for carrying on industrial production or manufacturing and extractive and mining industry is a premises for carrying out quarrying and crushing of stone, Lime and brick kiln and extraction of sub-soil material, etc.	Extractive and Mining industry.
9	Flying club	1.0	18 mt & above	A premises used for training and fun rides on gliders and other small aircrafts. It may include other activities like recreational club and indoor games.	Flying club, Watch & ward residence (up to 30 sq.m.), Residential flat (for maintenance staff), Swimming pool and Indoor and Outdoor games facilities.
10	Jail			A premise having facilities for detention, confinement and reform of criminals under the law.	Jail
11	Junk Yard	0.05 to 0.07	12 mt & above	A premise for covered, semi covered or open storage including sale and purchase of waste goods, commodities and materials.	Junk yard, Watch & ward residence sales office.
12	Motel	0.4		A premise Designed and Operated especially to cater to the Boarding, Lodging, Rest and Recreation and Related activities of travellers by road.	Motel

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
13	National Cadet corps, scouts, & guide training area	0.50 or may be more	18 mt & above		
14	Naturopathy hospital/yoga centre	1.0	18 mt & above		
15	Petrol pump	36 mt x 36 mt	24 mt & above	A premise for sale of petroleum products to consumers. It may include servicing of automobiles.	Petrol pump, Soft drink & Snack stall, Automobile repair shop.
16	Piggery	1.0 to 1.5		A premise with facilities or rearing and processing of piggery products. It may have temporary structure for sheds of pigs.	Piggery shed, Watch – ward residence (up to 30 sq.m.). All structures shall be temporary in nature.
17	Police station	0.05 to 0.10	12 mt & above	A premise having facilities for the offices of local police station.	Police station, Essential staff housing
18	Poultry farm	1.0 to 1.5	18 mt & above	It is a premise with facilities for rearing birds and production of eggs. It may have temporary structure for sheds to birds.	Poultry farm, watch and ward residence (upto 30 sq.m) all structures shall be temporary in nature.
19	Research and development centre	0.1	18 mt. & above	A premise providing facilities for research and development for any specific field.	Research and development Centre, watch and ward residence (upto 30 sq.m), residential staff (for maintenance staff), Hostel, Canteen, Bank Extension Counter, Library, post office extension facility.
20	Resorts	1.0	18 mt. & above		
21	Sports City	50	18 mt. & above		

S. No.	Activity	Minimum Area Required (Ha)	Road Width in Meters	Definitions	Use Premises
22	Storage/Perishable / inflammable goods	1.0 or may be more	18 mt. & above		
23	Veterinary Hospital	0.20	18 mt. & above	A premises providing treatment for indoor and outdoor sick animals.	Veterinary hospital, Residential flat (for employees and service personnel), Institutional hostel, Veterinary college, Retail shop (confectionery, Grocery, General merchandise, Books & Stationery, Barber, Launderer).
24	Burial Grounds/ Cremation site	The site for Burial grounds/ Cremation site shall be indentified at such locations which are not in proximities to residential areas.		It is a premise with facilities for burying of dead bodies.	Burial ground, Cremation ground, Cemetery and electric crematorium- burial ground, Cremation ground, Cemetery and electric crematorium, Retail shops of wood, Flowers and related materials, Watch & ward Residence (up to 30 sq.m.)
25	In addition to 1-24 above, agriculture, horticulture, social forestry, sanitary landfill site/compost processing plant, farm house outside abadi areas, wireless station/weather station, telephone and electric transmission lines and poles, power substation/water				

10.10.9 The Permission of Use premises in following use zone shall be governed by the specific function of the use zone:

Rail Terminal, Rail Circulation, Bus Terminal & Depot, Road Circulation, Multi Modal Transit Station(MMTS),Multi Modal Logistics Hub (MMLH), Water, Sewerage, Electricity, Solid Waste, Drain, Government Reserved Area, Cremation and Burial Ground, Religious, Water Body

NOTE: In case of any doubt, the permissibility of use premises shall be decided by the compete

Annexure-I

JODHPUR- PALI- MARWAR INDUSTRIAL AREA MASTER PLAN

TITLE: **GENERALISED EXISTING LAND USE - 2012**
सामान्यकृत विद्यमान भू–उपयोग–2012

LEGEND

RESIDENTIAL
आवासीय
- RESIDENTIAL आवासीय

COMMERCIAL
वाणिज्यिक
- RETAIL BUSINESS & GENERAL COMMERCIAL फुटकर व्यापार एवं सामान्य वाणिज्यिक

GOVERNMENTAL
राजकीय
- GOVERNMENT & SEMI -GOVERNMENT OFFICES राजकीय एवं अर्द्ध–राजकीय कार्यालय

PUBLIC & SEMI - PUBLIC
सार्वजनिक एवं अर्द्ध–सार्वजनिक
- SENIOR SECONDARY / SECONDARY SCHOOL वरिष्ठ माध्यमिक / माध्यमिक विद्यालय
- HEALTH FACILITIES चिकित्सा सुविधाएं
- HISTORICAL, SOCIO - CULTURAL & RELIGIOUS PLACES ऐतिहासिक, सामाजिक–सांस्कृतिक एवं धार्मिक स्थल
- OTHER COMMUNITY FACILITIES अन्य सामुदायिक सुविधाएं
- PERIPHERAL CONTROL BELT परिधि नियंत्रण पट्टी
- REVENUE VILLAGE BOUNDARY राजस्व ग्राम सीमा
- URBAN AREA LIMIT NOTIFIED U/S 3(1) OF RAJ. U.I. ACT.1959 राज. नगर सुधार अधिनियम 1959 की धारा 3 के अन्तर्गत अधिसूचित नगरीय क्षेत्र सीमा
- EXISTING DEVELOPED AREA BOUNDARY विद्यमान विकसित क्षेत्र सीमा
- BROAD GAUGE RAILWAY LINE & RAILWAY STATION बड़ी रेलवे लाईन एवं रेलवे स्टेशन
- NATIONAL HIGHWAY राष्ट्रीय राजमार्ग
- STATE HIGHWAY राज्य राजमार्ग
- MAJOR ROADS मुख्य सड़कें
- OTHERS ROADS अन्य सड़कें
- CONTOUR समोच्च रेखा
- POND तालाब
- RIVER नदी
- DRAIN नाला
- HIGH TENSION ELECTRIC LINE उच्च क्षमता विद्युत लाईन
- GAS PIPE LINE गैस पाईप लाईन
- EMBANKMENT तटबंधन

100 HECTARES
40 ACRES

N

KEY MAP

CONSULTANT:
Parsons Brinckerhoff India Pvt.Ltd,
6th Floor, Technopolis,
DLF Golf Course Road,
Sector - 54,Gurgaon - 122002.

सहायक नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर
अतिरिक्त आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

दिल्ली – मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

Annexure-II

JODHPUR- PALI- MARWAR INDUSTRIAL AREA MASTER PLAN

TITLE: **URBAN AREA 2042 (DRAFT)**
नगरीय क्षेत्र 2042 (प्रारूप)

LEGEND

- EXISTING URBANIZED AREA-2011
  विद्यमान नगरीकृत क्षेत्र 2011
- PERIPHERAL CONTROL BELT
  परिधी नियंत्रण पट्टी
- URBANISABLE AREA - 2042
  नगरीयकरण योग्य क्षेत्र – 2042
- URBANISABLE BOUNDARY - 2042
  नगरीयकरण सीमा – 2042
- REVENUE VILLAGE BOUNDARY
  राजस्व ग्राम सीमा
- URBAN AREA LIMIT NOTIFIED U/S 3(1) OF RAJ. U.I. ACT.1959
  राज. नगर सुधार अधिनियम 1959 की धारा 3 के अन्तर्गत अधिसूचित नगरीय क्षेत्र सीमा
- BROAD GAUGE RAILWAY LINE & RAILWAY STATION
  बड़ी रेलवे लाईन एवं रेलवे स्टेशन
- NATIONAL HIGHWAY
  राष्ट्रीय राजमार्ग
- STATE HIGHWAY
  राज्य राजमार्ग
- MAJOR ROADS
  मुख्य सड़के
- OTHERS ROADS
  अन्य सड़के
- CONTOUR
  समोच्च रेखा
- POND
  तालाब
- RIVER
  नदी
- DRAIN
  नाला
- HIGH TENSION ELECTRIC LINE
  उच्च क्षमता विद्युत लाईन
- GAS PIPE LINE
  गैस पाईप लाईन
- EMBANKMENT
  तटबंधन

100 HECTARIES
40 ACRES

N

KEY MAP

CONSULTANT:

Parsons Brinckerhoff India Pvt.Ltd,
6th Floor, Technopolis,
DLF Golf Course Road,
Sector - 54,Gurgaon - 122002.

सहायक नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	वरिष्ठ नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर
अतिरिक्त आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

दिल्ली – मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

Annexure-III

JODHPUR- PALI- MARWAR INDUSTRIAL AREA MASTER PLAN

TITLE:

TOWN MAP - 2012
नगर मानचित्र–2012

LEGEND

- REVENUE VILLAGE BOUNDARY
  राजस्व ग्राम सीमा
- URBAN AREA LIMIT NOTIFIED U/S 3(1) OF RAJ. U.I. ACT.1959
  राज. नगर सुधार अधिनियम 1959 की धारा 3 के अन्तर्गत अधिसूचित नगरीय क्षेत्र सीमा
- BROAD GAUGE RAILWAY LINE & RAILWAY STATION
  बड़ी रेलवे लाईन एवं रेलवे स्टेशन
- NATIONAL HIGHWAY
  राष्ट्रीय राजमार्ग
- STATE HIGHWAY
  राज्य राजमार्ग
- MAJOR ROADS
  मुख्य सड़के
- OTHERS ROADS
  अन्य सड़के
- CONTOUR
  समोच्च रेखा
- POND
  तालाब
- RIVER
  नदी
- DRAIN
  नाला
- HIGH TENSION ELECTRIC LINE
  उच्च क्षमता विद्युत लाईन
- GAS PIPE LINE
  गैस पाईप लाईन
- EMBANKMENT
  तटबंधन

100 HECTARES
40 ACRES

N

KILOMETRES

KEY MAP

CONSULTANT:

Parsons Brinckerhoff India Pvt.Ltd,
6th Floor, Technopolis,
DLF Golf Course Road,
Sector - 54,Gurgaon - 122002.

सहायक नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	वरिष्ठ नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर
अतिरिक्त आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

दिल्ली – मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

Annexure-IV

JODHPUR- PALI- MARWAR INDUSTRIAL AREA MASTER PLAN

TITLE: **LAND USE PLAN 2042 (DRAFT)**
भू–उपयोग मानचित्र 2042 (प्रारूप)

LEGEND

RESIDENTIAL	**आवासीय**
RESIDENTIAL	आवासीय
ABADI AREA	आबादी क्षेत्र
ABADI DEVELOPMENT AREA	ग्रामीण आबादी विकास क्षेत्र
MIXED USE	**मिश्रित भू–उपयोग**
MIXED USE	मिश्रित भू–उपयोग
INDUSTRIAL	**औद्योगिक**
INDUSTRIAL	औद्योगिक
COMMERCIAL	**वाणिज्यिक**
CC CITY CENTRE	वाणिज्यिक केन्द्र
SCC SUB CITY CENTRE	उप–शहरी केन्द्र
PUBLIC/ SEMI PUBLIC	**सार्वजनिक एवं अर्द्ध–सार्वजनिक**
PUBLIC/SEMI PUBLIC	सार्वजनिक एवं अर्द्ध–सार्वजनिक
TRANSPORTATION	**यातायात**
MULTIMODAL LOGISTICS HUB	मल्टीमॉडल लॉजिस्टिक्स हब
GENERAL LOGISTICS AND WAREHOUSING	जनरल लोजिस्टिक्स एंव भण्डारण
TRANSPORT FACILITY	ट्रांसपोर्ट
RAILWAY CORRIDOR	रेलवे कोरिडोर
UTILITIES	**सुविधाएं**
CETP COMMON EFFLUENT TREATMENT PLANT	कॉमन एफ्लुएन्ट ट्रीटमेन्ट प्लैन्ट
ESS ELECTRICAL SUBSTATION	विद्युत उप–क्रेन्द्र
RECREATIONAL	**खुले स्थल एवं आमोद–प्रमोद**
ECOLOGICAL PARK	इकोलॉजिकल पार्क
DISTRICT PARK	डिस्ट्रीक्ट पार्क
GREEN BUFFER	**हरित पट्टी**
G1	जी–1
G2	जी–2
PERIPHERAL CONTROL BELT	**परिधी नियंत्रण पट्टी**
PERIPHERAL CONTROL BELT	परिधी नियंत्रण पट्टी
OTHERS	**अन्य**
REVENUE VILLAGE BOUNDARY	राजस्व ग्राम सीमा
URBAN AREA LIMIT NOTIFIED U/S 3(1) OF RAJ. U.I. ACT.1959	**राज. नगर सुधार अधिनियम 1959 की धारा 3 के अन्तर्गत अधिसूचित नगरीय क्षेत्र सीमा**
BROAD GAUGE RAILWAY LINE & RAILWAY STATION	बड़ी रेलवे लाईन एवं रेलवे स्टेशन
NATIONAL HIGHWAY	राष्ट्रीय राजमार्ग
STATE HIGHWAY	राज्य राजमार्ग
MAJOR ROADS	मुख्य सड़कें
OTHERS ROADS	अन्य सड़कें
30 MT.COLLECTOR & SUB COLLECTOR ROADS	उप कलेक्टर सड़कें
45 MT. SUB-ARTERIAL ROADS	उप प्रमुख सड़कें
60 MT. SPINE ROADS	स्पाईन सड़कें
CONTOUR	समोच्च रेखा
POND	तालाब
RIVER	नदी
DRAIN	नाला
EMBANKMENT	तटबंधन
HIGH TENSION ELECTRIC LINE	उच्च क्षमता विद्युत लाईन
GAS PIPE LINE	गैस पाईप लाईन

100 HECTARES
40 ACRES

N

KEY MAP

CONSULTANT:

Parsons Brinckerhoff India Pvt.Ltd,
6th Floor, Technopolis,
DLF Golf Course Road,
Sector - 54,Gurgaon - 122002.

सहायक नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	वरिष्ठ नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर
अतिरिक्त आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

दिल्ली – मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

Annexure-V

JODHPUR- PALI- MARWAR INDUSTRIAL AREA MASTER PLAN

TITLE: **DRAINAGE SYSTEM NETWORK**

LEGEND

DRAIN	नाला
INLET/ OUTLET	प्रवेश / निर्गम मार्ग
PHASE-1	चरण – 1
PHASE-2	चरण – 2
PHASE-3	चरण – 3
ABADI AREA	आबादी क्षेत्र
ABADI DEVELOPMENT AREA	ग्रामीण आबादी विकास क्षेत्र
DISTRICT PARK AND ECOLOGICAL PARK	डिस्ट्रीक्ट पार्क एवं इकोलॉजिकल पार्क
DISTRICT PARK	डिस्ट्रीक्ट पार्क
REVENUE VILLAGE BOUNDARY	राजस्व ग्राम सीमा
URBAN AREA LIMIT NOTIFIED U/S 3(1) OF RAJ. U.I. ACT.1959	राज. नगर सुधार अधिनियम 1959 की धारा 3 के अन्तर्गत अधिसूचित नगरीय क्षेत्र सीमा
BROAD GAUGE RAILWAY LINE & RAILWAY STATION	बडी रेलवे लाईन एवं रेलवे स्टेशन
NATIONAL HIGHWAY	राष्ट्रीय राजमार्ग
STATE HIGHWAY	राज्य राजमार्ग
MAJOR ROADS	मुख्य सड़कें
OTHERS ROADS	अन्य सडकें
30 MT. COLLECTOR & SUB COLLECTOR ROADS	उप कलेक्टर सड़कें
45 MT. SUB-ARTERIAL ROADS	उप प्रमुख सड़कें
60 MT. SPINE ROADS	स्पाईन सड़कें
CONTOUR	समोच्च रेखा
POND	तालाब
RIVER	नदी
DRAIN	नाला
EMBANKMENT	तटबंधन
HIGH TENSION ELECTRIC LINE	उच्च क्षमता विद्युत लाईन
GAS PIPE LINE	गैस पाईप लाईन

100 HECTARES
40 ACRES

KEY MAP

CONSULTANT:

Parsons Brinckerhoff India Pvt.Ltd,
6th Floor, Technopolis,
DLF Golf Course Road,
Sector - 54,Gurgaon - 122002.

सहायक नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	वरिष्ठ नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर
अतिरिक्त आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

दिल्ली – मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

Annexure-VI

JODHPUR- PALI- MARWAR INDUSTRIAL AREA MASTER PLAN

TITLE: **INDUSTRIAL WASTE WATER COLLECTION NETWORK**

LEGEND

INTERSCEPTOR	नाला
CETP SECONDARY LINE	सीईटीपी माध्यमिक लाइन
FLOW DIRECTION	प्रवाह की दिशा
PHASE-1	चरण – 1
PHASE-2	चरण – 2
PHASE-3	चरण – 3
LIGHT INDUSTRIAL	औद्योगिक
HEAVY INDUSTRIAL	औद्योगिक
ABADI AREA	आबादी क्षेत्र
ABADI DEVELOPMENT AREA	ग्रामीण आबादी विकास क्षेत्र
DISTRICT PARK AND ECOLOGICAL AREA	डिस्ट्रीक्ट पार्क एवं इकोलॉजिकल पार्क
DISTRICT PARK	डिस्ट्रीक्ट पार्क
PERIPHERAL CONTROL BELT	परिधी नियन्त्रण पट्टी
REVENUE VILLAGE BOUNDARY	राजस्व ग्राम सीमा
URBAN AREA LIMIT NOTIFIED U/S 3(1) OF RAJ. U.I. ACT.1959	राज. नगर सुधार अधिनियम 1959 की धारा 3 के अन्तर्गत अधिसूचित नगरीय क्षेत्र सीमा
BROAD GAUGE RAILWAY LINE & RAILWAY STATION	बडी रेलवे लाईन एवं रेलवे स्टेशन
NATIONAL HIGHWAY	राष्ट्रीय राजमार्ग
STATE HIGHWAY	राज्य राजमार्ग
MAJOR ROADS	मुख्य सड़कें
OTHERS ROADS	अन्य सड़कें
30 MT. COLLECTOR & SUB COLLECTOR ROADS	उप कलेक्टर सड़कें
45 MT. SUB-ARTERIAL ROADS	उप प्रमुख सड़कें
60 MT. SPINE ROADS	स्पाईन सड़कें
CONTOUR	समोच्च रेखा
POND	तालाब
RIVER	नदी
DRAIN	नाला
EMBANKMENT	तटबंधन
HIGH TENSION ELECTRIC LINE	उच्च क्षमता विद्युत लाईन
GAS PIPE LINE	गैस पाईप लाईन

100 HECTARES
40 ACRES

KEY MAP

CONSULTANT:

Parsons Brinckerhoff India Pvt.Ltd,
6th Floor, Technopolis,
DLF Golf Course Road,
Sector - 54,Gurgaon - 122002.

सहायक नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	वरिष्ठ नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर
अतिरिक्त आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

दिल्ली – मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

Annexure-VII

JODHPUR- PALI- MARWAR INDUSTRIAL AREA MASTER PLAN

TITLE:

POWER INFRASTRUCTURE & DISTRIBUTION NETWORK

LEGEND

33 KV PRIMARY DISTRIBUTION NETWORK	33 के.वी प्राथमिक वितरण नेटवर्क
11 KV SECONDARY DISTRIBUTION NETWORK	11 के.वी माध्यमिक वितरण नेटवर्क
33/11 KV PRIMARY DISTRIBUTION NETWORK SS	33 / 11के.वी प्राथमिक वितरण नेटवर्क
132 KV POWER GRID SUB STATION	132 के.वी पावर ग्रिड सबस्टेशन
132 KV POWER GRID SUB STATION	132 के.वी पावर ग्रिड सबस्टेशन
PHASE-1	चरण – 1
PHASE-2	चरण – 2
PHASE-3	चरण – 3
ABADI AREA	आबादी क्षेत्र
ABADI DEVELOPMENT AREA	ग्रामीण आबादी विकास क्षेत्र
REVENUE VILLAGE BOUNDARY	राजस्व ग्राम सीमा
URBAN AREA LIMIT NOTIFIED U/S 3(1) OF RAJ. U.I. ACT.1959	राज. नगर सुधार अधिनियम 1959 की धारा 3 के अन्तर्गत अधिसूचित नगरीय क्षेत्र सीमा
BROAD GAUGE RAILWAY LINE & RAILWAY STATION	बडी रेलवे लाईन एवं रेलवे स्टेशन
NATIONAL HIGHWAY	राष्ट्रीय राजमार्ग
STATE HIGHWAY	राज्य राजमार्ग
MAJOR ROADS	मुख्य सड़कें
OTHERS ROADS	अन्य सड़कें
30 MT. COLLECTOR & SUB COLLECTOR ROADS	उप कलेक्टर सड़कें
45 MT. SUB-ARTERIAL ROADS	उप प्रमुख सड़कें
60 MT. SPINE ROADS	स्पाईन सड़कें
POND	तालाब
RIVER	नदी
DRAIN	नाला
EMBANKMENT	तटबंधन
HIGH TENSION ELECTRIC LINE	उच्च क्षमता विद्युत लाईन
GAS PIPE LINE	गैस पाईप लाईन

100 HECTARES
40 ACRES

KEY MAP

CONSULTANT:

Parsons Brinckerhoff India Pvt.Ltd,
6th Floor, Technopolis,
DLF Golf Course Road,
Sector - 54,Gurgaon - 122002.

सहायक नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	वरिष्ठ नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर
अतिरिक्त आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

दिल्ली – मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

Annexure-VIII

JODHPUR- PALI- MARWAR INDUSTRIAL AREA MASTER PLAN

TITLE:

POTABLE WATER DISTRIBUTION NETWORK

LEGEND

OHT	ओ.एच.टी
CWR	सी डब्लू आर
WATER SUPPLY RING MAINS	जल आपूर्ति रिंग साथन
PHASE-1	चरण – 1
PHASE-2	चरण – 2
PHASE-3	चरण – 3
ABADI AREA	आबादी क्षेत्र
ABADI DEVELOPMENT AREA	ग्रामीण आबादी विकास क्षेत्र
REVENUE VILLAGE BOUNDARY	राजस्व ग्राम सीमा
URBAN AREA LIMIT NOTIFIED U/S 3(1) OF RAJ. U.I. ACT.1959	राज. नगर सुधार अधिनियम 1959 की धारा 3 के अन्तर्गत अधिसूचित नगरीय क्षेत्र सीमा
BROAD GAUGE RAILWAY LINE & RAILWAY STATION	बडी रेलवे लाईन एवं रेलवे स्टेशन
NATIONAL HIGHWAY	राष्ट्रीय राजमार्ग
STATE HIGHWAY	राज्य राजमार्ग
MAJOR ROADS	मुख्य सड़कें
OTHERS ROADS	अन्य सड़कें
30 MT. COLLECTOR & SUB COLLECTOR ROADS	उप कलेक्टर सड़कें
45 MT. SUB-ARTERIAL ROADS	उप प्रमुख सड़कें
60 MT. SPINE ROADS	स्पाईन सड़कें
CONTOUR	समोच्च रेखा
POND	तालाब
RIVER	नदी
DRAIN	नाला
EMBANKMENT	तटबंधन
HIGH TENSION ELECTRIC LINE	उच्च क्षमता विद्युत लाईन
GAS PIPE LINE	गैस पाईप लाईन

100 HECTARES
40 ACRES

KEY MAP

CONSULTANT:

Parsons Brinckerhoff India Pvt.Ltd,
6th Floor, Technopolis,
DLF Golf Course Road,
Sector - 54,Gurgaon - 122002.

सहायिक नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	वरिष्ठ नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर
अतिरिक्त आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

दिल्ली – मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

Annexure-IX

JODHPUR- PALI- MARWAR INDUSTRIAL AREA MASTER PLAN

TITLE:

POTABLE WATER SUPPLY MAIN NETWORK

LEGEND

OHT	ओ.एच.टी
CWR	सी डब्लू. आर
PHASE-1	चरण – 1
PHASE-2	चरण – 2
PHASE-3	चरण – 3
ABADI AREA	आबादी क्षेत्र
ABADI DEVELOPMENT AREA	ग्रामीण आबादी विकास क्षेत्र
REVENUE VILLAGE BOUNDARY	राजस्व ग्राम सीमा
URBAN AREA LIMIT NOTIFIED U/S 3(1) OF RAJ. U.I. ACT.1959	राज. नगर सुधार अधिनियम 1959 की धारा 3 के अन्तर्गत अधिसूचित नगरीय क्षेत्र सीमा
BROAD GAUGE RAILWAY LINE & RAILWAY STATION	बडी रेलवे लाईन एवं रेलवे स्टेशन
NATIONAL HIGHWAY	राष्ट्रीय राजमार्ग
STATE HIGHWAY	राज्य राजमार्ग
MAJOR ROADS	मुख्य सड़कें
OTHERS ROADS	अन्य सड़कें
30 MT. COLLECTOR & SUB COLLECTOR ROADS	उप कलेक्टर सड़कें
45 MT. SUB-ARTERIAL ROADS	उप प्रमुख सड़कें
60 MT. SPINE ROADS	स्पाईन सड़कें
CONTOUR	समोच्च रेखा
POND	तालाब
RIVER	नदी
DRAIN	नाला
EMBANKMENT	तटबंधन
HIGH TENSION ELECTRIC LINE	उच्च क्षमता विद्युत लाईन
GAS PIPE LINE	गैस पाईप लाईन

100 HECTARES
40 ACRES

KEY MAP

CONSULTANT:

Parsons Brinckerhoff India Pvt.Ltd,
6th Floor, Technopolis,
DLF Golf Course Road,
Sector - 54,Gurgaon - 122002.

सहायक नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	वरिष्ठ नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर
अतिरिक्त आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

दिल्ली – मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

Annexure-X

JODHPUR- PALI- MARWAR INDUSTRIAL AREA MASTER PLAN

TITLE: **TERTIARY TREATED WATER MAIN DISTRIBUTION NETWORK**

LEGEND

BOOSTER STATION	बूस्टर स्टेशन
PRESSURE PHASE-1	दबाव चरण – 1
PRESSURE PHASE-2	दबाव चरण – 2
PRESSURE PHASE-3	दबाव चरण – 3
PHASE-1	चरण – 1
PHASE-2	चरण – 2
PHASE-3	चरण – 3
LIGHT INDUSTRIAL	औद्योगिक
HEAVY INDUSTRIAL	औद्योगिक
ABADI AREA	आबादी क्षेत्र
ABADI DEVELOPMENT AREA	ग्रामीण आबादी विकास क्षेत्र
REVENUE VILLAGE BOUNDARY	राजस्व ग्राम सीमा
URBAN AREA LIMIT NOTIFIED U/S 3(1) OF RAJ. U.I. ACT.1959	राज. नगर सुधार अधिनियम 1959 की धारा 3 के अन्तर्गत अधिसूचित नगरीय क्षेत्र सीमा
BROAD GAUGE RAILWAY LINE & RAILWAY STATION	बडी रेलवे लाईन एवं रेलवे स्टेशन
NATIONAL HIGHWAY	राष्ट्रीय राजमार्ग
STATE HIGHWAY	राज्य राजमार्ग
MAJOR ROADS	मुख्य सड़कें
OTHERS ROADS	अन्य सड़कें
30 MT. COLLECTOR & SUB COLLECTOR ROADS	उप कलेक्टर सड़कें
45 MT. SUB-ARTERIAL ROADS	उप प्रमुख सड़कें
60 MT. SPINE ROADS	स्पाईन सड़कें
CONTOUR	समोच्च रेखा
POND	तालाब
RIVER	नदी
DRAIN	नाला
EMBANKMENT	तटबंधन
HIGH TENSION ELECTRIC LINE	उच्च क्षमता विद्युत लाईन
GAS PIPE LINE	गैस पाईप लाईन

100 HECTARES
40 ACRES

N

KEY MAP

CONSULTANT:

Parsons Brinckerhoff India Pvt.Ltd,
6th Floor, Technopolis,
DLF Golf Course Road,
Sector - 54,Gurgaon - 122002.

सहायक नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	वरिष्ठ नगर नियोजक, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर
अतिरिक्त आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर,विभाग राजस्थान,जयपुर	आयुक्त, दिल्ली– मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

दिल्ली – मुम्बई इण्डस्ट्रीयल कॉरीडोर विभाग, राजस्थान,जयपुर

Annexure-XI

Annexure XI: Supporting Documents

a) Study on typical land use requirements from relevant national and international case studies
b) Sample conversion table of industry sub-division output to water and power requirement
c) Social and Physical Infrastructure Assumption sheets

a) Sample conversion table of industry type output to land area requirement

Industry type output to land area requirement (adopted from Shanghai Standard)*

S. No.	Target Industry Group	Conversion Rate (1000 crore per sqkm)	Output INR crores	km2
1	Agro Food	15.2	33,178	2.19
2	Textile and Apparel(Generalized)	14.9	11,705	0.78
3	Building Material	8.6	26,929	3.13
4	Handicraft	19.1	8,624	0.45
5	Motor Vehicle & Auto Components	22.6	23,585	1.05
6	Computer, Electronic and Optical Products	43.4	30,714	0.71
7	Solar Energy and Equipment Related	28.2	19,009	0.67
8	Machinery & Equipment	14.5	39,514	2.72
	Total (year)		**193,258**	**11.70**

**Note: Taken from low growth scenario forecast*

Base figures and output rates are derived from Shanghai Industrial Land Guidelines (2008), edited by Shanghai Municipal Commission of Economy and Information, Shanghai Development and Reform Commission, Shanghai Planning and Land Authority and Shanghai Municipal Statistics Bureau

Land area per industry type = Output divided by land output rate

Land output rate is based on the average scoring of each industry type surveyed during the reporting year (2008)

2008 INR : RMB currency conversion is used adjusted to take into account of inflation @ 6%

b) Sample conversion table of industry sub-division output to water and power requirement

	Standard Unit		
Category	**Water**	**Energy**	**Electricity**
Unit	m3 per 10,000RMB	TCE* per 10,000RMB	Million kWh
Vegetable and animal oils and fats	0.717	0.062	25.1
Manufacture of prepared animal feeds	1.15	0.06	50.9
Dairy products	2.508	0.047	54.1
Processing and preserving of meat	7.24	0.068	57.1
Apparel product	2.841	0.046	54.2
Textile product	6.315	0.161	46.8
Clay, porcelain and other ceramic building materials	1.831	0.143	50.1
Cement, lime and plaster building material	4.658	0.179	48.4
Other non-metallic mineral products	2.188	0.1	65
Handicraft	0.543	0.009	82.6
Parts and accessories of motor vehicles	0.787	0.035	70.3
Motorcycle & the components	1.378	0.039	71.4
computers and peripheral equipment	0.182	0.005	95.5
consumer electronics	0.512	0.02	89.6
communication equipment	0.551	0.018	92.4
Photovoltaic cells	3.751	0.09	91.3
Solar Heating & Cooling	0.78	0.036	90.9
General-purpose machinery	1.604	0.048	78.1
Machinery for mining, quarrying and construction	0.953	0.079	45.8
Machinery for food, beverage and tobacco processing	1.1014	0.021	84
other special-purpose machinery	2.113	0.048	87.3

* Tonnes of standard Coal Equivalent

- Base figures and output rates are derived from *Shanghai Industrial Land Guidelines* (2008), edited by Shanghai Municipal Commission of Economy and Information, Shanghai Development and Reform Commission, Shanghai Planning and Land Authority and Shanghai Municipal Statistics Bureau
- Water, power requirements per industry type = Output divided by water, power requirements
- Based on the average scoring of each industry type surveyed during the reporting year (2008)

c) Social and Physical Infrastructure Assumption sheets

a) Physical Infrastructure

- Solid Waste Generation

Year	JPM IA Population	Kg Waste/capita/day	Waste Generation (in Kg)
2012	16000	0.21	3360
2022	90000	0.21	18900
2032	210000	0.21	44100
2042	390000	0.21	81900

- Power Demand

Type of Industry	Million kWh
Agro Food	353
Textile and Apparel(Generalized)	224
Building Material	760
Handicraft	24
Motor Vehicle & Auto Components	230
Computer, Electronic and Optical Products	151
Solar Energy and Equipment Related	432
Machinery & Equipment	516
Total(year)	2689
Total (day)	7 (~700 MW)

b) Social Infrastructure

- Area requirement for all social infrastructures

Planning Phase		Educational Facilities	Health Care Facilities	Socio-Cultural Facilities	Distribution & Others	Recreation/ Open spaces	Total (Ha)
		Area (Ha)	Area (Ha)	Area (Ha)	Area		
2012	Base Year	4.0	0.1	0.4	0.0	**4.4**	**4.5**
2022	Phase I	34.0	7.5	4.1	2.3	**32.2**	**47.9**
2032	Phase II	74.2	12.9	9.0	4.8	**72.4**	**100.9**
2042	Phase III	194.5	36.3	17.1	9.4	**152.4**	**257.3**

- Education

S.No.	Facility	2012	16000	2022	95000	2032	214000	2042	392000
		No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)
1	Pre-primary, nursery school	7	0.6	38	3.0	86	6.9	157	12.6
2	Primary school (I-V)	7	0.3	38	1.5	86	3.4	157	6.3
3	Secondary school (VI-XII)	2	3.2	13	20.8	29	46.4	52	83.2
4	Integrated school (I-XII)	0	0.0	1	3.5	2	7.0	4	7.0
5	School for handicapped	0	0.0	2	1.0	5	2.5	9	2.5
6	College	0	0.0	1	4.0	2	8.0	3	8.0
7	University campus	0	0.0	0	0.0	0	0.0	0	0.0
8	New university area	0	0.0	0	0.0	0	0.0	0	0.0
9	Industrial training institute	0	0.0	0	0.0	0	0.0	0	0.0
10	Polytechnic	0	0.0	0	0.0	0	0.0	0	0.0
11	Technical training centre	0	0.0	0	0.0	0	0.0	0	0.0
12	Coaching centre	0	0.0	0	0.0	0	0.0	0	0.0
13	New engineering college	0	0.0	0	0.0	0	0.0	1	60.0
14	New medical college	0	0.0	0	0.0	0	0.0	1	15.0
	TOTAL		**4.0**		**33.9**		**74.2**		**194.5**

- Healthcare

S.No.	Facility	2012	16000	2022	95000	2032	214000	2042	392000
		No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)
15	General hospital	0	0.0	0	0.0	0	0.0	2	12.0
16	Intermediate hospital (A)	0	0.0	1	3.7	2	7.40	4	14.8
17	Intermediate hospital (B)	0	0.0	1	1.0	2	2.00	4	4.0
18	Poly-clinic	0	0.0	1	0.3	2	0.60	4	1.2
19	Nursing home, child welfare & maternity center	0	0.0	2	1.8	4	1.20	8	2.4
20	Dispensary	1	0.12	6	0.72	14	1.68	26	1.92
	TOTAL		**0.1**		**7.5**		**12.9**		**36.3**

- Socio-cultural Facilities

S.No.	Facility	2012	16000	2022	95000	2032	214000	2042	392000
		No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)
21	Community room	3	0.2	19	1.3	43	3.0	78	5.5
22	Community hall & library	1	0.2	6	1.2	14	2.8	26	5.2
23	Recreational club	0	0.0	1	1.0	2	2.0	4	4.0
24	Music, dance & drama center	0	0.0	1	0.1	2	0.2	4	0.4
25	Meditation and spiritual center	0	0.0	1	0.5	2	1.0	4	2.0
26	Socio-cultural center	0	0.0	0	0.0	0	0.0	0	0.0
	TOTAL		**0.4**		**4.1**		**9.0**		**17.1**

- Distribution and Other Services

S.No.	Facility	2012	16000	2022	95000	2032	214000	2042	392000
		No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)
27	Petrol pump	-	-	-	-	-	-	-	-
28	Milk booth	3	-	19	-	43	-	78	-
29	LPG godowns	0	-	2	-	5	-	10	-
30	Police station	0	0.0	1	1.5	2	3.0	4	6.0
31	Police post	0	0.0	2	0.3	4	0.6	8	1.3
32	District office and battalion	0	0.0	0	0.0	0	0.0	0	0.0
33	Police line	0	0.0	0	0.0	0	0.0	0	0.0
34	District jail	0	0.0	0	0.0	0	0.0	0	0.0
35	Civil defence & home guards	0	0.0	0	0.0	0	0.0	0	0.0
36	Religious building	2	0.0	13	0.5	29	1.2	52	2.1
37	Telephone exchange	0	-	1	-	1	-	3	-
38	Telegraph office	0	-	1	-	2	-	4	-
	TOTAL		**0.0**		**2.3**		**4.8**		**9.4**

- Recreational Facilities

S.No.	Facilities	2012	16000	2022	95000	2032	214000	2042	392000
		No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)	No.	Area (Ha)
39	Neighbourhood Park	3	2.4	19	15.2	43	34.4	78	62.4
40	Community Park	2	2.0	10	10.0	21	21	39	39
41	Community sports centre	0	0.0	1	2.0	2	4	4	8
42	Zonal Park	0	0.0	1	5.0	2	10	4	20
43	Play Ground/ Open Space	0	0.0	0	0.0	1	3	1	3
44	City Level Park	0	0.0	0	0.0	0	0.0	1	20
	Overall Town/ city level		**4.4**		**32.2**		**72.4**		**152.4**

Annexure-XII

Annexure XII: Compliance report on Comments received from DMIC, Government of Rajasthan, on the Draft Development Plan Report for Jodhpur Pali Marwar Industrial Area

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
Initial Comments from DMIC Rajasthan on Draft Development Plan report:						
1					It is observed that the green buffer shown in proposed land Use plan along the roads that is provided as just strip of road side plantations which is not sufficient. The main focus should be on the siting and zoning of industry and residential areas in case of project like this (sustainable industrial township development). The buffer area between residential and industrial area should be categories according to the type of industry because to avoid or minimize adverse effects on residential area and environmental conflicts arising from land use incompatibility. Approximately the buffer zone for light industrial areas could be about 50m and for medium it could be 250m and for heavy industrial areas it will go up to 500m.	The buffer widths have been updated and required locations; however the buffers along the road have been indicated on the basis of width of the roads and its use with emphasis on the use of streets by pedestrians. Also there are plantations proposed within the ROW for shading of the pedestrian areas
2	Page No. xviii				Plan objectives are highly generalized but in the instant case it should be re-framed on the line of industrial area development	Updated as appropriate
3		Chapter 6			Land use and structure plan:- • 60% of urban area is control area and only 40% is Urbanizable area Feasibility of reducing the control area may be worked out. • The chapter should envisage separate zone/informal sector policy for JPMIA.	Control area is the peripheral villages around the IA. This has been kept so that entire village revenue areas are part of the Control Area. This is important to hold the investment value of the core IA, else there will be competition between the unregulated development in proximity to the IA
4		Chapter – 7; Traffic and Transportation Plan			The chapter has focused on walkability and public transport strategy; with this, the integrated transportation system can also be included for end to end solution for commuters. The chapter should promote the growth of public transport by curbing the excessive share of private vehicles	This is already incorporated, now updated with TOD and walkability being the prime objectives

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
5		Chapter -8			Urban design and landscape guidelines :- It is imperative to study soil composition and type in the context of landscape planning	The choice of horticulture is already incorporated with local species being used.
Comments below (1 to 21) after preliminary analysis of the report						
1					The Draft Development Plan needs to be renamed as Draft Master Plan, as it is the basic terminology which is mentioned in UI Act of Rajasthan	Name has been changed. Soft copy the report has been provided for any changes required by the government to meet the legislative requirement of the state.
2					The total No. of revenue villages in the area to be notified is 9. The report mentions 8 villages, therefore, 1 more village, namely, Dalpatgarh and its data needs to be added in all the relevant sections and maps	Report does mention 9 villages in the chapter 12 of report. This 9th village (Dalpatgarh) was part of Rohat village and separated recently but separate revenue map was not available during data collection in 2012, 2013 and 2014
3					The chapter names and subsequent section names in the contents pages do not match with the chapter and section headings of the report at various places. This needs to be corrected.	Formatting errors has been rectified in the revised draft report.
4					A separate chapter on existing demographic profile, occupational structure, ------- needs to be incorporated in the report	This information was included in the chapter 12. The information is now included in Chapter 3 in revised draft report. This is part of the market assessment report which has already been submitted
5					Similarly, separate chapter on existing land use need to be incorporated in the report.	95% of this area is greenfield in terms of urban uses. Existing land use details have been submitted as part of the site assessment report
6					The report has numerous spelling errors as well as there is merging of words. This requires to be corrected.	Formatting errors has been rectified in the revised draft report.
7					The total area for various land uses does not match in different tables and relevant text. Therefore, this needs to be made coherent.	Has been updated
8					Most of the figures and maps are not legible and many maps do not have a proper legend,	Updated

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
		making it difficult to comprehend.				
9		In chapter 2- Existing Legal and Policy Analysis , the following modifications are required: i. All the policies need to be updated including a brief on existing land acquisition policy. ii. Modify and rewrite Section 2.2-SIR Act: As it is still proposed and therefore should be mentioned as bill and written in brief.				i. All policies have been update including brief on land acquisition policy.
10		In chapter 6-Landuse and Structure Plan, Section 6.11-Height Density should be removed.				This is important from an Urban design perspective to maintain the overall image of the city
11		In chapter 13: Subdivision rules, only permitted and conditional uses for each type of land use need to be mentioned and the sections pertaining to byelaws need to be removed.\				Updated as appropriated
12		The proposed commercial land use percentage needs to be increased from 1.8% to at least 2.5% and this should be uniformly distributed so as to provide commercial activities in close proximity of all the sectors.				Consultant does not agree to the suggestion as the flexibility has been given in the master plan so that mixed uses can be used as commercial if required in future.
13		Proposed Green Belts along various roads need to be included in the proposed cross sections and relevant sections related to different types of road proposed in the report.				Proposed Green belts are not part of the ROW, Green belts have been updated on the Landuse Plan
14		The report needs to incorporate a table showing green buffer along different types of road proposed, green belt between residential land use/ abadi areas and different types of industrial land use. Accordingly, green buffer should be shown in proposed land use map.				Green belts have been updated on the Land use Plan
15		The ROW of NH should be proposed as 150mt including 30mt Green Belt on both sides and ROW of SH should be proposed as 120mt including 30mt Green Belt on both sides.				Green belts have been updated on the Land use Plan
16		The report needs to include the following maps: i. Base Map ii. Existing Landuse Map iii. Proposed Landuse Map iv. Notified Urban Area showing Revenue Villages (9 in No.)				i. The map was provided in draft development Plan. The same map has been modified and updated as per the requirement of the state government. Refer Annexure I of the final draft report. ii. Included as Annexure II iii. Included as Annexure IV iv. The map has been modified and updated as per the requirement of

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
						the state government. Refer Annexure III of the final draft report.
17					The Proposed Landuse Map needs to incorporate following modifications: i. The legend colors need to be matched with map. ii. The legend symbols need to be matched with map. iii. Different types of roads with proposed ROW needs to be shown in the legend. iv. There are several other corrections which would be conveyed during discussions.	i. Revised and changed to more opaque colours. It is matching but the colours may vary during printing from different laptops and desktops. ii. The Map has been updated as desired iii. Incorporated all the changes suggested during discussions.
18					The document needs to be translated in Hindi or it can be bilingual (Hindi & English).	Not in the scope of Consultant However Consultant can assist to get it translated in Hindi after getting approval on the draft report, with additional cost
19					There are several repetitions of sections in the report (Eg: Early Bird Projects, SIR Act, Land Acquisition Act, etc) which need to be removed.	Reviewed and removed the repetitive parts. However the SIR ACT that is still under finalisation state cannot be accounted in the report.
20					The comments received from various other departments (Eg: Office of Chief Town Planner, PHED, RRVPNL, etc.) also need to be incorporated in the report.	Comments have been incorporated in various sections of the report
21					All the above mentioned comments are based on preliminary analysis of the report and there are several other corrections/modifications which would be conveyed during detailed discussions.	Received detailed comments as below (S. No. 1 to 118) and incorporated in the revised draft report.
More specific Comments (1 to 119) below on Draft Development Plan report from DMIC Rajasthan						
1	Cover Page				The name of the report should be Master Plan and not Development Plan	As per the Contract with DMICDC consultant need to prepare the Development plan. As state government need to name it Master Plan, consultant changed it on the cover page and in different sections of

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
						the report.
2.	Contents	The Chapter and Sections should have corresponding Page Numbering				This has been left intentionally as the document was in draft form; however the same has been included in the revised draft report.
3.	(ii)	Contents	--	--	Chapter 1: Introduction and Background; Title is different in the report	Checked and Corrected in the revised draft report
4.	(ii)	Contents	1.3	--	Instead of "Why Rajasthan and Why JPMIA" , it should be written as "Rajasthan and JPMIA in context of DMIC".	Changed as per suggestion
5.	(ii)	Contents	1.3	--	Add separate chapters on Base Demographic Profile and Existing Land Use	Chapter 3 has been updated
6.	(iii)	Contents	--	--	Name of Chapter no. 7 & 8 is same.	Corrected
7.	(vi)	Glossary			Remove 'node' word from IA and IR.	Removed
8.	(vii-ix)	Abbreviations			Add TOD and TEFR	Included
9.	(x)	Preface	--	3	Eight revenue villages need to be replaced with 9 revenue villages.	Replaced
10.	(xi)	Preface	--	--	In, Figure 1 text the "Relevance" has been misspelled.	As per discussion Figure 1 removed
11.	(xiii)	Executive Summary	--	1	Eight revenue villages need to be replaced with 9 revenue villages and 'Dalpatgarh 'village needs to be added.	Section removed as it is not required in the draft master Plan report
12.	(xiii)	Executive Summary	--	--	In, Figure 3; The Map needs to include village 'Dalpatgarh'.	Section removed as it is not required in the draft master Plan report
13.	(xiv)	Executive Summary	Existing Land Use and Development Activities	In, Figure 2&3; The text in the 'Map' is not legible		Section removed as it is not required in the draft master Plan report
14.	(xvii)	Executive Summa	Target Population Projections	In, Table1; Phase wise is written as Phase-wide, this needs to be corrected.		Section removed as it is not required in the draft master Plan report

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
		ry				
15.	(xx)	Executive Summary	Landuse Plan-2042	Point 3: 'routes' misspelled as 'routs'.		Section removed as it is not required in the draft master Plan report
16.	(xxii)	Executive Summary	Table 1	The total of Total Proposed Development Area in percentage is 84.4% and not 84.5%		Section removed as it is not required in the draft master Plan report
17.	(xxiii)	Executive Summary	Traffic and Transportation Plan	In Para 2; 'convert' needs to be replaced with 'converted'.		Section removed as it is not required in the draft master Plan report
18.	(xxiv)	Executive Summary	Figure 9	The text in the 'Map' is not legible		Section removed as it is not required in the draft master Plan report
	(xxviii)	Executive Summary	Table 2	The total of Total Proposed Development Area in percentage is 84.4% and not 84.5%. Also some other figures are not correct		Section removed as it is not required in the draft master Plan report
19.	1-6	Ch. 1	Fig: 1-4 and 1-5	--	Instead of Urban Centre in Jodhpur and Pali change it to Urban Centre in Jodhpur and Pali Districts	Updated
20.	1-8	Ch. 1	1.3	--	Instead of "Why Rajasthan and Why JPMIA" , it should be written as "Rajasthan and JPMIA in context of DMIC".	Changed as suggested
21.	1-11	Ch. 1	Fig: 1-6	--	Instead of Industry Nodes it should be Industrial Nodes. What does the area shaded in light red imply?	Changed as suggested. Legend updated
22.	1-11	Ch. 1	Fig: 1-7	--	The map is not legible.	Maps removed to avoid confusion
23.	2-6 &7	Ch. 2	Rajasthan Industrial Development Strategy	All the policies need to be updated and Township Policy has two policies.		Updated
24.	2-8	Ch. 2	2.2	SIR Act and other	It should be written in brief, 2 pages max.	This act would be the foundation of all the developments under DMIC, therefore it has been added in details.

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
				legislation		
25.	2-18	Ch. 2	2.3	Land Acquisition Act 2013	It should be removed	removed
26.	3-12	Ch. 3	3.7.9	Integration of Existing Village Settlements	It should be rewritten. It is incomplete and incomprehensible.	Paragraph restructured to give clarity
27.	4-4	Ch. 4	4.2.2	Sustainable Development as the core underlying principle	Industrial Ecology: The text of footnote (3) is written in the paragraph as well. Why repeated?	Foot note removed
28.	Chapter 5: Concept Master Plan	This chapter needs to be merged with Chapter 4 with only the relevant sections.				Relevant contents merged with chapter 5 of current report
29.	5-5	Ch. 5	Fig:5-5		The concept is not replicated in the land use plan. Also, the colors need to be different for better legibility	Relevant contents merged with chapter 5 of current report
30.	5-6	Ch. 5	Fig:5-6		The concept is not replicated in the land use plan.	Relevant contents merged with chapter 5 of current report
31.	5-8	Ch. 5	Fig:5-9		No Legend is given.	Relevant contents merged with chapter 5 of current report
32.	5-9	Ch. 5	5.3	Population Estimation	How it has been estimated. Provide calculations?	Details provided in Chapter 4

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
33.	5-9	Ch. 5	5.3	Population Estimation	What is the total estimated population for 2042? How it has been estimated? Provide calculations?	Details provided in Chapter 4
34.	5-14	Ch.5	5.4.1	Total road categories are 6 and the report mentions 5		Updated
35.	5-14	Ch.5	Fig: 5-11	No Legend with the Map		Updated
36.	5-16	Ch.5	5.5	Early Bird Projects And Critical Development Projects	Repetition from Chapter 3.	Deleted
37.	6-2	Ch.6	Fig: 6-1	Proposed Land Use 2042	• The Map is not legible. • Color difference between landuses is not proper. For Eg; Abadi and Abadi Development Area color code is same. • The naming of District Park and District Park & Ecological Park needs to be changed, it is confusing. • Term "Attenuation water body" needs to be changed. • Major geographical features like river and physical infrastructure like NH/SH/Railway line needs to be named. • Color code for Transport Facility and attenuation water body is similar, should be changed. Also, location of Transport Facility is not clear.	Updated now chapter 7
38.	6-3	Ch.6	Table: 6-1	Proposed Land Use 2042 Area Breakup	The table has calculation errors.	Updated now chapter 7
39.	6-3	Ch.6	Table: 6-1	Proposed Land Use 2042 Area	• The total area allocated for commercial area is 1.8%, this is very less. • In the proposed landuse the commercial area needs to be increased to atleast 2.5% and commercial pockets	Replied in Serial No 12. now chapter 7

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
				Breakup	need to distributed more evenly in the overall master plan area.	
40.	6-4	Ch.6	Below Table: 6-1 Point No.18	9 Villages not 8		Updated now chapter 7
41.	6-4	Ch.6	Table: 6-2	9 Villages not 8, Add figures for Dalpatgarh Village.		Updated now chapter 7
42.	6-5	Ch.6	6.2.1 Land Use Allocation	The first line says Approx 1980Ha, This does not match with Table 6.1 figures for industrial use.		Updated now chapter 7
43.	6-7	Ch.6	6.2.2	Fig: 6-2	The given map does not have color coding also category 5 is not given in legend	Updated now chapter 7
44.	6-9	Ch.6	6.2.2	Fig: 6-3	The given map does not have color coding also category 3 and 8 is not distinguishable.	Updated now chapter 7
45.	6-10	Ch.6	6.3.1 Land Use Allocation	• The first line says Approx 1096Ha, This does not match with Table 6.1 figures for Residential use. • Area break up for different residential categories i.e. low density housing, medium density housing, high density housing needs to be provided. • Mixed Use zoning housing needs to be separately explained in a separate category of mixed use.		Updated now chapter 7
46.	6-14	Ch.6	Fig: 6-4	The given map does not have color coding.		Updated now chapter 7
47.	6-15	Ch.6	6.4.1	Para 5	Replace Parthmik Vidhyalay with Primary Schools and Rajkiya Madyamik Vidhyalay with Govt. Secondary Schools.	Replaced and Updated now chapter 7
48.	6-18,19	Ch.6	Table 6-12 & Table 6-13	Mention year and population in table heading. The total is incorrect.		Updated now chapter 7
49.	6-22	Ch.6	Fig: 6-6	• The given map does not have color coding. • The title of the figure says in relation to residential zones but this relation is not established in the given map.		Updated now chapter 7
50.	6-22	Ch.6	6.5	Para 1	Description of existing utilities along with locations needs to be provided.	Part of Gap Assessment Report
51.	6-23	Ch.6	Fig: 6-7	The given map does not show clearly the location of utilities infrastructure. Also the utility needs to be shown in proposed landuse map.		Part of Gap Assessment Report
52.	6-24	Ch.6	Section 6.6	The given map does not show clearly the location of transportation facilities with proper boundary. There is no figure no. given which disturbs the subsequent figure numbering. Transportation facilities		Part of Gap Assessment Report

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
				need to be shown in proposed landuse map.		
53.	6-26	Ch.6	6.8	There is lack of clarity between commercial use and mixed use and their subsequent representation in related maps. Therefore, commercial use and mixed use zones need to be separated in terms of relevant sections and the respective location should be given properly.		Commercial and Mixed uses have a synergistic relationship and can be interchanged depending on the composition of a specific mixed use parcel
54.	6-29	Ch.6	6.8.2	Fig: 6-8	The given map does not have color coding.	Updated now chapter 7
55.	6-30	Ch.6	6.9.1	Para 2	Break up of 557 Ha needs to be provided.	Updated now chapter 7
56.	6-30	Ch.6	6.9	Table 6:20	The nomenclature needs to be changed as it is confusing. Also, location of District & Ecological Park sandwiched between District park along river needs to be justified/clarified.	This has been proposed to have a visual access between the IA and the River
57.	6-31	Ch.6	6.9.2	Fig:6-9	• The given map does not have color coding. • Green buffer is shown as park, clarification required.	Updated now chapter 7
58.	6-32	Ch.6	Table: 6-21	Green belt should be along all types of roads, except urban collector roads.		Explanation provided in 1
59.	6-32	Ch.6	6.10	List out activities permitted and permissible in PCB Area		Part of Sub Division Regulations
60.	6-33	Ch.6	6.11	The section on Height Density needs to be relooked at and needs discussions.		This is important from an Urban design perspective to maintain the overall image of the city
61.	7-1	Ch.7	7.2	Para 6	It is mentioned that refer figure below. But there is no figure related to the text.	Updated now chapter 8
62.	7-1	Ch.7	7.2	Para 6	It is mentioned that refer figure below. But there is no figure related to the text.	Updated now chapter 8
63.	7-2	Ch.7	7.2	Para 2	It is mentioned that refer figure below. But there is no figure related to the text.	Updated now chapter 8
64.	7-3	Ch.7	7.3	Para 2	The ratio mentioned in bullets is not reflected in street design figure.	Updated now chapter 8
65.	7-7	Ch.7	Table: 7-2 & 7-4	There is error in totaling.		Updated now chapter 8
66.	7-7	Ch.7	Fig: 7-7	Legend is not clear. The different types of rail corridors are not legible.		Updated now chapter 8
67.	7-7	Ch.7	Fig: 7-8	Full page image is required		Updated now chapter 8

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
68.	7-7	Ch.7	Fig: 7-9	Figure is not clear		Updated now chapter 8
69.	7-7	Ch.7	Fig: 7-10	• Figure is not clear. Freight priority roads are not shown.		Updated now chapter 8
70.	7-7	Ch.7	7.6.2	• All types of road category description should mention the respective green belts and show the same in respective road cross sections. • All road cross sections need to be revised in order to accommodate proper non motorized infrastructure like dedicated cycle tracks. In order to achieve this, it is suggested that Urban Road Codes by MoUD and Street Design Guidelines by UTTIPEC of DDA may be referred.		Already Explained, and updated as per relevant guidelines
71.	7-7	Ch.7	7.6.2	NH or SH	• NH ROW should be 150m including 30mt green belt on both sides • SH ROW should be 120m including 30mt green buffer on both sides. • Though, the text mentions freight priority road, it is not shown in corresponding figures.	Already Explained,
72.	7-20	Ch.7	7.6.2	45mt sub arterial freight priority roads	• ROW of freight priority roads should be increased to 60mt. • Fig: 7-21 should mention roads.	Updated now chapter 8
73.	7-24	Ch.7	7.6.3	Para 5	Text mentions following figure, which is the following figure?	Updated now chapter 8
74.	7-26	Ch.7	7.6.3	NH-65 and Spine Boulevard Junction	Figure no.'s mentioned in text does not match with the actual figure no.s	Updated now chapter 8
75.	7-29	Ch.7	7.8	Fig:7-29	• The figure is not legible • Directions should be given to all outgoing roads. • Nomenclature is required	Updated now chapter 8
76.	7-35	Ch.7	Fig:7-33 & 7-34	• The cross section in Fig:7-33 is wrong, check nomenclature.		Updated now chapter 8

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
					• What is the point of continuous 3mt wide street furniture and not providing dedicated cycle track? • Street furniture cannot be throughout the road length, it would be at strategic or intermittent locations	
77.	8-29	Ch.8	8.3.2	Figure:8-36	The legend color of residential does not match with the color in the figure	Chapter removed, relevant sections merged with Chapter 7
78.	9-3	Ch.9	9.1.4	Table:9-1	• The table serial no is incorrect. • 9 villages and not 8	Chapter removed and few contents are included in other chapters after discussion with officials of State government
79.	9-3	Ch.9	9.1.4	Para 3	• 9 villages and not 8 • Table:9-2 needs to be updated	Chapter removed and few contents are included in other chapters after discussion with officials of State government
80.	9-3	Ch.9	9.1.5	Table:9-2 Fig:9-1	• Map is not readable and the client name needs to be changed to DMIC • The total govt. land details are not properly explained.	Chapter removed and few contents are included in other chapters after discussion with officials of State government
81.	9-3	Ch.9	9.1.5	Fig:9-2	• The unit of DLC rates is not given	Chapter removed and few contents are included in other chapters after discussion with officials of State government
82.	9-7	Ch.9	9.1.7 & 9.1.8		• These two sections: either be removed or written in short	Chapter removed and few contents are included in other chapters after discussion with officials of State government
83.	9-10 to 9-38	Ch.9	9.2 to 9.4		These three sections to be removed	Chapter removed and few contents are included in other chapters after discussion with officials of State government
84.	9-41	Ch.9	9. 5	Table:9-14 to Tables related to	• Check with Table:6-1 • There are totaling errors	Chapter removed and few contents are included in other chapters after discussion with officials of State government

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
				phasing		
85.	There should be separate chapter (At Ch.3 or 4) in the beginning on existing social and physical infrastructure.					Included in the Chapter 4 in revised report
86.	10-1	Ch.10	10.1	Third Para	Remove concept word	Corrected and changed chapter no is 8 in the revised draft report
87.	10-2	Ch.10	10.1	Table 10-2	2022 water demand total is incorrect	corrected
88.	10-3	Ch.10	10.2.1		One water concept is not clear	This Concept means the inclusion of all stake holders in the analysis at a regional level with both urban and non-urban uses including agri, etc
89.	10-4	Ch.10	10.2.1	Last para	9 villages and not 8	Updated now chapter 9
90.	10-5	Ch.10	10.1	Table 10-4	Total population residing in IA is incorrect	Updated now chapter 8
91.	10-7	Ch.10	10.1	Table 10-7	2022 & 2032 water demand total is incorrect	Updated now chapter 8
92.	10-8	Ch.10	10.2.1	First para	Figure no. is incorrect	Updated now chapter 8
93.	10-8	Ch.10	10.2.1	Second para	Instead of “we have arrived” it should be written as “it was arrived”.	Updated now chapter 8
94.	10-10	Ch.10	Water Treatment Plant	• What is the status of the first para?? • It should be re written		rewritten
95.	10-17	Ch.10		Fig:10-6	The legend is not clear and same color has been used.	Updated Map provided in Annexure IV
96.	10-20	Ch.10	10.3		Check whether the policy needs to be updated.	Updated
97.	10-21	Ch.10	10.3.1	Table:10-14	The total is incorrect	Corrected
98.	10-22	Ch.10	10.3.1	Third para	• The proposed water storage tanks/reservoirs should be located on the map and these should not be named as ponds. • The existing ponds need to be located • Figure no. is not provided • Rediya river is misspelt	Maps revised and updated as Annexure I, II and III
99.	10-25	Ch.10			Figure no. and description is not given	Fig removed
100.	10-36	Ch.10		Fig:10-11	The legend is not clear and location of type of industries is incorrect	Maps revised and updated as Annexure I, II and III

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
101.	10-50	Ch.10	Table:10-33 and 10-34	The total is incorrect		Updated now chapter 8
102.	10-55	Ch.10	10.5.9	c. energy minimization	Needs to be re written.	Updated now chapter 8
103.	10-57	Ch.10	10.6	First para	Needs to be re written.	Updated now chapter 8
104.	10-61	Ch.10	10.7.5		Location map is required.	Provided as annexure IV
105.	Overall chapter 10, needs proper formatting, the maps and figures are not readable					Updated now chapter 8
106.	11-1 to 11-51	Ch.11	• The chapter needs to be removed from this report and the conclusion given in Section 11.12 should be replicated in Land use plan. • There are contradictions in section 11.12 and proposed land use plans. For eg; the location of industries and residential areas.			Chapter removed and relevant sections provided in Chapter 6
107.	12-2	Ch.12	12.1	Fig:12-1 & 12-2	• The maps and legend are not clear. • Dalpatgarh village boundary needs to be shown.	Chapter removed
108.	12-1	Ch.12	• The chapter needs to be removed from this report and the relevant sections need to be added in other chapters, for example: I. The sections on existing social infrastructure should be part of a separate chapter detailing out the existing scenario and this chapter should be at the beginning of the report at chapter no.3 or 4. II. The sections related to conclusions for requirement of social infrastructure should be part of proposed landuse plan (Chapter 6).			Chapter removed and relevant sections merged with Chapter 3 and 4. Conclusions are provided in Chapter 6.
109.	13-1	Ch.13	The chapter needs to be renamed as Development Promotion And Control Regulations.			Name Changed, now chapter 10
110.	13-2	Ch.13	13.1.3	What is the difference between Zoning map and Land use map? If same, then why different terminology.		Updated now chapter 10
111.	13-2	Ch.13	13.1.4	Definitions	• The given definitions need not be included in this report as these would be part of detailed building bye-laws • The relevant definitions have not been given such as: Landuse plan Permitted use Conditional use, etc.	Updated now chapter 10
112.	13-6 to 13-12	Ch.13	13.2		• The zoning regulations for each type of use zone are not provided in detail. • For example; the industrial use zone only gives details	Updated now chapter 10

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
					of type of industries but the ancillary activities permitted or conditional use have not been included.	
113.	13-12	Ch.13	13.2.7		• Building Byelaws need not be part of this report	Updated now chapter 10
114.	13-12	Ch.13	13.3		• Group Housing rules and norms need not be presented in this report	Updated now chapter 10
115.	Chapter No.14 & 15 need to be removed as these are not required in the Master Plan Report					Removed
116.	In addition to proposed landuse map the following maps also need to be provided along with the report: I. Town Map II. Existing Landuse Map III. Urban Area Map					I. Refer Annexure III II. Refer Annexure I III. Refer Annexure II
117.	There are repetitions of several sections such as "Early Bird Projects", "Critical Plan Components", etc. at several places in the report. This needs to be corrected.					Removed
118	<u>Comments on Proposed Landuse Map of Draft Development Plan Report for JPMIA</u> 1. The Legend should be bilingual (English and Hindi). 2. The symbols in the legend of the map do not match with the contents of the map in most of the categories and many symbols have same color which makes it difficult to distinguish between categories. 3. The existing roads have not been considered in the proposed landuse plan. This needs to be modified and the existing roads need to be incorporated in the proposed landuse plan. 4. There are lots of spelling errors in the map which needs to be corrected. 5. The proposed road width of different proposed roads has not been shown properly in the legend. This needs to be corrected. 6. The green buffer along proposed roads is not continuous on some roads and its width also differs on two sides of a same road. This needs to be corrected. 7. Many roads near the railway line are not continuous, these needs to be corrected and also, roads should be proposed on both sides of the railway line. 8. The existing nalas and drains seem to end abruptly, this needs to be corrected. 9. SH-65 needs to be shown properly as per other SH. 10. Names of major water bodies/ponds/rivers, etc. should be given. 11. The legend does not show existing roads this needs to be corrected. 12. Font size of "GAS" pipeline needs to be reduced. 13. Font size of "peripheral control belt" needs to be reduced and font style should be changed. 14. Grid lines of the map need to be removed. 15. Color of railway line should be changed. 16. The road network for existing abadi and abadi development area needs to shown.					1. Updated 2. Updated 3. Wherever possible existing roads have been used. Most of these are village roads and using these would have changed the overall layout of the plan. 4. Updated 5. Updated 6. Updated 7. Updated wherever required 8. Updated, please refer to the Drainage plan for details 9. Updated 10. Updated 11. Updated 12. Updated 13. Updated 14. Removed 15. Updated 16. Updated wherever required 17. Updated 18. Updated

Sr. No.	Page No.	Chapter No.	Sec No.	Para No.	Comments by DMIC Rajasthan on Draft Development Plan Report	Compliance by Consultant in the draft development plan report
	17. All the roads and railway lines going outside the notified area needs to show the direction. 18. Village boundary needs to be shown in the map. 19. Key map needs to be shown. 20. Title needs to be corrected.					19. Updated 20. Updated
119	In addition to the above mentioned comments, lot of corrections has been conveyed to the Consultants during discussions.					As per discussion report has been finalised, taking into account most of the suggestions as appropriate