Master Plan is a long term plan giving comprehensive guidance or instruction. This is a written document supported by illustrations and maps, containing spatio-economic development policies, strategies and general programmes of the local authority. Master Plan provides a policy framework for further detailing and serves as a guide for urban local authority in preparation of the development plan.

For a holistic and an all round development, it is necessary to prepare an integrated urban development plan for the Aizawl Urban Area. Else, isolated planning for individual urban area would lead to piece-meal and skewed development. A master plan for Aizawl Urban Area (AUA), if efficiently and equitably managed, will trigger collateral development of its adjoining hinterland mostly through ' trickling down effect'- which in turn will help raise the level of over all welfare in this part of the region directly, and all over the state indirectly.

FINAL PROPOSAL

## **Aizawl Development Authority**



Vision 2030

October 2012

Department of Architecture and Regional Planning Indian Institute of Technology Kharagpur



Department of Architecture and Regional Planning Indian Institute of Technology Kharagpur





Volume-II

## FINAL PROPOSAL

## Master Plan for Aizawl

**Vision - 2030** 







Off. :0389-2322150 (O) 0389-2322274 (O) Fax :0389-2322245 E-mail : cm-mizoram@nic.in

#### MESSAGE

Aizawl being the administrative, socio-economic, cultural and religious capital in Mizoram ensures its primacy in the State of Mizoram. Rapid urbanisation and tremendous migration to the city has been witnessed over the years resulting in the organic growth and scattered development of the city. In addition, the city of Aizawl has over the years failed to pay due regard to its environment and to the aspects of development management and sustainability. The organic growth of the city has been an outcome of the lack of any concerted planning process and the absence of any attempt at



integrating the various urban planning functions of the city. Aizawl today is riddled with the issues of traffic chaos, absence of landuse zoning, occurrences of landslides, encroachment on tree cover and congestion along the main spine of the city.

An executable Master Plan is the foremost critical step in addressing the interdisciplinary issues and relationships ailing the city. It is hoped that this policy document will be the framework of development to ensure a co-ordinated and planned process in the years to come and thereby provide a sustainable future to the city and its inhabitants.

I am pleased to introduce the Master Plan for Aizawl, Vision 2030 which outlines the direction for development in Aizawl over the next two decades and beyond. I hope the plan provides a significant level of clarity for the local community, government organisations, businesses, tourism interests and aspirations of all stakeholders regarding the proposals for the future of Aizawl.

As Chairman of the Authority, I congratulate the Aizawl Development Authority in their accomplishment and express my gratitude to Prof. B.K.Sengupta and his team of experts from IIT, Kharagpur.

(LAL THANHAWLA)

Dated Aizawl the 11<sup>th</sup> September, 2012.

जोडिनतुलांगा ZODINTLUANGA



MINISTER Taxation Urban Development & Poverty Alleviation Information & Communication Technology Sports & Youth Services Government of Mizoram

The previous Master Plan (2002-2011) for Aizawl has lost its relevance due to various constraints and thus a revision is overdue. The need, therefore, arises for a comprehensive policy document to provide the requirements of the projected population, while also addressing the issues of environmental concern and providing proposals for transit and transportation, housing, public utilities, education, recreation and community facilities, administrative and financial plans including directions for development control.



The salient features of the Plan include shifting of activities from the congested city core to the peripheral areas of the city by providing attractive infrastructure services to the proposed new areas; attempts to boost the economy of the region through the setting up of commercial centres and introducing recreational activities within the city; creation of a by-pass road on the western side of the city along with transportation proposals to provide significant developments in tackling the intra-city connectivity and thereby pave a way for the transition to an improved and dynamic Aizawl as a tourist destination and a hub for potential investors.

It is not out of place to mention here the painstaking efforts, diligent support and interactions between the Aizawl Development Authority and their consultants, the Indian Institute of Technology, Kharagpur, which had culminated in the publication of the Master Plan for Aizawl, Vision 2030. Further, public consultations and stakeholder participation have all along been ensured during the preparation process of the plan. However, it is to be noted that the success of the plan will depend on the comprehensive and sustained determined efforts by all stakeholders to realize the goals set forth in the Plan so as to ensure a quality life and better environment for the present as well as the future generations of the city.

ZODINTLUANGA Minister Urban Development & Poverty Alleviation Department

ROOM NO. 201, 1ST FLOOR, NEW SECRETARIAT COMPLEX, KHATLA, AIZAWL, MIZORAM-796001 (C) OFF. : 0389-2323211 FAX : 0389-2310083 E-MAIL : zralte@hotmail.com



"Sustainable Development for Better Aizawl" AIZAWL DEVELOPMENT AUTHORITY New Secretariat Complex, Khatla (Post Box.117) AIZAWL: MIZORAM \*\*\*\*\*

### ACKNOWLEDGEMENT

The primary objective of the Aizawl Development Authority (ADA), as spelled out in Section 6 of the ADA Act, 2005, is to promote and secure the development of Aizawl according to plan. Established in 2006, under the capable guidance of Mr. Lalfak Zuala IAS (Retd.), ADA immediately embarked on the preparation of a new Master Plan for Aizawl which would be operational and effective in addressing the unprecedented unplanned growth and haphazard development of the city of Aizawl, in addition to commencement of enforcing the Building Regulations in the city.



On 26<sup>th</sup> March 2007, the Department of Architecture and Regional Planning, IIT Kharagpur was duly appointed as consultants for the preparation of the Master Plan having vision till the year 2030.

The declared 'Aizawl Station Area' was taken up as the planning area for the Master Plan and termed as the 'Aizawl Urban Area (AUA), which is 23.82 sq km larger than the Greater Aizawl City Development Planning Area as stated in the ADA Act, 2005. The AUA covers up to Sihphir-Neihbawih in the North, Muallungthu in the South, Sairang-Sihhmui in the West and Zemabawk-Zokhawsang in the East and covers an area totaling 152.80 sq.km. With a present population of around 3.2 lakhs (2011 provisional census figure) which is more than 50 percent of the urban population of the state within the AUA, and the population in the year 2031 is projected to be around 8.2 lakhs.

The Master Plan sets out spatial strategy for the 10 planning zones, which conform to the then existing Assembly Constituency boundaries of 2008 and addresses the different characteristics and needs of each planning zone.

In compliance to Rule 6 of the Aizawl Development (Master and Zonal Development Plan) Rules, 2005 read with Section 10 of the Aizawl Development Authority Act, 2005, the Draft Master Plan was published inviting objections and suggestions from any person with respect to the draft plan within 60 days from the date of publication of the notice. Subsequently, as per Rule 8 of the above mentioned Rules, the Board of Enquiry and Hearing was constituted comprising of - R. Lalrinawma MLA, as Chairman, Rin Sanga IAS (Retd.), Er. Dunglena, Member Secretary, ADA and Town Planner Member, ADA as members for considering the representations and suggestions.

The Board conducted a total of 14 meetings, and after incorporating necessary revisions and reconsiderations arising out of the abjections and comments from interested parties, the final Master Plan for Aizawl, Vision 2030 has now been published in two volumes - investigations and surveys followed by analysis/inferences and projections thereof are contained in the Final Status Report which forms Volume I of the Master Plan, while Volume II comprises of policy recommendations and programs of development.

The Master Plan for Aizawl, Vision 2030 is essentially the outcome of the consultations, joint effort and cooperation of all stakeholders. As Member Secretary of the Aizawl Development Authority, I take this opportunity to acknowledge with gratitude the role of the Authority in rationalizing the Vision for Aizawl;

I extend my thanks to the UD&PA Dept and the PWD for providing both the administrative and technical support in all matters;

I extend my thanks to Mr. R. Lalrinawma MLA , Chairman of the Board of Enquiry and Hearing and all its members for their intense participation and continued interest in ensuring the completion of the Master Plan;

I would like to thank Prof. B.K. Sengupta and his team of experts on their professionalism and providing Aizawl with a meaningful and significant vision;

My special thanks to both Mr. Rin Sanga IAS (Retd.) and Er. Dunglena who have enthusiastically shared their experience and expertise all along the preparation of this document in spite of their busy schedules;

I acknowledge the hard work and dedication of Mr C.Lalmalsawma, Asst. Town Planner ADA and all his staff including the contribution made by those staff members of ADA presently transferred to the Aizawl Municipal Council.

Planning requires teamwork at various levels and needs to ensure that all stakeholders are consulted and sensitized with all the aspects and issues in the development process. Needless to say, the success and accomplishment of the Master Plan would largely depend on the proper coordination and integration of various line departments and other stake holders responsible for the various urban planning functions in line with the Master Plan. In addition, it would remain desirous to have a dedicated body/agency to be a responsible custodian and which should be duly empowered to undertake the next immediate follow up requirement of preparing Zonal Development Plans.

(NGHAKLIANMAWIA) Member Secretary Aizawl Development Authority

It is heartening that planned development and the role of planners are increasingly being recognised in our country. The Consultant Team in the Department of Architecture and Regional Planning IIT Kharagpur, appreciates the fact that the decision makers at the Government of Mizoram and the Aizawl Development Authority (ADA) were concerned and wished to draw a blueprint of development for the Aizawl Urban Area. The State Capital Region is having tremendous potentiality and opportunities for growth.

Aizawl Urban Area with an area of 152.8 sq km. and a population of around 3.2 lakhs (2011 provisional census figure) has experienced tremendous growth of urban activities in recent times – some in planned fashion and mostly in unplanned manner. Haphazard and unplanned growth tends to threat the vitality of this capital town, which now accommodates more than 50 percent of the urban population in the state. There is an urgent need to reverse this situation and give proper direction to the future growth of this capital town. Considering the importance of issue, Aizawl Development Authority (ADA) has been formed recently and initiative has been taken to prepare a Master Plan for Aizawl Urban Area.

The proposed Master Plan intends to arrive at an integrated and comprehensive development framework based on the existing status, future trends and intrinsic potential of the urban area and its adjoining hinterland. This planning initiative has been taken to create an economically and environmentally self-sustaining area with an optimal distribution of resources and provision of facilities for improved quality of life within a sustainable planning framework.

The Mizoram Government envisages provision of reasonable livelihoods and acceptable levels of livability to its urbanites within an environmentally sustainable framework. The focus of the State Government is on urban poor and other socially disadvantaged groups, including women and children, who are central to the development process. The State Government intends a spatially balanced development to evolve over time so that equitable opportunities are available for the citizens, especially the children who are the future urbanites.

The Vision 2030 will endeavor to provide a sustainable and operational framework for suitable strategies, policies, and priorities for resource planning to achieve the desired objective of socioeconomic and physical development of the people through enhancement of quality of life by providing equal access to improved social and physical infrastructure and proper planning and management of the development process by ensuring proper conservation of environment heritage and culture.

Aizawl is one of the most risk prone hill cities in India. The City is developing on a steep slope without extensive grading coupled with unidentification of undevelopable slopes which creates serious problems of slope stability and endangers to the surrounding area. Construction activities are totally uncontrolled in earthquake zone-V. Special studies and appropriate planning approach suitable for the hill town have been considered.

The entire exercise has stressed the need for participatory planning and has been drawn giving due weightage to the priorities and aspirations of the stakeholders. With the active participation of all the concerned departments, the Master Plan when implemented is expected to bring in balanced and holistic development in the region, open up major avenues of investment, trigger collateral growth, provide opportunities of employment, raise the quality of life of the people and boost the image of the region significantly.

The methodology for preparation of the Master Plan while following the statutory guidelines will comprise of three stages, .viz: .Stage 1: Investigation and survey, Stage 2: Analysis, Inferences and Projection. Stage 3: Policy Recommendations and Programmes of Development. This Master Plan Report is representing the Stage-3.

The Consultants would also like to put on record that the entire exercise would not have been in its present form without the whole hearted support of ADA and all the concerned departments, for collection of data and inputs from the experts, duly acknowledged elsewhere.

**Prof. B. K. Sengupta** Consultant In-charge

#### Project Team

Prof. S. Basu Consultant

Prof. S. Chattopadhyay Consultant

Prof. S. Sen Consultant

Prof. A. K. Gupta Consultant

Prof. T. N. Mazumder Consultant

Ms. Gitali Mandal Senior Project Officer

Mr. Prashob Raj Senior Project Officer















Aizaw	I Development Authority	Contents			
Maste	r Plan for Aizawl: VISION 2030				
		Page No.			
Fore	word				
Prefa	ce				
Ackn	owledgement				
From	the Planning Team				
Conte	nts	i - vi			
List of	Tables	i - vi vii - viii ix x xi - xii xiii - xxi 1-6 taken r Plan s for Hill Area development			
List of	Figures	ix			
Listof	Maps	x			
	viations	vi - vii			
Evoci	itivo Summany				
LXECU	luve Summary	XIII - XXI			
Chap	ter 1: Introduction	1-6			
1.1	Introduction				
1.2	Planning Efforts Undertaken				
1.3	Need for Aizawl Master Plan				
1.4	Five Guiding Principles for Hill Area developm	ent			
1.5	The Structure of Proposed Master Plan				
1.6	The Plan Process				
1.7	Observation on Existing Land Use				
1.8	Landslide Zonation of vacant land				
1.9	Planning Thrust on Developmental mechanisr	n			
Chap	ter 2: Study Area	7-10			
2.1	Administrative Jurisdiction				
Chap	11-18				
3.1	Population				
3.2	Population Density				
3.3	Population Projection				
3.4	Population allocation				
3.5	Economic Perspective				
3.5.1	Primary Sector Activities				
3.5.2	Secondary Sector Activities				
3.5.3	Tertiary Sector Activities				
3.6	Other salient goals				

#### **Chapter 4: Proposed Land Use Plan**

- 4.1 Master Plan Objectives
- 4.2 Identification of Developable Areas
- 4.3 Planning Methodology
- 4.4 Strategic Framework of activities
- 4.5 Factors considered for future zoning of land use
- 4.6 Concept of Zoning of Land Use
- 4.7 The Proposed Plan
- 4.8 Hubs and Corridors of Specialised Activities
- 4.9 Future Land Use Proposals
- 4.9.1 Residential Areas
- 4.9.2 Commercial Areas
- 4.9.3 Public/Semi-public Areas
- 4.9.4 Utilities and Services Areas
- 4.9.5 Industrial Areas
- 4.9.6 Recreational Areas
- 4.9.7 Traffic and Transportation Areas
- 4.9.8 Defense Land Areas
- 4.9.9 Agricultural/Forest Areas
- 4.9.10 Slopped Land/Undevelopable Areas
- 4.9.11 Rivers, Streams and Water bodies
- 4.9.12 Restricted Areas
- 4.10 Zone wise major land use proposals

#### **Chapter 5: Environmental Concerns**

- 5.1 Environmental Concerns Population Density
- 5.2 Objective
- 5.3 Recommendation for Environmentally Sensitive Areas
- 5.3.1 Soil Erosion and steep slopes
- 5.3.2 Forests
- 5.3.3 Water Resources
- 5.3.4 Air quality
- 5.3.5 Noise Impact
- 5.3.6 Earthquake

#### **Chapter 6: Transit and Transportation Plan**

- 6.1 Introduction
- 6.2 Basic Issues of Concern
- 6.2.1 Issues related to Regional connectivity
- 6.2.2 Intra-urban connectivity

## 19-30

Department of Architecture & Regional Planning, Indian Institute of Technology Kharagpur - 721302

ii

35-48

#### Aizawl Development Authority

#### Master Plan for Aizawl: VISION 2030

- 6.2.3 Future urban structure and its impact on trip characteristics
- 6.2.4 Transit facilities
- 6.2.5 Parking management
- 6.2.6 Safety issues
- 6.2.7 Freight Movement
- 6.3 Proposals and Recommendations
- 6.3.1 Proposed by-pass Road
- 6.3.2 Augmentation of the existing urban road network
- 6.3.3 Improvement and upgradation of the existing road network
- 6.3.4 Upgradation of pedestrian facilities
- 6.3.5 Management of parking supply and demand
- 6.3.6 Management of transit facilities
- 6.3.7 Management of freight movement
- 6.3.8 Restructuring of transport management mechanism
- 6.4 Conclusion

#### **Chapter 7: Housing Plan**

- 7.1 Introduction
- 7.2 Existing housing Status
- 7.3 Future growth directions
- 7.3.1 Housing requirement in AUA
- 7.3.2 Land requirement for future housing
- 7.3.3 Future housing locations
- 7.4 Rate of Urbanization A Profile
- 7.4.1 Mandate of Ministry of Housing and Urban Poverty Alleviation (HUPA)
- 7.4.2 Overview of the Rajiv Awas Yojana
- 7.5 Vision for Redevelopment of Slums
- 7.5.1 Slum Redevelopment Policy for AUA
- 7.6 Strategy for residential housing and land development
- 7.7 Land Management Techniques
- 7.7.1 Land Banking
- 7.7.2 Land Readjustment
- 7.7.3 Land Pooling
- 7.7.4 Land Sharing
- 7.8 Housing policies and programmes
- 7.8.1 Rental housing policy
- 7.8.2 Policy on Building Material
- 7.9 Some Emerging Concepts in Housing
- 7.9.1 FDI in Townships
- 7.9.2 Concept of SRZ and SRC
- 7.9.3 Low-Income Housing Tax Credit

#### **Chapter 8: Public Utilities Plan**

- 8.1 WATER SUPPLY
- 8.1.1 Introduction
- 8.1.2 Water Supply Scenario of Aizawl
- 8.1.3 Demand Gap Assessment
- 8.1.4 Proposals
- 8.1.5 Action Plan
- 8.2 SEWERAGE SYSTEM
- 8.2.1 The background
- 8.2.2 Existing Sewerage System
- 8.2.3 Wastewater management in 2031
- 8.2.3.1 Expected Sewage Generation in Aizawl
- 8.2.3.2 Special design considerations for hilly area
- 8.2.4 Proposals
- 8.2.4.1 Treatment Options
- 8.3 DRAINAGE
- 8.3.1 Existing drainage system
- 8.3.2 Water logging
- 8.3.3 Pollution and drainage maintenance
- 8.3.4 Proposals
- 8.4 SOLID WASTE MANAGEMENT
- 8.4.1 Quantitative assessment of MSW
- 8.4.2 Composition of SW
- 8.4.3 Collection and transportation system
- 8.4.4 Treatment and disposal of Solid Waste
- 8.4.5 Health hazards
- 8.4.6 Bio-medical Waste generation and management
- 8.4.7 Action plan for a sustainable SWM programme
- 8.4.8 Processing and Disposal of Solid Waste
- 8.4.9 Proposals for solid waste treatment
- 8.4.10 Hazardous/bio-medical waste treatment
- 8.4.11Financial management plan
- 8.5 POWER
- 8.5.1 The background
- 8.5.2 Availability of power
- 8.5.3 Power supply
- 8.5.4 Street lighting
- 8.5.5 Future Demand
- 8.5.6 Bottlenecks
- 8.5.7 Vision for Development of Electricity generation and distribution

8.5.8 Power Generation Technologies from Renewable Sources

8.5.9 Renewable Energy at Local Government Level

#### Chapter 9: Education, Recreation and Community Facilities Plan 97-116

- 9.1 Introduction
- 9.2 Hierarchy of Social Infrastructure
- 9.3 Educational facilities
- 9.3.1 Proposed Educational Facilities in Aizawl
- 9.4 Health care facilities
- 9.4.1 Existing Health care facilities
- 9.4.2 Proposed Health care facilities
- 9.5 Recreation & Open Space
- 9.5.1 Proposed Open Space, Playgrounds, Indoor Stadiums and Community Centers
- 9.6 Community facilities
- 9.6.1 Community halls
- 9.6.2 Community Libraries
- 9.7 Other social infrastructural facilities
- 9.7.1 Religious
- 9.7.2 Non Governmental Organisations and Associations
- 9.7.3 Proposed Other Social Infrastructural facilities
- 9.7.3.1 Postal services
- 9.7.3.2 Fire services
- 9.7.3.3 Police, safety and security
- 9.8 Vernacular Art and Cultural Heritage
- 9.8.1 Policies on Cultural Development
- 9.8.2 Policies on Development of Recreation
- 9.8.3 Proposed Cultural Hub Gateway to Aizawl
- 9.8.4 Policies on Development of Tourism
- 9.8.5 Developing Tourism Travel Circuits for integrating tourist destinations having a common theme
- 9.9 Heritage and Conservation
- 9.9.1 Existing Heritage & conservation
- 9.9.1.1 Historical monuments and important heritage sites of Aizawl City
- 9.9.2 Preservation initiatives by Cultural Departments & Organisations
- 9.9.3 Goals and policies

#### Chapter 10: Administrative Plan

- 10.1 Introduction
- 10.2 Strategy for Plan Implementation
- 10.2.1 Projectisation and Packaging the Projects
- 10.3 Organisational and Institutional Profile

V

123-128

129-148

- 10.4 Urban Governance
- 10.5 Legislation
- 10.6 Towards formulation of policy options for development
- 10.7 Conclusion

#### **Chapter 11: Financial Plan**

- 11.1 Introduction
- 11.2 Financing Urban Development
- 11.3 Innovative Options for Resource Mobilisation
- 11.4 Options for Land Resource Mobilisation
- 11.5 Revenue Financing Options
- 11.5.1 Non-Tax Revenue Generation through Commercial Development of Properties
- 11.5.2 Non Tax Revenue Generation through Innovative Land Planning and Development Control Regulation
- 11.6 Establishment of a Special Purpose Company (SPC) to Implement the Plan
- 11.7 Involvement of Private Sectors
- 11.8 Towards formulation of policy options for development
- 11.9 Conclusion

#### **Chapter 12: Development Control**

- 12.1 Introduction
- 12.2 The Proposed Plan
- 12.3 Regulations for land use zoning for natural hazard prone areas
- 12.3.1 Introduction
- 12.3.2 Land use zoning
- 12.3.3 Use zones
- 12.3.4 Non-conforming use
- 12.4 Regulations for Identification of Natural Hazard Prone Areas
- 12.4.1 Earthquake Prone Areas
- 12.4.2 Land Slide Prone Areas
- 12.5 Zoning Regulations
- 12.5.1 Introduction
- 12.5.2 Simplified Urban Land Use Zoning Regulations
- 12.6 Suggestions for development control in Planning Zone No -3 Aizawl: East I and Planning Zone No -4: Aizawl East II
- 12.7 Suggestions for development control along the Chanmari to Chaltlang and Bawngkawn to Durtlang roads
- 12.8 Other Development Control Guidelines
- 12.8.1 Building Regulations
- 12.9 Towards formulation of policy options for development
- 12.10 Conclusion

#### References

#### 149-150

vi

#### **List of Tables**

Table-1.1: Study area at a glance

- Table 1.2: Planning Zone-wise landslide susceptibility of vacant land
- Table-2.1: Aizawl Urban Area
- Table-2.2: Local Councils within Aizawl Municipal Council
- Table-2.3: Village Councils within AUA
- Table-3.1: Percentage Share of Area, Population and Household in different Administrative Jurisdiction
- Table-3.2: Population share of different planning zones in Aizawl Urban Area
- Table-3.3: Population density of different Planning Zones in Aizawl Urban Area
- Table-3.4: Planning Zone wise population allocation for 2031
- Table 4.1: Zone-wise normalized values on selected aspects of urban development
- Table-4.2: Percentage break-up of proposed urban and non-urban land use for AUA
- Table-4.3: Percentage break-up of proposed land use for AUA
- Table-4.4: Zone wise major proposals
- Table-4.5: Zone wise Proposed Land Use
- Table-6.1: List of intersections within core areas of AUA which require immediate attention
- Table-6.2: List of road links within core areas of AUA which require immediate attention
- Table-6.3: Important links requiring improvement in pedestrian facilities within AUA
- Table-6.4: Parking characteristics along selected links and recommendations
- Table-7.1: Future Dwelling Unit Requirement in AUA
- Table-7.2: Future Housing Area Requirement in AUA
- Table-8.1: General characteristics of surface water from Tlawng River
- Table-8.2: Percentage distribution of households by source of water
- Table-8.3: Percentage distribution of households by average hours of water supply per week
- Table-8.4: Percentage distribution of households by distance of source of water from house
- Table-8.5: Planning Zone wise demand of water in Aizawl
- Table 8.6: Split up for reusable water from STPs
- Table-8.7: Tentative location of STPs
- Table-8.8: Expected Solid waste Generation in 2031 for Aizawl urban area (AUA)
- Table-8.9: Performance evaluation of SWM scenario of Aizawl city
- Table-8.10: Quantification of the expected solid waste composition in different areas of AUA
- Table-8.11: Categories of Bio-Medical Wastes

Table-8.12: Treatment and Disposal Options of Bio-Medical Wastes

Table-8.13: Percentage distribution of households by availability of power

Table-8.14: Source of power supply

Table-8.15: Pattern of power consumption

Table 8.16: Phase wise demand of electricity in the planning zones

Table 8.17: Number of 11 KV substations required for AUA (2030)

Table-9.1: Hierarchy of Social Infrastructure

Table-9.2: Recommended Guidelines for educational facilities

Table-9.3: Zone wise existing and future (2030) no. of educational facilities and their area requirement

Table-9.4: Recommended Guidelines for Healthcare Facilities for Hilly Areas

Table-9.5: No. of existing Healthcare Facilities (2006) and additional requirement of facilities and recommended areas for 2030

Table-9.6: Recommended Guidelines for Open Space and Cultural Facilities in Hill Areas

Table-9.7: No. of existing Open Space (2006) and additional requirement of facilities and recommended areas for 2030

Table-9.8: No. of existing Indoor Stadiums and cultural facilities (2006) and additional requirement of facilities for 2030

Table-9.9: No. of existing Community Halls and additional requirement for 2030

Table-9.10: No. of existing community libraries and additional requirement for 2030

Table-9.11: Recommended guidelines for Telecommunications, Postal Services and Fire Service for Hill Areas

Table-9.12: No. of existing Postal Facilities (2006) and additional requirement of facilities and recommended areas for 2030

Table-9.13: Future requirement of Auditorium/Cinema Hall. Fire Service and Police Station

Table-9.14: Five best options of Site for Gateway to Aizawl

Table-9.15: Historical sites and structures (enlisted through local initiatives for inclusion in the list of protected monuments)

Table-9.16: Significant heritage structures & Precincts

Table-12.1: Land Uses Permitted, Permitted Under Special Consideration & Prohibited In Different Use Zones

Table-12.2: Maximum Permissible Floor Area Ratio (F.A.R.)

Table-12.3: Maximum Permissible Ground coverage

viii

#### **List of Figures**

- Fig-3.1: Population share of planning zones
- Fig-3.2: Comparative zone wise population density
- Fig-4.1: Share of urban and non urban uses in AUA
- Fig-4.2: Proportion of different proposed urban uses in AUA
- Fig-4.3: Proportion of different proposed land uses in AUA
- Fig-8.1: Percentage dependence of people of AUA on different water supply sources
- Fig-8.2: Percentage distribution of households in AUA by average hours of water supply per week
- Fig-8.3: Percentage distribution of households in AUA by distance of source of water from house
- Fig-8.4: Phase wise water requirement in various planning zones of AUA
- Fig-8.5: Percentage distribution of households by discharge of septic tank effluent
- Fig-8.6: The expected water demand and wastewater generation in Aizawl in 2007 and 2031
- Fig-8.7: Treatment chain for ASP sewage treatment plant
- Fig-8.8: Percentage distributions of villages by available systems of drainage
- Fig-8.9: Percentage distributions of villages by maintenance of open drains
- Fig-8.10: The expected solid waste generation in Aizawl in 2007 and 2031
- Fig-8.11: Composition of solid waste generated in Aizawl City
- Fig-8.12: Flowchart showing steps of co-composting process
- Fig-9.1: Planning zone wise existing and proposed educational facilities
- Fig-9.2: Planning zone wise existing and proposed healthcare facilities
- Fig-9.3: Planning zone wise existing and proposed playgrounds
- Fig-9.4: Planning zone wise existing and proposed parks
- Fig-9.5: Planning zone wise existing and proposed Community Welfare Centre
- Fig-9.6: Planning zone wise existing and proposed indoor stadiums
- Fig-9.7: Trade Fair Complex site selection
- Fig-9.8: Mc. Donald Hills, Zarkawt, Aizawl
- Fig-9.9: Memorial stone, Govt. Mizo Higher Secondary School, Chanmari
- Fig-9.10: Governmental buildings and bungalows by British

## List of Maps

- 1.1 Ten Planning Zones of AUA
- 2.1 Administrative Jurisdiction of AUA
- 2.2 Ward map of Aizawl Municipal Corporation
- 3.1 Existing Population Density
- 3.2 Existing & Proposed Population
- 4.1 Concept Plan
- 4.2 Proposed Land Use for AUA
- 4.3 Proposed Land Use for Aizawl North-I
- 4.4 Proposed Land Use for Aizawl North-II
- 4.5 Proposed Land Use for Aizawl East-I
- 4.6 Proposed Land Use for Aizawl East-II
- 4.7 Proposed Land Use for Aizawl West-I
- 4.8 Proposed Land Use for Aizawl West-II
- 4.9 Proposed Land Use for Sairang
- 4.10 Proposed Land Use for Aizawl South-I
- 4.11 Proposed Land Use for Aizawl South-II
- 4.12 Proposed Land Use for South Extension
- 6.1 Proposed Road Network
- 6.2 Intersections and Road Links Require immediate action
- 6.3 Conceptual Spine of Movement
- 6.4 Location of Truck Terminals
- 7.1 Future Housing Locations
- 8.1 Proposed Water Treatment Plants
- 8.2 Proposed Sewage Treatment Plant
- 8.3 Drainage Map
- 8.4 Proposed Solid Waste Treatment Plant
- 8.5 Existing Power Network
- 9.1 Proposed Social and Cultural Facilities
- 9.2 Significant Heritage Structures, Precincts and Areas

#### **Abbreviations**

ADA	: Aizawl Development Authority
ADPA	: Aizawl Development Plan Area
AIIHPH	: All India Institute of Health and Personal Health Hygiene
ASEB	: Assam State Electricity Board
ASP	: Activated Sludge Process
AUA	: Aizawl Urban Area
BMW	: Bio-medical Wastes
BOO	: Built-Operate-Own
BOLT	: Built-Operate–Lease-Transfer
вот	: Built-Operate–Transfer
BSUP	: Basic Services to the Urban Poor
CBD	: Central Business District
CLTC	: City Level Technical Cells
CREDAI	: Confederation of Real Estate Developers in India
DSS	: Decision Support System
FDI	: Foreign Direct Investment
GIS	: Geographic Information System
GSI	: Geological Survey of India
HUD	: Housing and Urban Development
HUPA	: Housing and Urban Poverty Alleviation
IHSDP	: Integrated Housing and Slum Development Programme
ILS	: Instrumental Landing Systems
JNNURM	: Jawaharlal Nehru National Urban Renewal Mission
KVA	: Kilo Volt Ampere
LAD	: Local Administration Department
LIHTC	: Low Income Housing Tax Credit Programme
MCDM	: Multi Criteria Decision Model
MHIP	: Mizo Hmeichhe Insuihkawm Pawl
MHWS	: Multipurpose Health Worker School
MPW	: Multipurpose Workers Scheme

## Contents

Master Plan for Aizawl: VISION 2030

MSWM	: Municipal Solid Waste Management
MUP	: Mizoram Upa Pawl
MZP	: Mizo Zirlai Pawl
NaREDCo	: National Real Estate Developers Consortium
NOC	: No Objection certificate
NMT	: Non-Motorized Transit
NT	: Notified Town
PHE	: Public Health Engineering
PHED	: Public Health Engineering Department
PPP	: Public Private Partnership
RAY	: Rajiv Awas Yojana
SC	: Secondary clarifier
SDD	: Special Development Districts
SEZ	: Special Economic Zones
SJSRY	: Swarna Jayanti Shahari Rozgar Yojana
SLTC	: State Level Technical Cell
SPC	: Special Purpose Company
SRZ	: Special Residential Zone
SRC	: Special Residential Corridor
STP	: Sewage Treatment Plant
TDR	: Transfer of Development Right
TPS	: Town Planning Schemes
UASB	: Up-flow Anaerobic Sludge Blanket
WTE	: Waste to Energy
YMA	: Young Mizo Association

#### Introduction

The First formal and statutory Master Plan in Mizoram, in accordance with provisions of Mizoram Urban and Regional Development Act 1990, was prepared for Aizawl Planning Area in 2002. After the Aizawl Development Authority (ADA) was setup in 2006, the Aizawl Planning Area was extended through a Gazette Notification. However, no blue print of development was prepared for the extended area. The Department of Architecture and Regional Planning, Indian Institute of Technology Kharagpur (IIT Kharagpur), was entrusted by Aizawl Development Authority to prepare the Master Plan for Aizawl: VISION-2030 so that a comprehensive strategy can be chalked out to make it a technologically viable and competitive modern city on the one hand, and save the city from landslide/erosion on the other. The VISION for development of Aizawl Planning Area aspires to be along the following lines:

- A destination for Trade, Commerce and Administrative functions by leveraging the existing regional resources along with upgradation of human skills
- A modern capital town of the North-Eastern region with the latest, state of the art infrastructure
- A centre for ecological tourism through promotion of the array of festivals, dances and handicrafts
- Self-sufficient in terms of all kinds of economic infrastructure

The procedure for preparation of the Master Plan for Aizawl as prescribed in the relevant Act and Rules is as follows:

**Preparation of Draft Plan:** Draft Plan is prepared and the same is published by issuing a public notice and inviting objections and suggestions.

**Local Authorities:** Local authorities within whose limits any land touched by the Plan is situated are given reasonable opportunities to make any representation with respect to the plan.

**Board of Enquiry:** A Board of Enquiry is appointed by the Authority for the purpose of hearing and considering any representation, objection and suggestion to the Draft Master Plan.

*Finalisation of the Master Plan:* The Authority, after considering the report of the Board will finalise the Master Plan.

**Approval of the Government:** The final Master Plan shall be submitted to the Government for approval.

**Seminar with Stakeholders:** In addition to the statutory requirements indicated above, it was considered necessary, in view of the importance of the Master Plan, to have as wide consultation as possible with various stakeholders.

The general land use breakup for Aizawl Urban Area show that the largest share of land use is vacant land (49.62%) followed by natural reserve 27%. Residential area is only 6.24% (953.92 ha) of the total Aizawl Urban Area.

Xİİİ

#### **Population and Economy**

Mizos are close-knit society with no class distinction and no discrimination on grounds of sex. Birth of a child, marriage in the village and death of a person in the village are important occasions in which the whole village is involved. As per 2001 Census, the population of Aizawl Urban Area (AUA) is around 2.61 lakhs with a gross density of around 1721 persons per sq. km. Aizawl Municipal Council has 93.27% of the entire AUA population, covering only 68.02% of the total AUA. Village Council Area has a population share of 6.73% of the entire AUA. Population for Aizawl Urban Area has been extrapolated assuming three types of growth rates and considering the population projections provided by the Economics and Statistics Department, Aizawl. Finally, the average of these four figures has been calculated for 2011, 2021 and 2031, which is around 3.82 lakhs, 5.60 lakhs and 8.20 lakhs respectively. Aizawl Urban Area is expected to have a population of 8.20 lakhs.

Aizawl, being the capital of Mizoram State, all the capital functions are the predominant economy of this city. Natural resources along with agro-climatic conditions offer opportunities for growing a variety of horticultural crops. There are good potentials for secondary sector activities i.e. small scale industries such bamboo crafts and readymade garments out of specially designed local handloom clothes, which could also be exported outside India. Presently, mineral exploration in Mizoram is only the recovery of hard rock of tertiary formation, which is mainly utilized as building materials and road construction work. Tertiary sector activities such as hospitality i.e. hotels and restaurants occupy the second position in the overall contribution to the economy sector followed by public administration and real estate business in Aizawl Urban Area. This area also serves as the heart of business and trading centre of the region. Apart from these, transport, storage and communication and other services form significant part of the economy.

The future perspective of economy recommends:

- All ten planning zones to have a future share of total projected population considering amount of developable land, natural growth as well as migration trend within the state.
- > More extensive development rather than intensive development of urban areas.

In view of the trend, a Work Force Participation Ratio of 46% has been adopted for AUA for 2031. The workforce in AUA in 2031 works out as 56%; considering additional 10% floating workforce, the total workforce in GMA works out as 4,00,000 approximately. It has to be acknowledged that the tertiary sector cannot singularly absorb the entire workforce in the AUA; the obsession towards white collared jobs has to be diluted by providing quality technical education and exposure pertaining to secondary sector and primary sector activities. The growth in opportunities in central and state government organizations cannot be sustained beyond a certain limit. Thus the workforce has to be channelized into more meaningful pursuits like similar tertiary sector activities or primary/secondary sector activities.

#### **Proposed Land Use Plan**

The large contiguous areas under 36 degree slopes, which are low and moderately susceptible from landslide point of view are identified and are linked with major transportation corridors. The higher order functions like administrative hub, institutes, satellite townships, utilities, commercial centres,

xiv

health facilities, industries etc. are placed in those areas and the basic proposed structure of the city has been envisaged.

Whereas Parks, playgrounds, gardens recreational areas which are open space based developments as well as wood lands and green belts are located in the range of 36 degree to 45 degree sloped area. Only lands which are high and very high susceptible to landslide are kept under no development use zone.

The Master Plan envisages allocation of land for urban uses like residential, commercial, public & semi-public, utilities and services, industrial, recreational, transportation and land under defense to meet the future requirements and proposed land use structure has been proposed accordingly. Out of 15280 hectares of Planning Area, 7009 hectares (45.87%) is earmarked under the different urban uses and rest 8271 hectares (54.13%) under non-urban uses like Agriculture and Forest, Water bodies and undevelopable Slopped Lands. In order to maintain an ecological balance and avoid land erosion such land use distribution has been proposed by the consultant. Moreover to cater for the demand for housing, residential use have been proposed as per the availability of developable land in planning area along by-pass road from Selesih-Durtlang-Muanna Veng-Thuampui to Falkland in the east, from Sihhmui-Sakawrtuichhun-Tanhril-Lawipu-Tlangnuam-Hlimen-Samtlang in the west and from Melriat-Kelsih-Falkawn to Muallungthu in the south. Out of total urbanized use, share of proposed commercial use is 2.66%. A new parallel CBD area has been proposed at Sakawrtuichhun to cater future demand of western corridor development. Institutes would come up at western side of planning area as well as medical and paramedical institutes at Falkawn area. State level and district level administrative hub has been proposed at Govt. Complex and New Secretariat Complex. Utilities and services and other social infrastructural facilities are proposed as per future requirements. In order to encourage local arts and crafts, and to introduce food processing, packaging industries and other eco-friendly small scale industries, an area of 103 hectares (0.68%) of planning area has been earmarked for industrial use. To boost Mizo ethnic culture and tradition, theme parks, regional parks, district parks, picnic huts, holiday resorts, shooting range, sports training center, open air theater, amphitheaters, camping sites have been proposed over 244 hectares proposed area. Many lateral upgraded and proposed roads will link western by-pass with central spine of the city. Many transportation hubs have been located in different strategic locations to provide good access to public transit facilities for existing as well as proposed dwellings.

#### **Environmental Concerns**

The objective of this plan is to protect Natural Resources and environmental quality that are important to the quality of life for Aizawl urban area, to facilitate conservation of resources, including a reduction of resource consumption and to protect environmental sensitive areas.

The greatest hindrance to development in the upland areas is the slope of the land and the increase in soil erodability associated with these slopes. To deal with this situation, development on slope more than 36 degree should be strongly discouraged. Along all major and minor fault lines development has been restricted. Around 52% of total urban area is kept under non-urban uses like Agriculture/Forest, Water Bodies, Undevelopable Slopped Lands. All along the river Tlawng an 800 m green belt on either side from the centre of the river has been kept reserved as per the Mizo District (Forest ) Act, 1955, section 14 read with section 21. Moreover, all along the major drainage channels, a 15 meters

## **EXECUTIVE SUMMARY**

#### Master Plan for Aizawl: VISION 2030

wide green buffer on both sides have also been recommended in the land use plan. Individuals can do a great deal to improve the water availability and ensure the water quality of their locality by practicing Rain Water Harvesting as a mandatory measure in all public buildings as well as judicial use of storm water for agricultural use. For this planning area, land use and transportation pattern that discourage single occupancy vehicle travel and encourage the use of alternative fuel are two most important components for achievement of better air quality standards. For this planning area, land use and transportation pattern that discourage single occupancy vehicle travel and encourage the use of alternative fuel are two most important components for achievement of better air quality standards.

#### Transit and Transportation Plan

Aizawl Urban Area's connectivity to the region is primarily via road – both for passenger and freight movement. Though rail connectivity is in pipeline and Sairang is being located for the proposed rail head of Aizawl, currently air travel is the main regional-level passenger interaction. Recently installed Instrumental Landing Systems improved air connectivity to Aizawl. The entry point to the town from the Lengpui airport demands significant improvement.

There has been a conscious effort to reduce the intermixing of local and regional traffic through the creation of bypass alignments and by creating a freight vehicle terminal outside the city limits.

The urban road network is severely capacity restrained – particularly due to its network layout structure as well as the rapidly growing dependence on private transit.

A significant part of the intra-urban movement is pedestrian in nature – mostly due to short trip distances and favourable climatic conditions. However, with increasing trip distances, conversion of pedestrian trips to vehicular trips will exhaust the network capacity further.

Transit facilities, both bus and para transit, play an important role in providing urban mobility. However, they also create significant hindrances to the traffic flow along the links. The vehicular carriageway acts as the para transit parking space as well as bus transit stoppage zone – thus impeding the link traffic flow and creating congestion.

In spite of huge volume of pedestrian traffic, most of the links and intersections do not have appropriate pedestrian footpath and crossing facilities. This decreases pedestrian safety as well as adds to the congestion woes of the traffic movement.

Rapidly increasing vehicle ownership, both 2-wheeler and 4-wheeler, has not only exhausted the capacity of the urban links but also exerted huge demand for parking, mostly in the form of on-street parking.

To improve the regional connectivity as well as accessibility to various planning zones within AUA, augmentation of the road network across various planning zones is proposed with connections to the regional linkages. A system of alternate road alignments has also been suggested which will provide bypass alignments to regional traffic movement without entering the congested core areas of AUA. Linkages to these bypass alignments has also suggested from strategic location within AUA. A list of intersections has been presented based on the observed traffic volume counts during peak traffic hours, where congestion indicators are beyond acceptable limits. A general set of recommendations is also listed following which can be suitably adopted to upgrade the intersections. A list of road stretches with existing pedestrian volume and facilities present has been listed with priority of

xvi

## EXECUTIVE SUMMARY

#### Master Plan for Aizawl: VISION 2030

intervention and certain measures to improve the pedestrian movement. Management of parking supply & demand, freight movement and re-structuring of traffic management mechanism is prescribed.

#### **Housing Plan**

The existing status of housing in Aizawl is influenced by two types of factors operating at different levels. At one level is the general factor of rapid urbanization, the breaking up of joint families to nuclear ones, leading to an increase in the demand for housing. At the second level, more specific to Aizawl, are the socio-economic factors, the tradition and customs, where it is reported that while homelessness is not a major concern in the Mizo community, having an independent house after marriage, is an important factor in the Mizo society.

This plan recommends:

Future housing requirement 84,614 + existing housing backlog (6700) + obsolescence (dilapidated) (5544) = 96,858 dwelling units  $\approx$  96, 860 dwelling units.

Total 4069 hectares area (26.62%) of planning area has been earmarked for gross residential use (including lower order non-residential facilities) to accommodate 8.2 lakhs people.

The total housing area required for projected population in AUA is around 1974 hectares (Net area).

In Aizawl West-I and Aizawl West-II, on about 700 hectares of land, a residential corridor has been proposed with High end housing, Institutions, campus style, studio apartment, government housing along with New Capital Complex CBD and mixed land use. This area has carrying capacity of around 1,80,000 population.

Around 500 hectares residential corridor at Neihbawih, Sihphir, Durtlang and Muanna Veng along proposed north-south roads from Neihbawih to Muanna Veng has been delineated with carrying capacity of 80,000.

At Zuangtui industrial estate, godowns and warehouses have been envisaged with reasonable number of workers houses and vocational and other training institutes.

In view of proposed State Level Medical Hub, a 300 hectare residential corridor has been proposed at Falkawn-Muallungthu-Melriat-Kelsih. Around 200 hectares housing area has been introduced at Lungleng with Cottage and small scale industries and along proposed western bypass, around 200 hectares housing area at Samtlang has also been proposed. This 700 hectare of housing area is to accommodate around 1,50,000 population.

#### **Public Utilities Plan**

Aizawl Water Supply scheme phase I is presently supplying 10.8 MLD of water and Aizawl water supply scheme phase II is designed to supply 24.1 MLD of water. Hence after the completion of Aizawl Water Supply Scheme phase II, the total quantity of water supplied will be 34.9 MLD. The water demand in 2031 is estimated to be around 149.24 MLD. Therefore it is essential to provide an additional minimum amount of 114.34 MLD water to meet the drinking water demand of Aizawl Urban

Area. Since the availability of ground water is less it would be better to make use of the available water from Tlawng and Tuirial Rivers.

Since it is necessary to provide sewage treatment facilities for 119.39 MLD of wastewater, a decentralized wastewater treatment system would be more appropriate. Keeping in view of the terrain characteristics and smaller road width, it is proposed to divide Aizawl into 9 sewage centers with individual treatment plants.

It is proposed that the existing drainage alignment within urban area be made permanent and also the natural drainage system be improved and protected with treatment facilities at the outfall points to reduce the pollution from storm water which is found containing domestic effluents. The main open drainage channels for the various drainage basins within the urban areas are to be properly aligned to provide efficient drainage network. Check dams are introduced to store spring/ rain water at suitable locations.

The developmental pattern of all the areas, especially the urban centers under Aizawl city demands the implementation of an integrated solid waste treatment system. It is felt that only a decentralized MSWM system could help solve the seemingly intractable problem of solid waste treatment in this area in an economically viable, socially desirable and environmentally sound manner.

The solid waste production in Aizawl would be around 410 MT/d in 2031 out of which the organic or biodegradable portion is 198 Mt/d. So the solid waste management system may be decentralised by providing 9 aerobic co-composting plants and four disposal sites following windrows method at the proposed sewage treatment plant (STP) sites.

*In* 2030, 164 MVA power is required for proposed population including domestic, commercial, industrial and other requirements.

#### Education, Recreation and Community Facilities Plan

According to the Scalogram analysis for distribution of social facilities, South Extension, Aizawl E II and Sairang are quite deficient in various types of social infrastructure facilities. In a nutshell, planning zones lying on the outer boundary of the urban area are deprived of basic social infrastructure which needs to be addressed in accordance with projected and proposed population distribution in various parts of the urban area.

Existing facilities show that except in planning zones of Sairang, West II and South Extension, there is not much shortage in number of schools at any level. On an average the shortage is not a quantitative one. However, there is need for qualitative improvement of existing educational facilities especially at school level. It is recommended that existing Secondary Schools/ Middle Schools be upgraded to High Secondary Schools if the situations permit so. There is lack of higher level educational facilities in Aizawl East II, Sairang, Aizawl South-II and South Extension. This has been taken care of in the proposal by providing adequate number of colleges in these areas.

It is being proposed to have at least one technical college or polytechnic at each planning zone. Indian government is encouraging establishment of Community Colleges for capacity building and vocational training. This programme can be integrated in AUA and necessary facilities be created and land allotted for the same.

xviii

## EXECUTIVE SUMMARY

#### Master Plan for Aizawl: VISION 2030

One Medical College has been proposed in Aizawl South Extension to cater to the entire state.

A Medical Hub is proposed at Falkawn (Planning Zone 10) where a Referral Hospital is already in existence. Considering the future population growth as proposed, it is important to have more number of primary health centres and dispensaries in AUA within easy reach of people. As per population threshold, number of general hospitals is quite satisfactory for most of the divisions. In West II, two more hospitals are proposed.

A requirement of at least one indoor stadium for every 10.000 people has been taken as a guideline for future proposal. Present premises of Assam Rifles, proposed to be shifted elsewhere has been proposed as one of the locations for city level recreational facilities and open space. Larger play grounds are required in North Aizawl, East Aizawl and West Aizawl.

Other social infrastructures like postal services, fire services, community and recreational halls, library, etc. are also proposed planning zone wise. At local level, each neighbourhood must have religious and congregation facility. Detail zonal plan must take care of provision of such facility as per specific requirement.

Aizawl has a rich tradition of cultural heritage both colonial and vernacular. Traditional crafts and art form have much more potential to promote Mizoram as an important tourist destination. With well structured rejuvenation policy and management guidelines, these crafts, festivals, performing arts can be projected at national and international forums.

In the proposal, places have been identified for development and promotion of tourism and recreational facilities. Tourism circuits have been proposed in accordance with existing and potential places of tourist interests.

For protection and preservation of traditional cultural edifices, natural sites and colonial heritage, it is recommended to form a Heritage Cell as an integral part of the Planning Department. Heritage Cell will be responsible for documentation, enlisting and preparing special byelaws for the enlisted structures and precincts

With appropriate policy guidelines and heritage management, the cultural resources of AUA can boost local economy, highlight the past heritage, promote tourism and also be able to play crucial and meaningful role in projecting Aizawl's cultural identity.

#### Administrative Plan

The establishment of appropriate organisational/institutional set up along with procedural layout is as important as finances. The set of organisation/institution would need to work in a coordinated manner so that the proposed initiatives from project conception, formulation, financing, execution and operation and maintenance through the project lives can happen as conceived or visualised.

The concerned agencies in the Aizawl Development Plan Area (ADPA) will be Aizawl Development Authority (ADA), Aizawl Municipal Council and Village Councils.

Coordination among various agencies for providing infrastructure and services in the urban areas requires consideration on priority. Execution has to be done in a planned and coordinated manner.

There is an evident need to re-strategise and streamline the responsibility of the functions of the participating agencies.

The Proposed Master Plan should look into:

- The Village Councils must augment their status of Governance and strengthen capacity building.
- It is expected that some of the non-municipal areas will attain municipal status.

The National Action Plan for Good Urban Governance (Government of India & UNCHS) with specific focus on Participatory Planning Process along with strengthening the local bodies have been accepted and adopted by the State Governments.

#### **Financial Plan**

Traditionally Aizawl has been funded through budgetary support of Central, State Government, N-E Village Council and local bodies through five-year plans and the annual plans. These resources have in some cases been supplemented by assistance from sources such as World Bank, multilateral agencies such as ADB, DFID and UNICEF etc as partly grants and partly as loans. The domestic financial institutions like HUDCO, HDFC and NHB have also provided financial assistance for urban infrastructure development projects. ICICI, IDBI, UTI and commercial banks have also made forays into the sector with their urban infrastructure portfolios. However, with the process of economic liberalisation being in practice throughout the country, the public sector resources are becoming increasingly scarce.

On the other hand, domestic financial institutions lay emphasis on financial viability of projects, which is hardly possible for most of the basic services infrastructure projects to match. Assistance from international donor agencies is also appearing hard to come by. In this context, exploring alternative sources of financing capital investment is the major option left.

Infrastructure financing requires long-term lending, whereas the normal borrowing in the Indian capital and debt market is short-term only. Financial Institution would need a mix of resources and balanced combination of lending portfolio constituting both long and short-term fund. Some such suggested mechanisms are listed below.

- a) Effective utilization of JNNURM fund for development of Planned Infrastructure
- b) Development Authority Bond or Municipal Bond
- c) Project Initialisation fund / Project Development Fund
- d) Special Economic Zone
- e) Public Private Partnership (PPP)
- f) Introduction for Freight Charge or Toll Tax
- g) Introduction of Land Development and or Development Charge
- h) Rationalisation of Excise and Sales Tax

ΧХ

- i) Enhancement of Vehicle Tax
- j) Parking Fees
- k) Land use conversion Charges etc.

Any capital investment expenditure calls for meeting, on recurrent basis, the requirement of funds for debt servicing, operation and maintenance and capital replacement reserve. Some of the innovative instruments are fees/charges/tax on infrastructures like water supply, sewerage, solid waste management, roads, terminus etc. and property.

Non-tax revenue generation through commercial development of properties like build and lease, sell land for private development, public-private joint development etc. Non tax revenue generation through innovative land planning and development control regulation like creation of special development districts imposition of development impact fees in the SDD, utilisation of transfer of development right imposition of user charges.

#### **Development Control**

Hill towns must formulate guidelines to regulate development of all kinds including construction activities in view of the carrying capacity, slope, physical threshold, environmental, ecological and heritage imperatives.

The land use pattern of Master Plan for Aizawl Urban Area should accommodate the dynamic growth of the planning area using land efficiently in a planned manner, fulfilling the conservation obligation. The salient features of the land use policy should adhere to the requisites of environment. The current thinking is in favour of flexible land use, which reaps the synergies between workplace, residence and transportation and also between complementary vocations. Ideally, land use should be responsive to the dynamics of the market.

In Aizawl Urban Area we have followed both the UDPFI and Manipur Gazette land use classification and customized as per availability of use area in this study area.

The proposed Aizawl Urban Area is comprised of Residential Use Zone, Commercial Use Zone, Public and Semi – Public Use Zone, Utilities and Services Use Zone, Industrial Use Zone, Recreational Use Zone, Transportation Use Zone, Defense Land, Restricted Use Zone, Agricultural and Forest Use Zone, Slopped Land/Undevelopable Use Zone and Rivers/Streams/Water bodies Use Zone.

A broad description of the proposed land use zones according to 'Activities/Uses Permitted', 'Permissible on application to Competent Authority (with conditions)' and 'Activities/Uses Prohibited' has been proposed.



# Chapter- 1

# INTRODUCTION



## 1.1 Introduction

Aizawl, the capital city of Mizoram, is the political, commercial, educational and cultural hub of the State. Its strategic location, pleasant climate, hilly topography and enchanting landscape along with high concentration of amenities and facilities have attracted many people from its nearby villages, giving rise to a fast growing city of today. The Aizawl Urban Area (AUA) is located on the north-west part of Aizawl district of Mizoram, covering an area of 152.80 Sq.km. The total population of the area in 2001 was 2,61,078, which was 29.38% of the total State population. The planning area is principally urban in nature. As per census 2001, 94.90% of total population is urban. About 56.18% urban population of the State resides here. Decadal population growth (1991-2001) is high (46.49%) compared with State (28.80%) and district (33.45%). The Literacy rate of AUA (97.49%) is higher than the State's average of 88.8%, which is the second highest figure in India.

	Mizoram	Aizawl District	AUA	% Share in State
Total Population	888573	325676	261078	29.38
Decadal Population Growth (1991-2001)	28.80%	33.45%	46.49%	-
Urban Population	441006	248145	247757	56.18
%age of Urban Population	49.63	76.19	94.90	-
%age of ST Population	94.46	93.23	93.07	28.95
Sex Ratio	935	952	963	-
Percentage of Child Population to total	16.18	14.19	13.77	25.02
Literacy Rate (age 7+ years)	88.8	96.51	97.49	-
%age of Workforce	52.57	50.04	46.72	26.11
No. of Total Households	176134	64753	51230	29.09
Urban	89183	49160	48655	54.56
Rural	86951	15593	2575	2.96
Household Size	5.0	5.0	5.1	-
No. of Local and Village Councils	707	109	92	-
Area Under Jurisdiction (sq. km.)	21081	3576	152.80	0.72
Density (person/sq. km.)	42	91	1708	-

#### Table-1.1: Study area at a glance

Source: Census of India, 2001

## 1.2 Planning Efforts Undertaken

First formal and statutory Master Plan in Mizoram, in accordance with provision of Mizoram Urban and Regional Development Act 1990, was prepared for Aizawl Planning Area in 2002. The proposals of Master Plan were envisaged for the year 2011. The 2002 Master Plan was prepared for old Greater Aizawl Plan Area covering 128.98 Sqkm. All sector wise plan projections were prepared to accommodate future population of 3,02,576 expected to be in 2011. As per the provisional census, the AUA have only reached 3,12,495 in the year 2011.

Subsequently, in order to implement the Development Plan, Aizawl Development Authority (ADA) was constituted in the year 2005. In 2005, new areas in the south (namely Falkawn, Kelsih, Lungleng I, N. Lungleng, Muallungthu, Samtlang, Melriat (Thingdawl), Hualngohmun) and new areas in the west (Sairang, Sihhmui, Sairang Dinthar,) were added to the older planning area making the total area to 152.80 sq.km. So it was necessary to prepare a new Master Plan including the newer areas, which could guide as a controller of urban development for longer period.

2002 Master Plan provides a broad flexible land use plan to be valid for a period of 10 years. 2002 Master Plan clearly mentioned about re-densification (from high density to medium density) at core

city area and high density development at western part of the planning area where ample amount of developable land is available. Vision 2030 Master Plan prepared now for a period of 25 years also envisages the same concept of de-centralization. In the Vision 2030 Master Plan, land use plan, transit and transportation plan, infrastructure plan was prepared with an expected 8.2 lakhs population. All the development proposals have been shown in 1:2,500 scale map in GIS platform which will help to implement the plan, where as 2002 Master Plan was not in a detailed scale. 2002 Master Plan also spoke about circulation plan with improvement of road junctions and intersections, widening of existing road, development of bypass/ring roads and new roads to inter-relate and facilitate residential, commercial, industrial, public semipublic and other utilities and services. However ropeway proposal in the 2002 Master Plan but it has limitation. Future of Aizawl requires a long term visionary Master Plan. Vision 2030 Master Plan will be fulfilling the changing requirement of future population within the Aizawl Urban Area and thus enhance the quality of life.

## 1.3 Need for Aizawl Master Plan

The Aizawl Development Authority Act, 2005 envisaged constitution of the Aizawl Development Authority with the object of **promoting and securing the development of Aizawl according to plan.** To achieve this object, the Act provides for preparation of a Master Plan for Aizawl which shall define the various planning zones into which Aizawl may be divided for the purpose of development and indicate the manner in which the land in each zone is proposed to be used so as to serve as a basic pattern of framework for a meaningful growth of the Capital City. The present Master Plan, prepared by the Town & Country Planning Wing of the State Government, has lost its relevance. To achieve the objective of promoting and securing the development of Aizawl according to plan, a new Master Plan for Aizawl has to be prepared under the provisions of the Aizawl Development Authority Act, 2005.

In the absence of effective urban legislation by appropriate municipal authority Aizawl suffered from haphazard growth of its physical condition, by emergence of slum-type hutments, encroachment on forest land and precious green cover, up-coming structures on nallahs spreading dirt and filth, intrusion of commercial activity, traffic chaos, confusion in tourism industry, inefficient service infrastructure, overcrowding of institutional area and congestion in prime locations have all led to the emergence of a concrete jungle. Therefore, a comprehensive strategy has to be chalked out to make it a technologically viable and competitive modern city.

The Master Plan will pave way for a healthy, wealthy, safer and vibrant Aizawl, attracting tourists of all kinds from all over the world and would accommodate, *inter alia*, all sorts of private investors who intend to settle in it as well as in its surrounding environs. In view of the fact that most of the physical thresholds of Aizawl have already been reached, there is no option other than to go in for at least a counter magnet by the year 2030 at another strategic locations. The new Master Plan will be devised for the year 2030 in order to orient it in accordance with the changing requirements and aspirations of the people of Mizoram.

- 2 -

## 1.4 Five Guiding Principles for Hill Area development

For all practical purposes the Master Plan is the most powerful public policy document that a Development Authority has to prepare to guide future growth and development and meet the needs of its community. Therefore, all the policies must be strong enough to withstand challenges from many directions as well as flexible enough to implement approaches or tools that can adapt to changing circumstances and hence should be meaningful enough to provide sage advice to local council, village council, planners, and the town's residents throughout the 25-year planning horizon.

Thus for all such hill area master plans the overall Guiding Principles should be intended to provide the citizen with clear guidance and direction for the planning policies and make sure that these public policies / decisions are based on what is best for the public good. If our planning principles are based on a solid foundation then the planning policies and decisions we make will be that much stronger. After several meeting with various stakeholders, a set of Guiding Principles were adopted while drawing up the proposed plan as stated below:

#### 1) Complete Communities

- Create an integrated, vibrant and diverse community that provides a mix of land uses, including a balance of housing, employment, community services, parks and open spaces.
- Direct growth to built-up urban areas with existing infrastructure and services in a network of centers and corridors.

#### 2) Environment

- Protect and enhance natural environmental systems, functions and resources over the long term.
- Incorporate and promote sustainable development practices and initiatives.

#### 3) Economy

- Promote economic vitality and provide for a balanced and diverse range of employment opportunities.
- Protect employment areas over the long term.

#### 4) Place-making

- Recognize and enhance the inherent and unique aspects of Aizawl hills and create focal points, gateways, experiences and landmarks.
- Strive for design excellence in the public and private realm.

#### 5) Connectivity and Mobility

- Plan for transit and pedestrian oriented development.
- Promote connectivity, mobility and accessibility within and between neighbourhoods, employment areas, parks and open spaces.

#### - 3 -

## 1.5 The Structure of Proposed Master Plan

The Master Plan for Aizawl is designed to have the following features:

- Planning horizon which is foreseeable and achievable, i.e., 25 years,
- The plan seeks to integrate infrastructure requirements and environmental concerns together with land use pattern and regulation of the same,
- The plan derives the vision, objectives and targets from socio-economic needs and quality of life as articulated by the response of the people of Aizawl during interaction with stakeholders and survey,
- The plan focuses on resources available, and seek to balance needs and priorities with available resources,
- Involvement of multiple stakeholders in such planning to ensure a shared and commonly owned development objective and plan of action,
- Institutional reforms and capacity enhancement measures of local bodies or other civic agencies, as integral to such plans.

## 1.6 The Plan Process

The procedure for preparation of the Master Plan for Aizawl, as prescribed in the relevant Act and Rules, is as follows:

**Preparation of Draft Plan:** Draft Plan is prepared and the same is published by issuing a public notice and making a copy thereof available for inspection and inviting objections and suggestions from any person with respect to the draft plan before a prescribed date.

**Local Authorities:** Local authorities within whose limits any land touched by the Plan is situated are given reasonable opportunities to make any representation with respect to the plan.

**Board of Enquiry:** A Board of Enquiry is appointed by the Authority for the purpose of hearing and considering any representation, objection and suggestion to the Draft Master Plan.

**Finalisation of the Master Plan:** The Authority, after considering the report of the Board, will finalise the Master Plan.

Approval of the Government: The final Master Plan shall be submitted to the Government for approval.

Seminar with Stakeholders: In addition to the statutory requirements indicated above, it was considered necessary, in view of the importance of the Plan, to have as wide consultation as possible with various stakeholders. A Seminar was, therefore, organized jointly by the Aizawl Development Authority and the IIT, Kharagpur (Consultants) to discuss the concept of the proposed Master Plan and the same was inaugurated by the then Chief Minister and attended by representatives of various concerned Departments of the Government, NGOs, Churches, Local Councils, Village Councils, and prominent individuals. Another Seminar was organized to discuss the Draft Master Plan which was inaugurated by Chief Secretary and again attended by the stakeholders mentioned above. The views

- 4 -

expressed in the Seminar were taken into consideration while preparing and finalising the Proposed Plan.

### 1.7 Observation on Existing Land Use

The State of Mizoram had a total of 22 urban settlements in 2001, of which the Aizawl city is seen to dominate the entire settlement distribution, both demographically and functionally. The urban settlements in Aizawl Urban Area have mainly developed at the higher levels of ridges with a linear shape of settlement pattern mainly concentrated along the National and State highways. The structural pattern of the Aizawl Urban Area is showing growth towards the north-west (Sairang) due to NH-54 and Tanhril, Sakawrtuichhun due to availability of developable land. Another agglomeration along the State highway in the south direction, i.e., Muallungthu Agglomeration has developed very sparsely, in view to the better infrastructural facilities envisaged for this region in the near future. The general land use breakup for Aizawl Urban Area show that the largest share of land use is vacant land (49.62%) followed by natural reserve 27%. Residential area is only 6.24% (953.92 ha) of the total Aizawl Urban Area. Planning Zones having residential area more than 1 sq. km. are North-I, North-II, South-II, West-I and West-II. The corresponding residential land use percentages of the individual Planning Zones areas are 4.56%, 14.89%, 3.96%, 10.59%, and 7.94% respectively. The major share of population is in Aizawl East-I and Aizawl East-II which have 42.75% and 39.84% of residential area respectively. Other non-residential land use categories like commercial, public-semi public are mainly concentrated in Aizawl East-I, East-II, South-I.

## 1.8 Landslide Zonation of vacant land

It was observed that out of the total vacant land available in Aizawl urban area, 31.17% falls under Low and Very Low landslide susceptibility category, 54.17% fall under Moderate landslide susceptibility category, 11.25% fall under High landslide susceptibility category, and a mere 3.4% falls under Very High landslide susceptibility category. Amongst all the 10 Zones, Aizawl North-I and Aizawl South-II account for a largest share of vacant land (1701.3 ha and 1558.07 ha respectively) of which 12.39% and 12.83% of the total AUA vacant land fall under moderate landslide susceptibility category and only about 2.73% and 3.47% of AUA vacant land under High landslide susceptibility category. Other Zones have vacant land varying from 0.17% to 9.7% in Moderate landslide susceptibility categories. With respect to very low and low landslide susceptibility categories (slopes less than 18<sup>0</sup>), Planning Zones Sairang and Aizawl North-I have 6.7% and 6.24 of AUA vacant land (508.46ha and 473.14ha respectively). Other planning zones that contribute significantly to Low and Very Low landslide susceptibility categories are Aizawl West-II (5.83%), South Extension (3.99%), Aizawl South-II (3.22%) and Aizawl West-I (2.78%).

	Slope Area (Ha)						
Planning zone	< 5 <sup>0</sup> (<9%)	5 <sup>0</sup> - 18 <sup>0</sup> (9-32%)	18 <sup>0</sup> - 36 <sup>0</sup> (32-72%)	36 <sup>0</sup> - 45 <sup>0</sup> (72-100%)	> 45 <sup>0</sup> (>100%)	Total Vacant Land (Ha)	% Area of vacant land of AUA
[1] Aizawl North I	25.01	448.13	939.15	206.78	82.22	1701.30	22.44
[2] Aizawl North II	10.62	80.78	211.26	52.89	23.53	379.07	5.00
[3] Aizawl East I	0.30	6.19	40.41	8.12	1.75	56.76	0.75
[4] Aizawl East II	0.50	5.37	12.66	1.67	0.23	20.43	0.27
[5] Aizawl West I	11.54	199.77	246.55	41.68	6.67	506.20	6.68
[6] Aizawl West II	34.36	407.45	564.62	95.38	15.13	1116.93	14.73
[7] Sairang	85.57	422.89	180.02	14.90	5.62	709.01	9.35
[8] Aizawl South I	4.79	72.66	204.85	46.88	16.95	346.13	4.57
[9] Aizawl South II	15.91	228.15	972.32	262.94	78.76	1558.07	20.55
[10] South Extension	31.78	271.16	735.27	122.01	27.15	1187.37	15.66
AUA	220.37	2142.54	4107.11	853.24	258.01	7581.27	100.00
% Area of Vacant Land	2.91	28.26	54.17	11.25	3.40	100.00	

Table 1.2: Planning Zone-wise landslide susceptibility of vacant land

## 1.9 Planning Thrust on Developmental mechanism

The fact that most of the physical thresholds of Aizawl have already been exhausted and there is no option than to go in for at least a counter- magnet by the year 2030. At strategic locations proposals for residential hubs and residential corridors have been made. Besides a Counter magnet all the local councils and village councils in Aizawl region, particularly along the Highways are required to be strengthened, well planned and developed in terms of services infrastructure. In order to safeguard Aizawl city from landslides, which has a lot to teach the coming generations, planners, architects, engineers, heritage lovers and environmentalists, a visionary authority, with adequate spatial planning know how which can revolve its resources and implement vital provisions by harnessing appreciation of land values, is inevitably required to be in place for implementation of this development plan. This Plan also envisages for restricted land acquisition and massive public-private participation by collective involvement of Development Authorities, Local Councils, Village Councils, Panchayats, Revenue Department and services infrastructural departments.




# Chapter- 2

# **STUDY AREA**



# 2.1 Administrative Jurisdiction

Aizawl, the capital city of Mizoram, is the political, commercial, educational and cultural hub of the state. Today, it houses all important government offices, the State Assembly house and the civil secretariat. It also offers some worthwhile visiting spots including some beautiful churches and markets.

The Aizawl Urban Area (AUA) has been constituted in 2005 as declared under Notification No. J-12011/71/2001-REV, dated 8<sup>th</sup> March 2005. AUA consists of 82 Local Council and 14 Village Council areas. The total planning area equals to 152.80 Sq.Km., out of which 103.94 Sq.Km., i.e. 68.02% of total land area of AUA is under Aizawl Municipal Council, and another 40.44 Sq.Km. (26.47%) area is under Village Council Area and the remaining 8.42 Sq.Km. area is under Special Area (Table-2.1). Aizawl Municipal Council comprises of 82 Local Councils and Village Council Area comprises of 14 Village Councils (Map-2.1; Table-2.2, 2.3). All the 82 Local Councils are distributed within 19 Wards (Map-2.2, Table-2.2). The total population of AUA is 261078 as per Census 2001 and they live in 51230 Households. The sizes of population and number of Households have shown wide difference between the Aizawl Municipal Council and the Village Council Area of AUA. The total population under Aizawl Municipal Council is 243509, which is 93.27% of the total population of AUA.

		Population		% Share of 2001	Area Under
SI. No.	Administrative Unit	1991	2001	Population in AUA	Jurisdiction (sq. km.)
	AUA	178219	261078	100	152.80
i	Aizawl Municipal Council	158901	243509	93.27	103.94
ii	Village Council Area	19318	17569	6.73	40.44
iii	Special Area	-	-	-	8.42

#### Table-2.1: Aizawl Urban Area

Source: Census of India, 2001

#### **Table-2.2:** Local Councils within Aizawl Municipal Council

SI. No.	Local Council	2001 Census Population	Ward No.	Council Name	Police Station	R.D. Block
1	Durtlang	2714	Ward No 1	Durtlang North	Bawngkawn P.S	Tlangnuam (Part)
2	Durtlang Leitan Veng	3761	Ward No 1	Durtlang North	Bawngkawn P.S	Tlangnuam (Part)
3	Durtlang Vengthar	2774	Ward No 1	Durtlang North	Bawngkawn P.S.	Tlangnuam (Part)
4	Muanna Veng	1810	Ward No 1	Durtlang North		
5	Selesih	428	Ward No 1	Durtlang North		
6	Zuangtui	3441	Ward No 1	Durtlang North	Bawngkawn P.S	Tlangnuam (Part)
7	Bawngkawn	7654	Ward No 2	Chaltlang	Bawngkawn P.S	Tlangnuam (Part)
8	Bawngkawn South	2700	Ward No 2	Chaltlang	Bawngkawn P.S	
9	Chaltlang	7968	Ward No 2	Chaltlang	Bawngkawn P.S	Tlangnuam (Part)
10	Chaltlang North		Ward No 2	Chaltlang	Bawngkawn P.S	Tlangnuam (Part)
11	Laipuitlang	1320	Ward No 3	Ramhlun North	Bawngkawn P.S	
12	Ramhlun North	1240	Ward No 3	Ramhlun North	Bawngkawn P.S	Tlangnuam (Part)
13	Ramhlun Sports Complex	709	Ward No 3	Ramhlun North	Bawngkawn P.S	Tlangnuam (Part)
14	Ramhlun Venglai	2389	Ward No 3	Ramhlun North	Bawngkawn P.S	Tlangnuam (Part)

# **Aizawl Development Authority**

#### Master Plan for Aizawl: VISION 2030

15	Ramhlun Vengthar	2252	Ward No 3	Ramhlun North	Bawngkawn P.S	Tlangnuam (Part)
16	Aizawl Venglai	1832	Ward No 4	Zarkawt	Aizawl P.S.	Tlangnuam (Part)
17	Ramhlun South	4681	Ward No 4	Zarkawt	Bawngkawn P.S	Tlangnuam (Part)
18	Ramthar North	5037	Ward No 4	Zarkawt	Aizawl P.S.	Tlangnuam (Part)
19	Ramthar Veng	4019	Ward No 4	Zarkawt	Aizawl P.S.	Tlangnuam (Part)
20	Chanmari	5404	Ward No 5	Chanmari	Aizawl P.S.	Tlangnuam (Part)
21	Electric Veng	5601	Ward No 5	Chanmari	Aizawl P.S.	Tlangnuam (Part)
22	Zarkawt	2807	Ward No 5	Chanmari	Aizawl P.S.	Tlangnuam (Part)
23	Chanmari West	4879	Ward No 6	Chanmari West	Vaivakawn Out Post	Tlangnuam (Part)
24	Edenthar	1730	Ward No 6	Chanmari West	Bawngkawn P.S	
25	Hunthar Veng	2071	Ward No 6	Chanmari West	Vaivakawn Out Post	Tlangnuam (Part)
26	Falkland	1730	Ward No 7	Zemabawk		Tlangnuam (Part)
27	Thuampui	2067	Ward No 7	Zemabawk	Bawngkawn P.S	Tlangnuam (Part)
28	Zemabawk	11671	Ward No 7	Zemabawk	Bawngkawn P.S	Tlangnuam (Part)
29	Zemabawk North		Ward No 7	Zemabawk	Bawngkawn P.S	Tlangnuam (Part)
30	Armed Veng	3568	Ward No 8	Armed Veng South	Aizawl P.S.	Tlangnuam (Part)
31	Armed Veng South	4012	Ward No 8	Armed Veng South	Aizawl P.S.	Tlangnuam (Part)
32	Chite	379	Ward No 8	Armed Veng South	Aizawl P.S.	Tlangnuam (Part)
33	Chhinga Veng	5940	Ward No 9	Chinga Veng	Aizawl P.S.	Tlangnuam (Part)
34	Dawrpui	4718	Ward No 9	Chinga Veng	Aizawl P.S.	Tlangnuam (Part)
35	Saron Veng	2635	Ward No 9	Chinga Veng	Aizawl P.S.	Tlangnuam (Part)
36	Tuithiang	1482	Ward No 9	Chinga Veng	Aizawl P.S.	Tlangnuam (Part)
37	Chawnpui	2826	Ward No 10	Chawnpui	Vaivakawn Out Post	Tlangnuam (Part)
38	Govt. Complex	1423	Ward No 10	Chawnpui	Luangmual Out Post	Tlangnuam (Part)
39	Zonuam	1635	Ward No 10	Chawnpui	Luangmual Out Post	Tlangnuam (Part)
40	Zotlang	2993	Ward No 10	Chawnpui	Vaivakawn Out Post	Tlangnuam (Part)
41	Chawlhhmun	2637	Ward No 11	Tanhril	Luangmual Out Post	Tlangnuam (Part)
42	Luangmual	2390	Ward No 11	Tanhril	Luangmual Out Post	Tlangnuam (Part)
43	Rangvamual	1419	Ward No 11	Tanhril	Sairang Out Post	Tlangnuam (Part)
44	Sakawrtuichhun	1145	Ward No 11	Tanhril	Vaivakawn Out Post	Tlangnuam (Part)
45	Tanhril	2578	Ward No 11	Tanhril	Luangmual Out Post	Tlangnuam (Part)
46	Phunchawng		Ward No 11	Tanhril	Luangmual Out Post	Tlangnuam (Part)
47	Tuivamit		Ward No 11	Tanhril	Luangmual Out Post	Tlangnuam (Part)
48	Dinthar	5795	Ward No 12	Dinthar	Vaivakawn Out Post	Tlangnuam (Part)
49	Tuikual North	4022	Ward No 12	Dinthar	Aizawl P.S.	Tlangnuam (Part)
50	Tuikual South	4673	Ward No 12	Dinthar	Aizawl P.S.	Tlangnuam (Part)
51	Dawrpui Vengthar	3632	Ward No 13	Vaivakawn	Vaivakawn Out Post	Tlangnuam (Part)

Department of Architecture & Regional Planning, Indian Institute of Technology Kharagpur - 721302

- 8 -

#### **Aizawl Development Authority**

#### Master Plan for Aizawl: VISION 2030

52	Kanan	2597	Ward No 13	Vaivakawn	Vaivakawn Out Post	Tlangnuam (Part)
53	Vaivakawn	2957	Ward No 13	Vaivakawn	Vaivakawn Out Post	Tlangnuam (Part)
54	Khatla	5683	Ward No 14	Khatla	Aizawl P.S.	Tlangnuam (Part)
55	Khatla South	2594	Ward No 14	Khatla	Aizawl P.S.	Tlangnuam (Part)
56	Mission Vengthlang	3881	Ward No 14	Khatla	Kulikawn P.S	Tlangnuam (Part)
57	Khatla East		Ward No 14	Khatla	Kulikawn P.S	Tlangnuam (Part)
58	Bungkawn	6142	Ward No 15	Nursery	Aizawl P.S.	Tlangnuam (Part)
59	Nursery	2032	Ward No 15	Nursery	Aizawl P.S.	Tlangnuam (Part)
60	Bungkawn Vengther	1615	Ward No 15	Nursery	Aizawl P.S.	
61	Lawipu Veng	552	Ward No 15	Nursery	Aizawl P.S.	Tlangnuam (Part)
62	Maubawk	3082	Ward No 15	Nursery	Aizawl P.S.	Tlangnuam (Part)
63	Bethlehem	3934	Ward No 16	Bethlehem Vengthlang	Aizawl P.S.	Tlangnuam (Part)
64	Bethlehem Vengthlang	5196	Ward No 16	Bethlehem Vengthlang	Aizawl P.S.	Tlangnuam (Part)
65	College Veng	2552	Ward No 16	Bethlehem Vengthlang	Aizawl P.S.	Tlangnuam (Part)
66	Republic Veng	5442	Ward No 17	Republic Veng	Aizawl P.S.	Tlangnuam (Part)
67	Republic Vengthlang	2247	Ward No 17	Republic Veng	Aizawl P.S.	
68	Upper Republic	2505	Ward No 17	Republic Veng	Aizawl P.S.	Tlangnuam (Part)
69	Venghlui	4334	Ward No 17	Republic Veng	Aizawl P.S.	Tlangnuam (Part)
70	Dam Veng	1098	Ward No 18	Venghnuai	Kulikawn P.S.	Tlangnuam (Part)
71	I.T.I. Veng	3613	Ward No 18	Venghnuai	Aizawl P.S.	Tlangnuam (Part)
72	Mission Veng	7609	Ward No 18	Venghnuai	Kulikawn P.S.	Tlangnuam (Part)
73	Salem Veng	2934	Ward No 18	Venghnuai	Kulikawn P.S.	Tlangnuam (Part)
74	Thakthing	966	Ward No 18	Venghnuai	Kulikawn P.S.	Tlangnuam (Part)
75	Venghnuai	1589	Ward No 18	Venghnuai	Kulikawn P.S.	Tlangnuam (Part)
76	Tuikhuahtlang		Ward No 18	Venghnuai	Kulikawn P.S.	Tlangnuam (Part)
77	Model Veng		Ward No 18	Venghnuai	Kulikawn P.S.	Tlangnuam (Part)
78	Hlimen	2337	Ward No 19	Kulikawn	Kulikawn P.S.	Tlangnuam (Part)
79	Kulikawn	3826	Ward No 19	Kulikawn	Kulikawn P.S.	Tlangnuam (Part)
80	Melthum	873	Ward No 19	Kulikawn	Kulikawn P.S.	Tlangnuam (Part)
81	Saikhamakawn	1124	Ward No 19	Kulikawn	Kulikawn P.S.	Tlangnuam (Part)
82	Tlangnuam	2915	Ward No 19	Kulikawn	Kulikawn P.S.	Tlangnuam (Part)
То	tal 82 Local Councils	243509				

Source: Census of India, 2001

- 9 -

#### Table-2.3: Village Councils within AUA

SI. No.	Village Council Name	2001 Census Population	Police Station	R.D. Block
1	Falkawn	859	Kulikawn P.S.	Aibawk
2	Hualngohmun	609	Kulikawn P.S.	Aibawk
3	Kelsih	679	Kulikawn P.S.	Aibawk
4	Lungleng North	544	Kulikawn P.S.	Tlangnuam (Part)
5	Lungleng - 1	640	Kulikawn P.S.	Tlangnuam (Part)
6	Melriat	838	Kulikawn P.S.	Aibawk
7	Muallungthu	996	Kulikawn P.S.	Aibawk
8	Neihbawih	303	Bawngkawn P.S	Tlangnuam (Part)
9	Sairang	2539	Sairang Out Post	Tlangnuam (Part)
10	Sairang Dinthar	939	Sairang Out Post	Tlangnuam (Part)
11	Samtlang	666	Kulikawn P.S.	Tlangnuam (Part)
12	Sihhmui	450	Sairang Out Post	Tlangnuam (Part)
13	Sihphir	5457	Bawngkawn P.S	Tlangnuam (Part)
14	Sihphir Vengthar	2050	Bawngkawn P.S	
	Total 14 Village Councils	17569		

Source: Census of India, 2001

- 10 -







# Chapter- 3

# POPULATION & ECONOMY





# 3.1 **Population**

The development of a particular city, town or a region depends upon natural, physical and socioeconomic factors. Among these factors, population assumes significance in determining the future pattern of progress and development. As per 2001 census, the population of Aizawl Urban Area (AUA) is 2,61,078 persons, which accounts for 80% of the population of Aizawl District. Socioeconomic analysis has been made on the basis of primary survey conducted by the consultants in 2007. 2% sample surveys were conducted for demographic, socio-economic, housing, commercial and other aspects.

As per the 2001 Census, the gross density of population in AUA is around 1708 persons per sq. km. Aizawl Municipal Corporation (AMC) has the highest share of population, i.e., 93.27% of the entire AUA population, covering only 68.03% of the total AUA. Village Council Area has a population share of 6.73% of the entire AUA (**Table-3.1**).

SI.	Notified	Ρορι	llation		% Share of 2001	Decadal Growth	Area Under	Density 2001	
No.	Villages	1991	2001	No. of HH	Population in AUA	Rate 1991- 2001	(sq. km.)	per km <sup>2</sup> )	
1	INDIA	838583988	1028610328		-	22.66	3287590	313	
2	MIZORAM	689756	888573	176134	-	28.82	21087	42	
3	Aizawl District		325676	64753	-	33.45	3756	87	
4	AUA	178219	261078	51230	100	46.49	152.80	1708	
i	Aizawl Municipal Council (AMC)	158901	244912	47719	93.27	54.13	103.93	2356	
ii	Village Council Area	-	17566	3511	6.73	-	40.42	435	
iii	Special Area	-	-	-	-	-	8.42		

Table-3.1: Percentage Share of Area, Population and Household in different Administrative Jurisdiction

Source: 2001, Census of India

The rapid growth of population since 1961 had been not only within the Aizawl Town limits but also in the neighboring settlements. In fact, this had happened due to the break out of insurgency in 1966 and grouping of villages at various strategic points. The upsurge of population around Aizawl resulted in further expansion of the urban area and inclusion of the following localities within Aizawl urban agglomeration, namely, Bethlehem Veng, Dinthar Veng, Electric Veng, Tuikhuahtlang, Tuikual Veng, Ramhlun Veng and Republic Veng.

With the implementation of the North East Reorganization Act, 1972, the Mizo District became a Union Territory with Aizawl as its capital. In order to accommodate the expanding needs of the seat of governmental activities along with increasing number of employees, job seekers with better socio economic opportunities and to provide improved living conditions, more areas were brought under Aizawl urban agglomeration such as Durtlang, Melthum, Rangvamual, Sakawrtuichhun and Tanhril. Mizoram attained its full Statehood in 1987, and this gave a further boost to the growth of the capital in various aspects, and subsequently, more and more villages were added within its ambit. The main factors responsible for rapid urbanization of Aizawl from 1981 onwards are stated below:-

- 1. Birth rate (19 per 1000) being much higher than death rate (7 per 1000) due to availability of various health facilities.
- 2. Availability of high concentration of government amenities and facilitates within Aizawl Urban Area.
- 3. High differential in development in Aizawl city as compared to other neighbouring centers.
- 4. Increase of immigration and less out-migration from AUA.
- 5. Expansion of existing town areas to suburbs due to socio-political reasons thereby exerting population pressure on land for shelter and services.
- 6. Decline of agricultural productivity caused by infertility of soil, deforestation and landslides.

The decadal growth rate of AUA during 1991-2001 has been 46.49%, which is higher than the growth rate of the State. This indicates a rapid growth in the AUA. The Aizawl Municipal Corporation grew at a higher rate (54.13%) during 1991-2001. The planning zone-wise population, households and its share in AUA as per Census, 2001 are given in **Table-3.2**.

Table-3.2: Po	pulation share	e of different	planning z	ones in Aiza	wl Urban Area
	palation onal				in orban / nou

No.	Planning zone	No. of Villages	Population 2001	No. of HH	% Share of Population in _ AUA _
1	Aizawl N-I	12	38206	7597	14.63
2	Aizawl N-II	10	32643	6395	12.50
3	Aizawl E-I	7	29579	5714	11.33
4	Aizawl E-II	7	22734	4388	8.71
5	Aizawl W-I	10	36190	7410	13.86
6	Aizawl W-II	13	30303	5701	11.61
7	Sairang	4	5034	976	1.93
8	Aizawl S-I	9	29823	5849	11.42
9	Aizawl S-II	12	30735	6046	11.77
10	South Extension	8	5831	1154	2.23
Total	AUA	92	261078	51230	100.00

Source: Census of India, 2001

## 3.2 **Population Density**

The average gross population density of AUA is 1708 persons per sq. km. It is evident that the planning area has much higher density than the District and the State. An analysis of the planning zone-wise population variations, as shown in **Table-3.3** reveals a higher density of population in Aizawl East-I and Aizawl East-II due to concentration of commercial activities, change in occupational patterns coupled with high investments, including the opening up of shops, hotels, offices and other financial institutions. Aizawl South I and Aizawl West I are having comparatively higher density of population due to high investment by the government sector in these particular areas, whereas areas of Aizawl North-II planning zone have higher density due to location advantage with respect to higher accessibility and concentration of other infrastructural facilities. The village councils within AUA have low density due to poor accessibility, poor ground conditions and poor availability of infrastructure facilities.

- 12 -

22.13

152.80

263

1708

#### Area Under Density 2001 No. of Population Jurisdiction (sq. (Persons per No. **Planning Zone** Villages 2001 km<sup>2</sup>) km.) 33.57 1138 1 Aizawl N-I 12 38206 Aizawl N-II 7.07 4619 2 10 32643 19209 3 Aizawl E-I 7 29579 1.54 7 1.35 16832 4 Aizawl E-II 22734 9.71 5 Aizawl W-I 10 3728 36190 23.74 1276 6 Aizawl W-II 13 30303 4 11.84 425 7 Sairang 5034 12.97 2299 8 Aizawl S-I 9 29823 Aizawl S-II 12 28.88 1064 9 30735

8

92

5831

261078

Table-3.3: Population density of different Planning Zones in Aizawl Urban Area

Source: Census of India, 2001

10

South Extension

# 3.3 **Population Projection**

For all practical purposes, the size of the present and future population is a key input in an urban planning exercise. Since the last Census was conducted in 2001, population projection for the coming thirty years starting from 2001 has been calculated. In this exercise, the future population distribution is more than a mere population projection of the past trends or past behaviour of the demographic variables. Such allocation depends majorly on development programmes envisaged or decided upon in the respective areas. Thus, the ideal way to study the distributional aspect of population has been to divide the population and area of AUA into sub-areas or planning zones on the basis of homogenity of the physical environment, administrative divisions and natural boundaries.

Population for Aizawl Urban Area has been extrapolated using different mathematical projection methods. Except the Polynomial method, all growth rates were found to be on the lower side, as compared to the 1991-2001 growth rate of AUA (46.49) which is on the higher side. In the earlier Master Plan for Aizawl (2002-11), population was projected assuming around 50% growth rate. For all practical purose, the population for AUA has been projected assuming three types of growth rates: Low, Medium and High. Population for Aizawl Urban Area has been extrapolated assuming various types of growth rates and considering the population projections provided by the **Economics and Statistics Department, Aizawl**. Finally, the average of those figures has been suggested which is around 3.82 lakhs, 5.60 lakhs and 8.20 lakhs for 2011, 2021 and 2031 respectively **(Table-3.4)** for adoption.

As per provisional census, population of AUA for 2011 is 312317. Hence, the decadal growth rate from 2001 to 2011 work out to be only 19.6%. Where as decadal growth rate for 71-81, 81-91and 91-2001 was 171.14, 80.39 and 47.05 respectively. To achieve 2021 proposed population from provisional 2011 population, the required growth rate would be 79.31, which is on the higher side.

# 3.4 **Population allocation**

Thus Aizawl Urban Area is expected to have a population of 8.20 lakhs by the year 2031, i.e. an additional population of 5,58,922 since 2001. Now the task is to apportion this total projected

- 13 -

population over the various planning units. Here again, a synthesis of the time honored demographicmathematical techniques has been adopted. The availability of vacant developable land, the observed density pattern, the underground bedrock geology, the accessibility index revealed through the nearness or distance from highways, the possibility and prospect of creating suitable infra-structure needed for good living, have been considered in conjunction with the past behavior of the demographic variables like migration, growth rate, fertility and mortality all obtained from socio-







economic survey. The share of population has been brought down in the four planning units Aizawl N-II, E-I, E-II and S-I due to the fact that these areas do not have sufficient developable land, and hence restriction on land use and urban functions are obvious and the usual demographic expansion should not operate. Natural population growth will migrate to nearby planning zone. Development control criteria for planning zone E-I and E-II has been suggested in Chapter-12: dealing with Development Control. On the other

hand newer areas such as Aizawl N-I, W-I, W-II, and Aizawl South-II will have more share of future population to sustain as self sufficient local councils and village councils (Fig-3.1). Moreover environmental consideration such as land slope, carrying capacity of each zone, available quality of infrastructural services, nearness to city core etc; have also been given due importance while distributing population into various planning zones

in AUA. The future allocation of estimated population and density along with present

population share and density over the various planning zones has been shown in Table-3.4 and Fig-3.2 (Map-3.1 and Map-3.2).

Planning zones	Popn. 2001	Popn. 2011	Popn 2021	Popn. 2031	Additional Popn. (Since 2001)
Aizawl N-I	38206	55000	74000	130000	91794
Aizawl N-II	32643	52000	64000	64000	31357
Aizawl E-I	31162	40000	40000	40000	8838
Aizawl E-II	22734	28000	28000	28000	5266
Aizawl W-I	36190	56000	100000	100000	63810
Aizawl W-II	30303	50000	88000	158000	127697
Sairang	5034	6000	18000	50000	44966
Aizawl S-I	29823	46000	59000	60000	30177
Aizawl S-II	29152	42000	69000	100000	70848
South Extension	5831	7000	20000	90000	84169
AUA	261078	382000	560000	820000	558922

Table-3.4: Planning Zone wise population allocation for 2031

\* Population of 2001 is Census population rest columns are projected population considering the population projections provided by the Economics and Statistics Department, Aizawl

- 14 -

# 3.5 Economic Perspective

Master Plan for Aizawl: VISION 2030

The local economy of a region is the manifestation of two major components, namely, the sectoral distribution, performance, its employment pattern and efficiency and the socio-economic attributes like the per capita income, income distribution, propensity to save, household assets etc. The local economy of Mizoram viz.- a - viz. the Aizawl Urban Area is intertwined as the former relies heavily on the latter's performance. The Aizawl Urban Area (AUA) consists of 2/3<sup>rd</sup> of the State's urban population and 60% of the NSDP is generated from tertiary sector activities concentrated in and around the State capital.

The following section would endeavor at unwinding the salient features of the existing local economy. It would also address the key areas of concern through physical, spatial and policy level proposals.

#### 3.5.1 Primary Sector Activities

#### Agriculture

The diminishing importance of agricultural activities can be demonstrated through two major events – the reducing contribution of agriculture in the NSDP, and the waning participation of the local workforce in agricultural and allied activities. The age old farming techniques are not helping the cause of the farmers in terms of yield of crops. Moreover, land topographically suitable and available for farming is limited and diminishing.

This scenario cannot be addressed by high yield crops alone; irrigation and power facilities have to be made available and availed by the farmers. Awareness about modern farming equipments and fertilizers and pesticides has to be grown. Terrace farming has to be adopted to optimize the limited land resource available. These can help the region, as well as the state to produce enough for subsistence if not surplus agricultural produce.

#### **Floriculture and Horticulture**

Topographically conducive land for floriculture and horticulture is abundant in the Aizawl Urban Area, i.e. 46% of the land within AUA is suitable for such activities. There is a steady demand for flowers like anthurium and rose in the western countries and can be positively exploited to generate revenues. Viability of natural products from flowers like perfumes, oils and cosmetics can be explored and developed to provide employment and add revenue to the state exchequer.

Fruits like bananas, oranges and lemon are produced in abundance. Food processing units can be developed to process these products and prepare them for markets in other states or abroad.

The entire venture rests upon careful storage, handling, processing and packaging of the products. An integrated facility to process and package the products from floriculture and horticulture activities can be developed with private enterprises and marketed to suitable markets.

#### Livestock, Animal Husbandry and Fishing

This sector has seen phenomenal growth in few years as there is huge demand for all livestock and animal husbandry products within the region. The households in this region actively participate in rearing animals like pigs, cattle and fowls due to this existing demand. Dairy products also have a

- 15 -

readymade market and the daily produce does not need any marketing or agency to be sold off. Increased impetus can be provided in this sector by creating a market outside the AUA by properly processing and marketing the products.

Although the number of water bodies available in AUA is limited, modern pisciculture techniques can be adopted and the sector organized to increase the yield and produce abundantly not just for the region but beyond it.

#### Sericulture

This sector has huge potential and can have huge economic and social implications on the region. The products can be upgraded for international market and then marketed properly to earn huge amount of revenues and provide employment to the local people.

Capacity building in this sector is mandatory and can be attained by providing vocational training to local people.

#### **Forest based activities**

Mizoram has seen the rare occurrence of increase in the land area under forest; the figures rose from 62% in 1977-78 to 83% in 2001. The abundance of forest in the region can be positively utilized for activities like production of wood and other products like leaves, starch, and formaldehyde through sustainable forestry. The abundance of bamboo in these forests can be used as raw materials for paper pulp. Proper road linkages to major cities can help in reducing transportation costs and make it feasible to export bamboo as raw materials for paper industries. Moreover it can also be used for cottage industries and handicrafts.

To sum up, it is important to recognize the role of trained manpower in primary sector, more so in areas with physical and topographical constraints. This sector can be made attractive to the local people by providing them vocational training, and creating job opportunities for them; job opportunities can again be created by encouraging local entrepreneurs by providing the required financial and technical support. This particularly holds good for activities like sericulture, animal husbandry and livestock, floriculture and horticulture. In the short term facilities like integrated processing units, packaging and storage facilities along with organized marketing will provide boost to these activities. Capacity building in these above mentioned activities as well as in processing, packaging, and storage facilities would go a long way to serve the region as well as the state.

#### 3.5.2 Secondary Sector Activities

The major activities undertaken in this sector are manufacturing, construction and power. The role of manufacturing sector in AUA as well as in the State of Mizoram is limited due to constraints in the topography, accessibility to major ports, markets, urban areas and dearth of natural resources. In the recent past some small scale enterprises have started operation in the State, but the onus of developing large scale industries in this region lies with the State and or the Central Government. This is because it would involve a comprehensive development of sectors like power, water supply, road linkages.

- 16 -

The construction sector involves primarily construction of public utilities and infrastructure, though this sector can provide employment significantly, the local population has an obsession for white collared jobs. Thus laborers from Assam, Bihar, Jharkhand etc. are employed. This sector will see huge growth in the region as there is huge scope of development and improvement of the infrastructural facilities and major urban utilities.

The generation of power in the region as well as the State is inadequate to meet the domestic demand and relies heavily on the adjoining States/national grid. The region has huge scope in generation of hydro electricity. Subsistence in power generation is required to boost the overall economy.

The secondary sector also has dearth of trained manpower and huge investments should be made not just in providing physical infrastructure but also setting up social infrastructure like technical schools and colleges. The younger generation has to be exposed to the manufacturing sector through training programs; a sense of pride can be instilled in working in this sector by providing proper technical education, exposure, and providing incentives to do so.

### 3.5.3 Tertiary Sector Activities

#### **Public Administration**

More than 20 years have elapsed since Statehood of Mizoram and setting up of Aizawl as its capital. The public administration contributes around 32% to the tertiary sector NSDP in Mizoram. Most of the employments linked to public administration are within the AUA. This will continue to be a major share holder in the employment scenario in the region.

#### **Real Estate**

The real estate sector has saturated in the core areas of the Aizawl Urban Area; however there is always a rising demand due to growing job opportunities and in migration it causes. The housing needs in the region can only be catered by creating new spines of development; this can be triggered by creating new linkages connecting the State capital to adjoining hinterland. Migration of labour workforce has necessitated the need of low cost housing in the region and this is needed to be addressed to prevent growth of slums and squatter settlements.

#### **Banking and Insurance**

The scope of banking and financial activities has not been exploited in the State capital to an appreciable extent. This sector has immense potential in providing employment particularly keeping in mind the craze of local people for white collared jobs. Private players in banking and financial organizations can be attracted to set up establishments in the State capital, to cater to the State and Central Government employees and trade and commerce in the region, provided they possess a valid RBI license.

- 17 -

#### Trade and Commerce

Trade and commerce activities in the capital are mostly unorganized and huge revenue generated through them is unaccounted for. The retail and wholesale trade in the region is based on FMCGs and primarily cater to the region. The number of formal organizations in this activity is limited (and these activities monopolized); this can be justified by the fact that there is a rise in income by 80% in this sector but a drop of 13-14% in the share of this activity was observed in tertiary sector.

#### **Transport, Storage and Communication**

The size of this sector is relatively small in other parts of AUA compared to the scale of operations in the State capital and this can be attributed to the topographical and physical characteristics of the region. Logistics and allied activities have tremendous potential in the AUA both in terms of passenger and freight traffic movement. The development of road linkages to other important urban destinations and within the region can provide impetus to this sector.

# 3.6 Other salient goals

It has to be acknowledged that the tertiary sector cannot singularly absorb the entire workforce in the AUA; the obsession towards white collared jobs has to be diluted by providing quality technical education and exposure pertaining to secondary sector and primary sector activities. The growth in opportunities in Central and State Government organizations cannot be sustained beyond a certain limit. Thus the workforce has to be channelized into more meaningful pursuits like similar tertiary sector activities or primary/secondary sector activities.

The employment preference of AUA reveals that people prefer to work in tertiary sector; they also prefer employment activities close to their home, e.g., animal husbandry, livestock rearing, etc. Thus employment opportunities close to their residences would generate interest in the local population.

78% of household has monthly income of less than INR 15000; however, the ownership pattern of consumer goods in households reveals that the assets thus created are not commensurate to their income. Households have fewer propensities to save; in certain planning zones like Sairang the number of households who do not avail banking services is around 50%. The households should be motivated to save a significant part of the household income and invest in health, education and nutrition to improve the overall quality of life.

- 18 -







# Chapter- 4

# PROPOSED LAND USE PLAN





#### Master Plan for Aizawl: VISION 2030

#### 4.1 Master Plan Objectives

- 1) to integrate the development of Aizawl Urban Area with its region
- 2) to sieve out landslide-prone, unsafe areas from its rugged topography and geomorphology
- 3) to delineate the planning area into identifiable functional zones based on demography, physiography, land use and growth direction
- 4) to predict the future distribution of population according to the carrying capacity of the land
- 5) to identify suitable land for future satellite urban centers in the region through proper transport and communication networks
- 6) to enrich the capital functions of this city towards achieving the goal of becoming a world class hill city.
- 7) to boost the economy of the region through setting up market centers, tourist centers, recreational spots
- 8) to provide land for creation of social and physical infrastructure following different hill area standards
- 9) to increase land supply for affordable housing units
- 10) to bring about ecological balance between the green cover and built coverage
- 11) to improve the east-west and north-south connectivity while strengthening the accessibility of various village councils
- 12) to explore various potentialities of resource mobilization for funding the developmental projects
- 13) to decongest the central area by shifting non-conforming activities to the periphery
- 14) to reenergize the institutional and administrative system to manage future urban development in the region
- 15) to design an effective development control mechanism with a high degree of public serviceability

#### 4.2 Identification of Developable Areas

The geography and geological structure of Aizawl urban area play a very important role in determining the type of sustainable development. Hence a detailed examination of various reports (MSRSC, 2005, DoIG&M, 2006, DDMP, 2003) on the geomorphology, topography and slope and disasters was undertaken by the Consultant (Chapter 5 of the Status Report may be referred to in this connection). While investigating the landslide susceptibility it was observed that in AUA, only 31.47% area falls under low and very low landslide susceptibility category (0-18 degrees), 53.84% area falls under moderate landslide susceptibility category (18-36 degrees) and the rest area falls under high and very high category (more than 36 degrees). Moreover detailed investigation on landslide zonation of vacant land reveals that out of the total vacant land available in Aizawl urban area, 31.17% falls under low and very low landslide susceptibility category, 54.17% fall under moderate landslide

- 19 -

susceptibility category, 11.25% fall under high landslide susceptibility category, and a mere 3.4% falls under very high landslide susceptibility category. It is desirable that in respect of all areas, future urban development is restricted only to very low to moderate landslide susceptible areas, i.e., any size of land with a slope degree of not more than 36 degree, in order to avoid any risk of landslide, disaster, life loss, demerge and compensation.

## 4.3 Planning Methodology

**Firstly,** overlapping the landslide-prone areas, unsafe areas for its rugged topography as well as critical geomorphology on a GIS platform, a resultant landslide susceptibility mapping has been sieved out to find out the availability of developable land in the AUA region.

**Secondly,** resources of each delineated planning zone have been identified vis-a vis their role in the city level. Moreover, in order to predict the future distribution of population and phasing of development over the ten planning zones, five quantitative urban aspects like carrying capacity of the land, density of population, monthly household income, share of non-residential development and road density as well as five qualitative urban aspects like the level of satisfaction on water supply, sanitation, electricity, health care, education etc., obtained from socio-economic survey, have been analyzed as per their respective normalized values. Since each indicator has different units, normative indexes, from 0-100 have been adopted in the exercise. Planning zones obtaining rank from 1 to 5 get first priority for first phase of development and for absorption of the projected population up to 2021. Rank 6 to 10 get next priority for development beyond 2021 and up to 2030 **(Table 4.1)**.

**Thirdly**, to improve east-west and north-south connectivity as well as accessibility to various villages within the AUA, many new linkages have been proposed for strengthening the bondage.

**Fourthly**, to enrich the capital functions of Aizawl city towards achieving the goal of becoming a world class hill city in future, State level and District level capital functions are identified and proposed accordingly. Also to boost the economy of the region, proposals are drawn up for setting up market centers, tourist centers, and recreational spots along with identified new townships.

**Lastly**, new areas were earmarked for creation of social and physical infrastructure following different hill area standards.

			luantitative	uantitative			Qualitative				_	
Planning Zones	Availability of Developable Land	Density of Population	Monthly Household Income	Residential/N on Residential Development	Road Density	Water Supply	Sanitation	Electricity	Health Care	Education	Score Obtainec	Rank
Zone -1 (N-I)	100	3	46	19	6	21	32	100	40	82	449	7
Zone -2 (N-II)	20	22	82	83	28	93	70	70	100	90	658	3
Zone -3 (E-I)	2	100	97	100	85	100	100	57	71	71	783	1
Zone -4 (E-II)	0	81	100	80	100	50	70	57	67	86	691	2
Zone -5 (W-I)	32	17	98	77	0	82	58	70	33	100	567	5
Zone -6 (W-II)	71	5	69	50	10	63	44	77	38	77	504	6
Zone -7 (Sairang)	48	1	0	3	42	39	0	0	0	0	133	10
Zone -8 (S-I)	19	19	96	0	32	15	66	62	25	100	434	8
Zone -9 (S-II)	86	4	83	56	20	95	48	73	82	100	647	4
Zone -10 (South Extn.)	73	0	11	18	1	0	0	62	0	88	253	9

Table 4.1: Zone-wise normalized values on selected aspects of urban development

- 20 -

The Master Plan provides for strategic framework for land use planning in the AUA, thereby shaping the future towards vision 2031 and beyond. It sets out the spatial strategy for the 10 Planning Zones as identified in the Status Report to address the different characteristics and needs of each area. In the present Master Plan on an average each Planning Zone has under its command an area of 15.27 sq. km. (highest 33.56 sq.km. in Aizawl N-I and lowest 1.35 sq.km. in Aizawl East -II). All these Zones are expected to have around 82,000 average populations by the year 2031, to arrive at an average gross density of 5400 persons per sq. km. It is expected that about 5000 hectares of additional land would be put to urban use by 2031 within the AUA limit.

This Plan envisages:

- In respect of new areas, utilisation of lands having slope up to 36 degrees for all types of urban development. Lands having slope between 36degrees to 45 degrees should have limited use, like recreational, based on location and other characters. However land beyond 45 degrees slope, which are normally landslide-prone, should not be used for normal development purpose.
- In respect of existing house sites, which have been granted permission before the coming into effect of this Master Plan, on lands with a slope of up to 45 degrees, construction may be allowed subject to fulfillment of other aspects of this Plan and the prevailing Building Regulations. Lands with slope degrees of 45 to 60, construction may be allowed subject to compliance with conditions to be laid down by the Government/ADA jointly and for lands with a slope degree of more than 60, no development may be allowed.
- Decentralization of many public, semi-public and economic activities from the core of the congested city to the periphery by providing attractive public infra-structure services in the new areas by the ADA.
- Restructuring and developing new growth centers with modern amenities along with the proposed transportation network to integrate Aizawl city with its region, and
- > Enrichment of capital functions and separation of district functions to suitable sites.

### 4.4 Strategic Framework of activities

As already mentioned, the Master Plan provides for strategic framework for land use planning in the AUA for shaping the future towards vision 2031 and beyond. It sets out the spatial strategy for the 10 Planning Zones as identified earlier to address the different characteristics and needs of each area. The priority set out for each zones is land use based activities supported by the policies in this Plan.

### 1) Creation of economic growth centres

Financial services, healthcare, IT/ITES and tourism/entertainment are the four key sectors located in different corners of AUA to boost the economic growth, namely, administrative functions in Govt. Complex, Secretariat Complex and Lawipu, healthcare service in Falkawn, IT/ITES in Tanhril and tourism/entertainment in different scenic value areas.

#### 2) Creation of mass employment zones

Suitable zones like Zuangtui, Sairang, Sihphir are earmarked for industries, hotel complex and modern retail format which are considered as key drivers of employment.

#### 3) Improvement and extension of transportation system

Introduce two north-south corridors bye-passing the central area, one from Sihhmui to Muallungthu-Melriat/Hualngohmun via Tanhril etc. to connect the western part of the region with airport directly and another in eastern region from Sihphir to Hlimen via Thuampui to avoid the city core traffic congestion. Strengthening few east-west road links for better accessibility namely Khatla to Tanhril via Govt. Complex, Lawipu to Khatla South via Bungkawn.

Setting up of four truck terminals, apart from Rangvamual, first, towards west of city entry point and another at Zemabawk, towards east of city entry point, third at Melriat towards south of city entry point and fourth at Sihhmui towards west of city entry point.

Shifting a part of central commercial functions towards the west of the region, near the boundary of AUA limit.

#### 4) Increase land availability for new housing

Special residential corridors and hubs are suggested for new housing allocation like Sairang, Tanhril, Lungleng, Durtlang etc. Re-densification has been advocated in city core of AUA. Building height and FAR rules are to be made stringent.

#### 5) Upgrading of Infrastructure

Augmentation of water treatment plants Creation of proper Sewage system and Treatment Plants Identification of Solid Waste disposal sites Installation of power infrastructure and substations Identification of check dams Construction/improvement of drainage channels Access to Quality Education centres

Improvement of healthcare services

#### 6) **Promotion of Tourism and Recreation**

Augmentation of existing cultural facilities

Setting up theme-based parks namely at Assam Rifles area in city centre after shifting of Assam Rifles, at Luangmual beside approach road from Tanhril to Khatla etc

Promotion of village and cultural tourism

- 22 -

#### 7) Finance for Development

Innovative options for resource mobilization.

Innovative instruments for revenue generation.

### 4.5 Factors considered for future zoning of land use

The proposed land uses were scientifically perceived based on detailed analysis of the following factors;

Existing land use distribution; Slope of the land; Vegetation index; Drainage channels; Existing Transportation network; Physical problems of each zone; Development potentials of each zone; Future population distribution; Government policies and programs including committed scheme and proposals.

# 4.6 Concept of Zoning of Land Use

The large contiguous areas under 36 degree slopes, which are low and moderately susceptible from landslide point of view are identified and are linked with major transportation corridors. The higher order functions like administrative hub, institutes, satellite townships, utilities, commercial centres, health facilities, industries etc. are placed in those areas and the basic proposed structure of the city has been envisaged.

Whereas Parks, playgrounds, gardens recreational areas which are open space based developments as well as wood lands and green belts are located in the range of 36 degree to 45 degree sloped area. Only lands which are high and very high susceptible to landslide are kept under no development use zone.

Aizawl Urban region has significant land area under defense. So Defense Land use category has been adopted particularly for this region. In **Map-4.1** concept of the plan is shown.

Taking all the above factors into consideration, **twelve category of land use zones** are proposed while drawing up the land use proposal. The details are described later in the subsequent paragraphs.

- 1. Residential
- 2. Commercial
- 3. Industrial
- 4. Public and Semi-Public
- 5. Utilities and Services
- 6. Traffic and Transportation
- 7. Recreational
- 8. Defense Land
- 9. Restricted Areas
- 10. Agriculture/Forest
- 11. Sloped Land/Undevelopable Areas
- 12. Rivers, Streams and Water bodies

# 4.7 The Proposed Plan

The Master Plan implementation requires (*i*) development of new areas (*ii*) redevelopment of existing developed areas and (*iii*) conservation of sensitive areas. Therefore land use plan, land use zoning, sub-division and development control regulations would in general be the base for all development, and redevelopment in the city. The land use proposal assumed that all the zones will be self sufficient with all social and physical infrastructural facilities to serve the future population. The broad features of the Plan, not all the details thereof, are discussed in this Plan.

It is important to remember that the future spatial structure as visualized can be achieved and realised through the combined effort of the public and the private sectors. Efforts are made through documentation of this Master Plan in order to

- i. Indicate future land use zones for various purposes, and
- ii. Indicate the pattern of the spatial structure plan and to realise the vision for Aizawl as an urban center of the eastern region through innumerable concepts proposed throughout the various



zones of AUA.

The proposed Master Plan envisages allocation of land for urban uses like residential, commercial, public & semi-public, utilities and services, industrial, recreational, transportation, restricted areas and land under defense to meet future requirements. Land uses are proposed keeping in view the availability of developable land for each planning zone, carrying capacity of population and activities, conformity with surrounding land

uses, site characteristics, convenient distance of work place from residential areas and ecological values. Out of 15280 hectares of Planning Area, 7009 hectares (45.87%) have been earmarked under the different urban uses and the remaining 8271 hectares (54.13%), are kept under non-urban uses like Agriculture/Forest, Water Bodies and Undevelopable Slopped Lands (Fig-4.1, Table-4.2) to keep the natural ecological balance.

SI. No.	Land Use	Area (Ha)	% of Planning Area
1	Urban uses	7009	45.87
2	Agricultural/Forest	5133	33.59
3	Slopped Land/Undevelopable	2553	16.71
4	Rivers/Streams/Water bodies	585	3.83
Total Aizawl U	Irban Area	15280	100.00

Table-4.2: Percentage break-up of proposed urban and non-urban land use for AUA

- 24 -

## 4.8 Hubs and Corridors of Specialised Activities

The existing capital city is extremely congested and, apart from action to prevent further congestion (which is considered to be essential), there is hardly any scope for substantial improvement. It is, therefore, necessary to plan for expansion of the city. Proposals in this regard are as follows:

To ease the pressure on the existing city, a **residential corridor** is needed which is proposed in the north-western side of AUA comprising of areas under Tanhril, Sakawrtuichhun and Sihhmui which can be extended beyond the existing Aizawl Urban Area (AUA) to include areas upto Tlawng river. Even though the proposed new residential corridor, which will extend upto the Tlawng River, will be fairly sizeable, it may not be big enough to accommodate the requirements up to 2030. In view of this, the adjoining lands of Nghalchawm, Lengte and Lengpui villages across Tlawng River may also be considered for inclusion in the satellite township.

**Residential corridors** are located along the by-pass roads from Selesih-Durtlang-Muanna Veng-Thuampui to Falkland in the east, from Sihhmui-Sakawrtuichhun-Tanhril-Lawipu-Tlangnuam-Hlimen-Samtlang in the west and from Melriat-Kelsih-Falkawn to Muallungthu in the south.

Administrative hubs are located at New Secretariat Complex and Govt. Complex for State-level and district-level functionaries.

**Educational hub** is located at Tanhril towards west and at Sihphir towards north and **State-level Health Complex** at Falkawn where a Referral Hospital already exists.

**Commercial hubs** are proposed at Zarkawt–Dawrpui, Lawipu-Maubawk, Sihhmui-Sairang, Durtlang, Tanhril-Sakawrtuichhun, Lungleng and Melriat.

**An Industrial estate** is identified at Zuangtui. **Industrial growth center** is identified at Tanhril-Sakawrtuichhun. New **Industrial hubs** are proposed at Sihphir Vengthar, Zemabawk and Melriat.

**Transportation hubs** are located at strategic points, like in the west one at Sihhmui, the entry point of AUA from Airport, a Rail Head has been proposed and a bus terminal has been proposed beside the proposed rail terminal, another bus terminal has been proposed at Tanhril. In north a hub is located at Neihbawih along State Highway. The existing bus terminal at Selesih is proposed for upgradation. At Central point the existing bus terminal at Chaltlang is proposed to be upgraded. In eastern part of AUA a bus terminal has been proposed at Zemabawk. In the south point bus terminals are proposed at Lungleng and Melriat.

**Recreational hubs** are proposed near the New Secretariat Complex, land at the centre of the City to be vacated by the Assam Rifles and along Tlawng River at Sihhmui, Lawipu Veng. The lands adjacent to the proposed ten check dams have been proposed as recreational.

# 4.9 Future Land Use Proposals

#### 4.9.1 Residential Zones

An area of 4064 hectares (26.60% of planning area) has been earmarked for residential zone (**Table-4.3**, **Fig-4.3**). Out of total urbanized use, share of residential use is 57.99% (**Table-4.3**, **Fig-4.2**). As such small area of nursery, primary, high schools, religious places, sub-post offices, dispensaries, convenient shopping, hawkers and other lower order amenities cannot be detailed out in Master Plan,

their land use requirements have been broadly included in residential zones. The proposed population by 2031 is 820000. Hence overall residential density is likely to be around 200 persons (around 34 DU, considering household size 6) per hectare.

In order to cater for the demand for housing areas, residential zones has been proposed as per the availability of developable land in planning area namely at Sihhmui, Sakawrtuichhun-Tanhril, Lawipu, Tlangnuam along the proposed west by-pass; along the proposed roads at Durtlang, Edenthar and western part of Hlimen. The central Aizawl has become over crowded. Population density in few pockets of central Aizawl is above 500 persons per hectare. Restricted residential area is to be developed in congested core area of Aizawl city. For balanced development, new activity centers are proposed in the western periphery like the capital complex, knowledge hub, new CBD. Similarly, in the southern fringe area new activities like proposed range from hospital and health care, in the north food processing units and allied activities. Consequently, new residential locations have been suggested in the strategic locations in these planning zones to minimize work travel distance. Since additional pressure of population and new constructions in this planning area will have to be done at the cost of its eco-system, the proposed Agricultural and Forest and slopped/undevelopable area shall have to be protected and construction shall have be banned in such areas.

#### 4.9.2 Commercial Zones

The commercial activities have come up here mainly at core area of Bara Bazaar-New Market, Bawngkawn, Vaivakawn along the main roads due to lack of space. To cater to the retail and wholesale demand for future, 187 hectares (1.22% of planning area) have been earmarked for commercial use (Table-4.3, Fig-4.3). Out of total urbanized use, share of commercial use is 2.66% (Table-4.3, Fig-4.2). A new parallel CBD area has been proposed at Sakawrtuichhun to cater for future demand of western corridor development. Wholesale trade centre of Bara Bazaar has to be shifted and new wholesale trade centres have been proposed near Rangvamual and proposed Zemabawk truck terminal. Wholesale godowns have been proposed beside proposed rail terminal at Sihhmui. New commercial centres have been proposed at Sairang, Sihhmui, Neihbawih, Durtlang, Muanna Veng, Tanhril, Lawipu Veng, Tlangnuam, Saikhamakawn, Samtlang, Lungleng etc.

#### 4.9.3 Public/Semi-public Zones

At present, government, semi-government, public offices are concentrated along the central spine at Chanmari, Tuikual, Khatla, Upper Khatla, Tuikhuahtlang, and expanding towards New Secretariat Complex. Institutes are coming up at western side of planning area as well as medical and paramedical institutes are situated at Durtlang area. State level administrative hub has been proposed at Govt. Complex. All other institutes have been proposed at Sihhmui, P.T.C., Sakawrtuichhun, Tanhril, Lawipu, Lungleng, Durtlang, Sihphir and Falkawn To fulfill future demand, an area of 903 hectares (5.91% of planning area) has been proposed for public/semi-public use **(Table-4.3, Fig-4.3)**. Out of total urbanized use, share of public/semi-public use is 12.89% **(Table-4.3, Fig-4.2)**.

#### 4.9.4 Utilities and Services Zones

An area of 184 hectares (1.20% of planning area) has been earmarked for utilities and services use **(Table-4.3, Fig-4.3)**. Since the new housing areas have been proposed, the planning area will face

- 26 -

huge land requirements for water treatment plants, solid waste management, burial grounds, power plants/sub stations etc. Out of total urbanized use, share of utilities and services use is 2.62% (Table-4.3, Fig-4.2). This use has been distributed all over the planning area based on requirements.

#### 4.9.5 Industrial Zones

In order to encourage local arts and crafts, and to introduce food processing, packaging industries and other eco-friendly small scale industries, an area of 103 hectares (0.68% of planning area) has been earmarked for industrial use (Table-4.3, Fig-4.3). Except Luangmual and Zuangtui industrial estate, other small scale cottage industries are located haphazardly. An Industrial estate is identified at Zuangtui. Industrial growth center is identified at Tanhril-Sakawrtuichhun. New Industrial hubs are proposed at Sihphir Vengthar, Zemabawk and Melriat. Out of total urbanized use, share of industrial use work out to be 1.47% (Table-4.3, Fig-4.2).

#### 4.9.6 Recreational Zones

Presently recreational place includes only small playgrounds, parks, theaters, stadiums, which are extremely inadequate. The planning area is lacking in city level recreational spaces. An area of 244 hectares (1.60% of planning area) has been earmarked for recreational use (Table-4.3, Fig-4.3). To boost Mizo ethnic culture and tradition, theme parks, regional parks, district parks, picnic huts, holiday resorts, shooting range, sports training center, open air theater, amphitheaters, camping sites have been proposed in the Master Plan. Lands with higher gradient have been developed to serve the recreational needs. Locations between Mizoram University to Sihhmui, South Hlimen, Tlangnuam, Neihbawih Tlang and other such suitable hillocks including the Hangi Lunglen tlang, Tlangnuam, Hillock at Lawipu, Chanmari West cemetery and Beraw Tlang could be investigated for recreational purposes. The Master Plan envisages providing sector level parks in each sector. Out of total urbanized use, share of recreational use is 3.48% (Table-4.3, Fig-4.2). City level recreational facilities and open space has been proposed at the premises of Assam rifles in the heart of the city. Other major proposals are beside Tlawng river and road to Reiek and between Lawipu and Govt. Complex.

#### 4.9.7 Traffic and Transportation Zones

The city core area is heavily loaded with traffic. The north-south spine of the city core is facing with major problems. To divert the traffic, eastern north-south by-pass i.e. World Bank road has been proposed from Thuampui to Hlimen. From Rangvamual to World Bank Road at Zemabawk, via a tunnel at Bawngkawn, road connectivity has been proposed by PWD. Four lateral upgraded roads will link eastern by-pass with central spine. Another north-south western by-pass has been proposed from State highway at Sihhmui to Melriat/Hualngohmun via Sakawrtuichhun, Tanhril and Lawipu. The future activities would develop along this western by-pass. Many lateral upgraded and proposed roads will link western by-pass with central spine of the city. Many transportation hubs have been located in different strategic locations to provide good access to public transit facilities for existing as well as proposed dwellings. Rail connectivity is in pipeline and Sairang is being located for the proposed rail head of Aizawl, An area of 542 hectares (3.55% of planning area) has been earmarked for traffic and transportation use (Table-4.3, Fig-4.3). Out of total urbanized use, share of traffic and transportation use is 7.74% (Table-4.3, Fig-4.2). Only new major roads have been proposed in this Master Plan. Areas for detail lower order roads have been included in other urbanized land uses.

- 27 -

#### 4.9.8 Defense Land

The planning area comprises of sizable amount of land under defense. An area of 697 hectares (4.56% of planning area) is under this use **(Table-4.3, Fig-4.3)**. Assam Rifles, Military, Border Road Organisation, Para-military, Central Reserve Police, Border security force etc. at New Secretariat Complex, Bawngkawn, Thuampui, Mualpui and east part of Chite lui are falling under this use. Defense land at core area has been shifted and changed to recreational use. Out of total urbanized use, share of defense land is 9.95% **(Table-4.3, Fig-4.2)**.

#### 4.9.9 Restricted Zones

An area of 84 hectares (0.55% of planning area) has been demarcated as restricted areas bodies **(Table-4.3, Fig-4.3).** Development on lands having slope more than 36° is prohibited as per the Master Plan. However there are certain areas where the slope is more than 36° but has some existing development. Here the developmental activities are restricted. Such areas are included in the restricted area. Areas within the 20m periphery of the historically important monuments are also included in the restricted zone. Out of total urbanized use, share of restricted zone is 1.20% only.

#### 4.9.10 Agricultural/Forest Zones

All existing land under agriculture, horticulture, farms over 18 degree slope and land under natural forest and plantation is covered under this land use. All along the river Tlawng an 800 m green belt on either side from the centre of the river has been reserved under this category. However, existing settlements, utilities like water treatment plants, sewage treatment plants, electrical sub-stations and recreational areas are permitted as proposal within this buffer. Along all streams, such forest buffer has been earmarked. An area of 5133 hectares (33.59% of planning area) has been earmarked for this land use category **(Table-4.3, Fig-4.3)**.

#### 4.9.11 Slopped Land/Undevelopable Zones

Lands above 36 degree slopped are covered under this use. An area of 2553 hectares (16.71% of planning area) has been earmarked for slopped land/undevelopable area **(Table-4.3, Fig-4.3)**. Maximum areas under this category have been identified in Aizawl North-I and Aizawl South-II Planning Zone. All such undevelopable areas should be investigated before potential utilization for recreational purposes such as mountaineering, hiking, trekking, etc. or afforestation programmes ensuring land stability and protection.

#### 4.9.12 Rivers, Streams and Water bodies

An area of 585 hectares (3.83% of planning area) has been earmarked for rivers, streams and water bodies **(Table-4.3, Fig-4.3)**. Buffers are proposed to be developed along the rivers and natural drainages. Eight new check dam has been proposed below Zuangtui, Sakawrtuichhun, Government Complex, Mission Vengthlang, Tlangnuam, Saikhamakawn, Melthum and Hlimen.

The proposed land use plan for Aizawl is shown in **Map-4.2**.

- 28 -



Fig-4.2: Proportion of different proposed urban uses in AUA



SI. No.	Land Use	Area (Sqkm)	% of Urbanised Area	% of Planning Area
1	Residential	40.64	57.99	26.60
2	Commercial	1.87	2.66	1.22
3	Public/Semi-Public	9.03	12.89	5.91
4	Utilities and Services	1.84	2.62	1.20
5	Industrial	1.03	1.47	0.68
6	Recreational	2.44	3.48	1.60
7	Traffic and Transportation	5.42	7.74	3.55
8	Defense Land	6.97	9.95	4.56
9	Restricted Area	0.84	1.20	0.55
Urbanise	d Area	70.09	100.00	
10	Agricultural/Forest	51.33		33.59
11	Slopped Land/Undevelopable	25.53		16.71
12	Rivers/Streams/Water bodies	5.85		3.83
Non-Urb	anised Area	82.71		
Total Aiz	awl Urban Area	152.80		100.00

Table-4.3: Percentage break-up of proposed land use for AUA

# 4.10 Zone wise major land use proposals

As per the provisions of the master Plan the entire planning area has been divided into 10 planning zones. Each planning zones has unique characteristics and accordingly the land use has been proposed for them. **Table-4.4** and **Map-4.3 to Map-4.12** show the major proposals made for each zones. In Aizawl North-I, Agriculture/Forest occupies the maximum land,1011 Ha (30.12%) followed by Residential 922 Ha (27.46%). In Aizawl North-II, Agriculture/Forest occupies the maximum land 255 Ha (36.09%) followed by Residential 201 Ha (28.45%). In Aizawl East-I, Residential use occupies the maximum land 67 Ha (43.40%) followed by Undevelopable/slopped land 23 Ha (14.67%). In Aizawl East-II, Residential use occupies the maximum land 49 Ha (36.63%) followed by Public-semi public use 35 Ha (26.25%). Aizawl West-I has Residential use as its primary land use occupying 323 Ha (33.22%) followed by Agricultural/Forest use 232 Ha (23.87%). Aizawl West-II has Agricultural/Forest use as its primary land use occupying 862 ha (36.30%) followed by Residential use

# Aizawl Development Authority Master Plan for Aizawl: VISION 2030

691 Ha (29.09%). In Sairang, Agricultural/Forest use occupies the maximum land 585 Ha (49.42%) followed by Residential 218 Ha (18.43%). Aizawl South-I has Defence use as its primary land use occupying 612 Ha (47.14%) followed by Agriculture/Forest use 237 Ha (18.23%). Aizawl South-II has Agriculture/Forest use as its primary land use occupying 1270 Ha (43.97%) followed by Undevelopable/slopped land 817 Ha (28.29%). Aizawl South Extension has Residential use as its primary land use occupying 973 Ha (43.97%) followed by Agriculture/Forest use 667 Ha (30.16%).

No.	Planning Zone Name	Area Under Jurisdiction (sq. km.)	Proposed Major Functions
1	Aizawl N-I	33.57	Residential Corridor, Food Packaging Industry, Technical college, Industrial Estate, Bus and Truck Terminals with warehouses and godowns
2	Aizawl N-II	7.07	Truck Terminal with warehouses and godowns
3	Aizawl E-I	1.54	Commercial District
4	Aizawl E-II	1.35	Institutional activities, Exhibition pavilion, Fair Ground,
5	Aizawl W-I	9.71	Administrative Hub, Research and Institutional Centres, Govt. Housing, Campus Style Housing, Information centres and Art Galleries, Central City parks, Picnic Spot, Water based amusement park, Star category Hotels
6	Aizawl W-II	23.74	Residential corridor, University, Technical college, Industrial Growth Centre, IT and ITEs, Business Improvement District, High-end commercial and institutional activities including Banking and Financial institutions, Golf Courses, Botanical and Zoological Research Centres, Forest Research Centres, Bus Terminal
7	Sairang	11.84	Rail head, Bus cum Truck terminal with warehouses and godowns
8	Aizawl S-I	12.97	Hotels, Water based amusement park
9	Aizawl S-II	28.88	Adaptive reuse of stone quarries, Art and Craft Village, Performing Arts Centre, Research institution, commercial plantation, Amusement Parks
10	South Extension	22.13	State level Medical hub, Residential hub and corridor, Musical instruments, Crafts and Handicrafts, Weaving, Lacquering industries, Bus cum Truck terminal with warehouses and godowns
		152.80	

#### Table-4.4: Zone wise major proposals

A detail land use break up for each zone has been shown in Table-4.5

- 30 -

# Table 4.5: Planning zone wise proposed land use

SI. No.	Land Use Zone	Aizawl North-I (Planning Zone 1)		Aizawl North-II (Planning Zone 2)		Aizawl East-I (Planning Zone 3)		Aizawl East-II (Planning Zone 4)		Aizawl West-I (Planning Zone 5)		Aizawl West-II (Planning Zone 6)		Sairang (Planning Zone 7		Aizawl South-I (Planning Zone 8)		Aizawl South-II (Planning Zone 9)		South Extension (Planning Zone 10)	
		Area (Ha)	% Area	Area (Ha)	% Area	Area (Ha)	% Area	Area (Ha)	% Area	Area (Ha)	% Area	Area (Ha)	% Area	Area (Ha)	% Area	Area (Ha)	% Area	Area (Ha)	% Area	Area (Ha)	% Area
1	Residential	922	27.46	201	28.45	67	43.40	49	36.63	323	33.22	691	29.09	218	18.43	165	12.69	456	15.80	973	43.97
2	Commercial	43	1.29	15	2.12	10	6.32	7	5.17	12	1.21	24	1.00	25	2.12	2	0.12	19	0.66	30	1.37
3	Public/Semi-Public	162	4.83	7	1.05	8	5.21	35	26.25	139	14.33	204	8.58	109	9.18	56	4.34	68	2.34	115	5.19
4	Utilities and Services	24	0.72	9	1.27	5	3.08	3	2.54	20	2.06	35	1.49	13	1.10	4	0.34	15	0.51	55	2.47
5	Industrial	61	1.83	1	0.15	0	0.00	0	0.00	0	0.00	34	1.41	0	0.00	0	0.00	0	0.00	7	0.32
6	Recreational	21	0.62	3	0.43	2	1.38	9	7.01	19	1.98	22	0.91	117	9.91	18	1.38	26	0.91	6	0.29
7	Transportation	117	3.49	28	3.99	10	6.33	9	6.80	42	4.34	94	3.97	77	6.54	25	1.92	77	2.66	62	2.81
8	Defence Land	42	1.27	9	1.33	0	0.00	0	0.00	34	3.51	0	0.00	0	0.00	612	47.14	0	0.00	0	0.00
9	Restricted	12	0.35	7	0.94	16	10.10	0	0.00	18	1.87	5	0.21	0	0.00	13	1.00	14	0.47	0	0.00
10	Agriculture/Forest	1011	30.12	255	36.09	11	6.86	4	2.73	232	23.87	862	36.30	585	49.42	237	18.23	1270	43.97	667	30.16
11	Slopped Land/Undevelopable	806	24.02	139	19.62	23	14.67	11	7.80	88	9.08	281	11.85	27	2.24	108	8.30	817	28.29	255	11.51
12	Water bodies	134	4.00	32	4.57	4	2.66	7	5.08	44	4.52	123	5.19	12	1.05	59	4.54	127	4.38	42	1.91
Total		3357	100.00	707	100.00	154	100.00	135	100.00	971	100.00	2374	100.00	1184	100.00	1297	100.00	2888	100.00	2213	100.00


























### Chapter- 5

# ENVIRONMENTAL CONCERNS



#### 5.1 Environmental Concerns

Environmental concern with Aizawl includes loss of hills and forests, degradation of stream system, landslide and erosion, natural hazard as earthquake, manmade hazard such as air pollution and roadway noise. This plan does not contain quantifiable standards for environmental protection. Although such goals may be desirable, ADA has not yet achieved a widely held consensus on what quantifiable standards have positive environmental impacts and are within the capacity of the development works undertaken by ADA. This is an ongoing challenge which the ADA may separately continue to work in collaboration with other related department for incorporation into the development process. Therefore, this master plan recommends option to address existing problems as well as guidelines that may prevent new problems from future development or redevelopment.

#### 5.2 Objective

- 1) Protect Natural Resources and environmental quality that are important to the quality of life for Aizawl urban area.
- 2) Facilitate conservation of resources, including a reduction of resource consumption
- 3) Protect environmental sensitive areas.

Aizawl urban area falls under tropical climate and experiences heavy rainfall that results in deep weathering of sedimentary rock and rapid and active erosion of weathered materials from steep slopes and bakes having no proper retaining walls around. Moreover the intensity of urbanization have mainly developed at the higher levels of ridges with a linear shape of settlement pattern concentrating along the National and State highways. The scenario of environmental degradation is varied in nature. Deforestation, expansion of residential areas and quarrying activities has led to environmental degradation. The problem of degradation is further aggravated by congestion and pollution from motor vehicles, and presence of several dilapidated buildings in the inner city. Air and noise pollution are also on the rise. In this regard thorough special studies need to be carried out by the State Government/Competent Authorities.

#### 5.3 Recommendation for Environmentally Sensitive Areas

#### 5.3.1 Soil Erosion and steep slopes

The Aizawl urban area is dominated by sandstone followed by silt and shade and loose gravel. Every year, a number of landslides have been usually reported from various localities. The Master Plan area is also characterized by the presence of several lineaments, both major and minor faults oriented in different direction and steep slopes. The greatest hindrance to development in the upland areas is the slope of the land and the increase in soil erodability associated with these slopes. To deal with this situation, development on slope more than 36 degree should be strongly discouraged.

#### 5.3.2 Forests

An area of 5133 hectares (33.59%) of planning area has been earmarked for agriculture/forest use. Above 36 degree slopped lands about 2553 hectares (16.71%) of planning area has been earmarked for slopped land/undevelopable area.

- 31 -

Such undevelopable areas need afforestation programmes to ensure land stability and protection. All along the river Tlawng an 800 m green belt on either side from the centre of the river has been kept reserved as per the Mizo District (Forest ) Act, 1955, section 14 read with section 21; and along all other small streams forest buffer has been earmarked. Existing settlements, utilities like water treatment plants, sewage treatment plants, electrical sub-stations and recreational areas are kept as proposal within this buffer. Forest areas need to be sanctified and conserved with no further development whatsoever, any cutting of trees and encroachment to be stopped. Similarly massive Afforestation programme are to be undertaken. A major goal of the forest conservation programme is to ensure that tree saving and tree planting occur on the developing properties. Existing public property might be used for re-forestation and acquired with State Fund through the development review process. Every effort should be made to identify specimen trees before development and at early stages of planning for public facilities, such as roads, schools and health centres, so that they may be preserved. Decidous trees should be planted in parking lots to provide shade to paved areas, reducing the urban heat island effect and reducing the thermal impact of runoff from such areas.

#### 5.3.3 Water Resources

#### **Rivers and Streams**

Tlawng River and Tuirial River are the two most important source of water with more than 50 tributaries, utilized as main source of water for daily needs of Aizawl Urban area. The natural topography of the urban area guides flow of the rainwater towards these two rivers. These long and vast stretches of rivers need all along river front development. In the areas for new development, as per CRZ-III, a 200 meters wide green belt has been marked as recreational green. Moreover, all along the major drainage channels, a 15 meters wide green buffer on both sides have also been recommended in the land use plan. The river front areas may be developed based on a landscape plan with proper shelter design on the water expanse with attractive laser shows for tourists and visitors during festive seasons.

#### Lakes

Any degradation of wetland or surface water body would lead to habitat loss for birds, aquatic species and rare vegetation. Even deterioration of water quality of such lakes may distract tourists. To check depletion of water bodies the master plan recommends the following:

- a) Stop dumping of waste in water body
- b) Stop earth filling of water body
- c) Encourage suitable recreational facility around water body to keep surveillance
- d) If funding becomes available, a water quality monitoring programme could be established for all such surface water body of AUA.

#### **Rain Water harvesting**

Individuals can do a great deal to improve the water availability and ensure the water quality of their locality by practicing Rain Water Harvesting as a mandatory measure in all public buildings as well as judicial use of storm water for agricultural use. In this regard many published standard manuals are available for adoption.

- 32 -

#### 5.3.4 Air quality

For this planning area, land use and transportation pattern that discourage single occupancy vehicle travel and encourage the use of alternative fuel are two most important components for achievement of better air quality standards. In addition, alternative forms of transportation (solar battery operated car) and transportation management are suggested in the transportation chapter of the plan. Promoting car pooling and van pooling is also essential to improve air quality. These measures will also contribute to the reduction of energy resource consumption required in energy act.

#### 5.3.5 Noise Impact

The major source of noise in AUA is roadway traffic. Roadway noise levels vary with traffic volume and speed, types of vehicles on the roadway and the type of roadway. For developed areas of AUA, where residential uses line the roadways, few noise mitigation options exist. New residential development or redevelopment of land adjacent to a major roadway should consider noisecompatible site design as the first priority for noise abatement. These measures include, placement of parking lots, open spaces, garages, recreation areas and other non-habitable uses of the property in the noise affected area between the noise source and the residential unit. Site design, which orients the front of a row of single family attached dwellings towards and parallel to the roadway, provides a barrier to noise at the deck or patio level behind the unit. Acoustical treatment of external façade, particularly windows and doors, landscaped berms could be also be more effective, but often have aesthetic impact on building façade.

#### 5.3.6 Earthquake

Seismically, Aizawl falls under Earthquake Prone Zone V, hence it is one of the most active areas of the world as reflected by neo-tectonic activity related to plate convergence and collision. The seismic activity of varying magnitude and intensity of several major thrusts, shear zones and lineaments passed through Mizoram. So it may be concluded that the entire city of Aizawl is situated on risk prone slopes, where earthquake of magnitude 8 or more can occur, i.e. the zones with highest intensity along the north eastern region. Since earthquake is among the dangerous and destructive natural hazard, a comprehensive earthquake hazard reduction programme should be prepared, which should include earthquake prediction, control measure, and post earthquake rehabilitation measures. In absence of such report this plan suggests that all new development should comply strictly with National building code on earthquake resistant building code.

(Page left blank intentionally)

- 34 -



	$\sum$	Falkawn Maailumathu Billiumathu Og		
Environmental Parameters for Land Use Proposal	AUA Boundary	Legend	Restricted Area	Map No: 5.1
Master Plan for Aizawl: Vision 2030 Dept. of Architecture & Regional Planning Indian Institute of Technology Kharagpur	<ul> <li>Planning Zone Boundary</li> <li>Village Name</li> <li>Major Roads</li> </ul>	Lineament	River 800mt River Buffer	N Scale - 1:80,000 Meters 600300 0 800 : 200



### Chapter- 6

# TRANSIT & TRANSPORTATION PLAN





#### 6.1 Introduction

Planning for Traffic and Transportation system for Aizawl is a critical component for realization of the goals and objectives of this Master Plan. This section highlights the basic issues of concern which must be addressed to correct the existing deficiencies as well as to cope up with the future demand for movement of people as well as goods – both at local and regional level. A set of proposals and recommendations has been provided which aims to improve the level of service of the Traffic and Transportation system of Aizawl. However, this document should not be taken as the detailed mobility plan for AUA but a broad set of guidelines which must be considered for successful implementation of the Master Plan goals.

### 6.2 Basic Issues of Concern

#### 6.2.1 Issues related to Regional connectivity

Most of the regional linkages pass through the congested urban network of the town. This causes interference to both regional and local traffic movements. This can be addressed by a comprehensive system of bypasses and ring roads to segregate regional traffic from intra-urban movement. On the eastern side of the major north-south corridor, a bypass alignment has been constructed. One more bypass is needed in the south-western side.

Entry point to the Aizawl town from airport side via Vaivakawn is extremely narrow and has very poor road geometry. Access from NH-54 via Bawngkawn does result in huge detour especially for central and southern parts of the town. New entry points to facilitate easy access from NH-54 to all planning zones are needed.

Certain road stretches which cater as both local and regional linkages (from Bawngkawn to Zemabawk) have experienced significant growth of automobile servicing and repairing activities. This has resulted in huge unorganized on-street parking of large regional busses as well as trucks which significantly interfere with the local and regional traffic movement. Some warehousing and storage functions have also come up along these stretches. As topographical conditions do not offer any possibility of creating alternative alignments, relocation of these activities at strategic locations will be crucial to maintain the LOS of these vital links.

Though rail connectivity is in pipeline and Sairang is being located for the proposed rail head of Aizawl, currently air travel is the main regional-level passenger interaction. Recently installed Instrumental Landing Systems improved air connectivity to Aizawl.

#### 6.2.2 Intra-urban connectivity

Urban road network in the core area (from Bawngkawn to Kulikawn) is congested and offers limited scope for capacity augmentation. Most of the links are single lane or intermediate lane – offering limited scope of movement for large vehicles. Ribbon development has occurred all along the major roads with negligible scope for widening. Most of them have inadequate pedestrian and drainage facilities. On-street parking occupies significant part of the vehicular carriageway reducing its effective capacity. Road surface conditions often deteriorate due to improper drainage and unstable road

pavement. The road geometry in most of the links and intersections are not conducive to easy maneuvering and reduces the capacity significantly. As a result, congestion related delay has scaled up to abnormal levels, especially during the peak traffic hours.

As most of the significant trip attracting land uses are located along this spine (Bawngkawn to Kulikawn), there is no scope for reduction in traffic volume except relocating those activities. The linear development of the town with few roads in north-south orientation and having prime concentration of the trip generating (high density residential functions) and trip attracting (important offices and CBD) land uses along them necessitate every intra-city travel to pass through it – thus creating cumulative loading of the network. New developments must consider on east-west development pattern with creation of new north-south alignments parallel to the existing ones.

#### 6.2.3 Future urban structure and its impact on trip characteristics

The allocation of future population in planning zones reveal that most of the new population in the coming years will be accommodated on the south-western and southern sides of the existing urban structure. This changing population distribution will have significant impact on the travel characteristics of the city.

Allocation of future population in various planning zones will increase the trip length. This will invariably reduce share of pedestrian trip and increase vehicular trip. At present, a significant portion of the trips are short distance and pedestrian in nature -2/5<sup>th</sup> of work trips and 3/5<sup>th</sup> of school trips are on foot.

Existing mode choice indicates higher reliance on private modes, especially two-wheelers. Lack of appropriate transit facilities and rising income will increase private vehicle ownership and travel by private modes.

Vehicle ownership is already quite high – nearly 20 percent of households own two-wheelers and more than 10 percent own four wheelers. The income elasticity of vehicle ownership is also high. This will further increase vehicular traffic on already congested urban road network unless commensurate augmentation of network capacity is undertaken.

There is a desperate need for creation of an expanded road network not only for creating access to the planning zones with new development activities but to relieve congestion from the central spine of movement. A significant share of the through traffic which is borne by the existing north-south corridor can be diverted to more direct links across planning zones within AUA.

#### 6.2.4 Transit facilities

Small capacity busses are the only public transit facility available for intra-urban movement and they are primarily available along few links of the road network. Nearly 1/4<sup>th</sup> of work trips and educational trips are made by public transit facilities. Access to public transit facilities is mostly by walking. Passenger loading/unloading from these vehicles as well as parking takes place within the carriageway – obstructing the vehicular traffic in most cases.

- 36 -

At present, the operation is in the hand of private operators which prefer routes where trip density is favorable and transit patronage is high. The occupancy of the buses is also observed to be low.

Looking at the future dispersion of residential and non-residential function, there is a dire need to expand and augment the public transit facilities. Active intervention of public sector may be needed along some of the non-profitable routes, primarily,

- 1. to expand the transit coverage and to reduce dependency on private modes
- 2. to make new areas of development accessible to all section of people
- 3. to relieve the traffic load on already congested road network
- 4. to protect local environment from further deterioration (particularly from vehicular pollution)

Regional transit movement is through buses which ply from specific terminal facilities i.e. Aizawl Temple Square Stand and Thuampui Bus Stand. Improvements in terminal capacity as well as provision of passenger facilities are the major issues of concern.

Several para-transit carriers also cater to the regional passenger traffic demand – particularly operating during the night from city centre. This sector is completely unorganized and needs immediate attention for improvement.

Taxis are the main para-transit modes for intra-city movement – mostly used for work, market and medical trips. Taxi ownership per household is comparably quite high. Taxi parking along the carriageway as well as low occupancy of these taxis is one of the major contributors to the congestion, particularly within the core area.

#### 6.2.5 Parking management

High ownership pattern and excessive reliance on private mode of movement, i.e., two-wheelers and cars exert huge parking demand. As most of the parking demand is met by on-street facilities due to negligible stock of off-street facilities, this is perhaps the biggest contributor to traffic congestion in the core area.

This calls for detailed parking management with adequate attention to parking supply as well as management of parking demand via various regulatory and fiscal controls. Creation of off-street parking facilities at strategic locations, preferably multi-storied is required to relieve the parking load from the vehicular carriageway. Strict enforcement of the ADA Building Regulations, 2008 under which construction of a garage/parking space is made compulsory for new construction will ease the problem to a certain extent.

#### 6.2.6 Safety issues

Most of the accidents recorded take place along the highways and regional linkages. Basic reasons are difficult road alignment, poor road geometry, bad road surface conditions, unstable road pavements and frequent landslides.

Huge pedestrian traffic volume is observed along the links and intersections within the core areas - as walking is one of the dominant modes of movement.

- 37 -

The prime reason being –

- 1. Shorter trip length
- 2. Lower spending power thus, a section is captive to walking
- 3. Low trip time in comparison to waiting time for public transit
- 4. Unavailability/greater search time for parking of car/two-wheeler
- 5. Usage of steps to reduce the travel distance further
- 6. Favorable climate

Most of the links do not have adequate footpaths on both sides to accommodate the high pedestrian volume – forcing them to move along the carriageway. Low traffic speed within the city significantly reduces the probability of accident in spite of very high level of pedestrian vehicular conflict. Steps, which helps to reduce travel distances for pedestrians are often in bad condition. The major deficiencies are:

- 1. Inadequate/irregular riser and tread
- 2. Poor surface condition
- 3. Poor illumination
- 4. Lack of railing and landing facilities for long flight of steps

As walking is the only effective Non-Motorized Transit (NMT) mode, management of pedestrian facilities along with steps can boost significantly the patronage for NMT movement within AUA.

#### 6.2.7 Freight Movement

Existing pattern of freight movement points at its inefficiency from logistics point of view. Nearly half of the vehicles are found to be empty. Consumption goods and building materials form the major chunk of freight movement. Apart from that, due to entry restriction within the town during daytime, most of the freight vehicles park along the regional linkages, clogging the entry point to the town. Need for a bypass system as well dedicated freight terminal facilities are strongly felt. A truck terminal facility at Rangvamual along NH-54 has been constructed. However, more of them at various strategic locations will be needed to cater to the growing freight movement.

#### 6.3 **Proposals and Recommendations**

#### 6.3.1 Proposed by-pass Road

#### East-West by-pass connecting with World Bank road

- Rangvamual to entry of Tunnel at Western side of Bawngkawn
- Exit of Tunnel at Eastern side of Bawngkawn to Falkland Veng (Chite valley below Thuampui)

#### Eastern north-south by-pass

• World Bank road from Thuampui to Hlimen

- 38 -

#### Western north-south by-pass proposed by PWD

- Melriat / Hualngohmun to Tlawng road via Samtlang, South Hlimen, Tlangnuam, Mission Vengthlang
- Tlawng road to Lawipu saddle above existing Reiek road
- Lawipu saddle to Mizoram University crossing Tuikual Lui and Tuithum Lui
- Mizoram University to NH-44A road near Bailey Bridge (Village Sihhmui)

Another western north-south by-pass has been proposed along the western boundary of AUA which is starting from PWD by-pass road at Mizoram University and connecting again with PWD by-pass road at north Samtlang.

Many lateral upgraded and proposed roads will link western by-pass with central spine of the city.

#### 6.3.2 Augmentation of the existing urban road network

To improve the regional connectivity as well as accessibility to various planning zones within AUA, augmentation of the road network across various planning zones is proposed with connections to the regional linkages. A system of alternate road alignments has also been suggested which will provide bypass alignments to regional traffic movement without entering the congested core areas of AUA. Linkages to these bypass alignments are suggested from strategic locations within AUA.

Proposed urban road network showing the major Urban Arterials and Secondary Arterials along with connections from Regional Arterials is shown in **Map-6.1**. As roads help opening up new areas for development through providing accessibility, this augmented major road network with minor roads branching out from it will help facilitate decentralization of urban functions from the core areas as well as accommodate future functions. However, only higher order arterial roads have been outlined in the new areas while lower order roads can be suitable developed while preparation of detailed zonal plan.

#### 6.3.3 Improvement and upgradation of the existing road network

Augmentation of the capacity of the existing road network is necessary to reduce the congestionrelated delay, primarily as a short term measure. Augmentation of capacity can be done primarily by improving the intersections as well as the links. It has been found that intersections in Aizawl reach their capacity much earlier than the links. And as intersections are closely spaced within the core area, they contribute more to the network congestion compared to links. However, both intersection and links require upgradation to increase the capacity to cope with the existing traffic demand.

A list of intersections has been presented in **Table-6.1** based on the observed traffic volume counts during peak traffic hours, where congestion indicators are beyond acceptable limits. A general set of recommendations is also listed following which can be suitably adopted to upgrade the intersections.

Intersection No.*	Intersection Name	Approach Volume (PCU/Hr): Morning Peak	Approach Volume (PCU/Hr): Evening Peak	Intersection Y Value	Priority of Intervention
7	Machhunga Point	4867	5195	2.22	Very High
11	Zothasanga Point	3589	3458	2.05	Very High
8	Harimandir Intersection	4693	4698	1.78	Very High
10	Brig. C Vankunga Point	2836	2952	1.69	Very High
6	Laldailova Point	3850	3440	1.64	Very High
3	Hrangbana College	4090	3405	1.56	Very High
17	Maenga Point	4041	4005	1.47	Very High
2	Aizawl Entry Point	2459	2628	1.29	Very High
5	Sumkhuma Point	3167	3288	1.27	Very High
4	Hrangbana Traffic Point	3312	2179	1.26	Very High
1	UTI Bank Crossing	2572	2450	1.09	High
24	Vaivakawn Market	1969	1755	1.09	High
9	Dr. C Thanthianga Point	4158	4063	1.07	High
23	Vaivakawn	1750	1501	1.02	High
16	Ztu Kamlova Point	2092	2633	1.01	High
14	Zokaithanga Point	2486	2431	0.95	High
25	Aizawl Temple Square	1896	1791	0.93	High
18	Kapthanga Point	3469	3139	0.84	Moderate
15	Khatla Bazaar Area	2025	2127	0.81	Moderate
12	R Lalzuava Point	1950	1463	0.72	Moderate

Table-6.1: List of intersections within core areas of AUA which require immediate attention

\* As indicated in the Transit and Transportation Survey Report and shown in Map-6.2.

Selected measures for improvement of intersection capacity are listed following:

- 1. Possible widening and correction of horizontal and vertical alignment
- 2. Installation of traffic signals with appropriate signage at strategic points
- 3. Removal of visual obstruction to increase sight distance and facilitate turning maneuvers
- 4. Restriction on turning movement for acute angle arms as far as possible [This will call for detailed traffic circulation plan at micro level for the core area and needs constant adjustment with changing traffic needs]
- 5. Installation of pedestrian crossing (preferably grade separated to segregate pedestrian and vehicular movement in intersections. For at grade pedestrian crossings, the movement should be synchronized with the signal phases.

Most of the existing roads within the urban core area require upgradation to accommodate the increasing traffic volume. Most of them do not offer any scope for widening. However, some recommendations are listed following which will help augment the traffic carrying capacity to some extent. Based on the peak hour V/C ratio, certain road sections has been highlighted in **Table-6.2 and Map-6.2** which requires immediate attention.

- 40 -

Link Description	Carriageway Width (m)	Peak Hour Traffic Volume (PCU/Hr)	Peak Hour V/C Ratio	Priority of Intervention
23 – 24 (Vaivakawn Market Area)	3 to 4	1256	47	Very High
23 - 2 (Valvakawn to Town Entry Point)	3 to 4	1200	4.6	Very High
21 - 23 (Vaivakawn to rown Entry Form)	3 to 4	1180	4.0	Very High
7 - 8 (Machhunga Point to Harimandir	5 10 4	1100	7.7	very riigit
Intersection via Dawrpui)	7 to 8	4584	3.7	Very High
3 - 2 (Near Hrangbana College): One Way	4 to 5	2045	3.6	Verv High
5 - 6 (Sumkhuma Traffic Point to Laldailova				
Point)	5 to 6	3080	3.6	Very High
1 - 2 (Near Axis ATM): One Way	4 to 5	1947	3.4	Very High
3 - 5 (Hrangbana College to Sumkhuma	E to G	2005	2.2	Von Ligh
Traffic Point)	5 10 6	2805	3.2	very High
Za Sanga Point (19) to Selesih via Sihphir	3 to 4	850	3.2	Very High
11 - 17 (Zothasanga Point to Maenga Point)	7 to 8	3488	2.8	Very High
Vaivakawn (24) to FCI Godown/Jail Area (22)	4 to 5	1429	2.5	Very High
4 - 3 (Near Hrangbana College): One Way	5 to 6	2109	2.4	Very High
1 - 4 (UTI Crossing to Hrangbana Traffic Point): One Way	5 to 6	2036	2.3	Very High
7 - 6 (Machhunga Point to Laldailova Point via Millennium Center): One Way	6 to 7	2473	2.3	Very High
24 - 25 (Vaivakawn Market Area to Aizawl Temple Crossing)	4 to 5	1198	2.1	Very High
1 - 18 (Axis ATM to Kapthanga Point)	5 to 6	1570	1.8	Hiah
18 - 19 (Kapthanga to Za Sanga Point)	7 to 8	2250	1.8	High
15 -Khatla Bazaar Area to New Capital		4.450		
Complex	5.5 to 6	1450	1.7	High
16 - 25 (Ztu Kamlova Point to Aizawl Temple Crossing)	7 to 8	2066	1.7	High
9 - 10 (Dr. C Thanthianga Point to Brig. C Vankunga Point)	8 to 10	2336	1.6	High
6 - 7 (Laldailova Point to Machhunga Point via Bara Bazaar): One Way	7 to 8	1933	1.5	High
10 - 11 (Brig. C Vankunga Point to Zothasanga Point)	10 to 12	2799	1.5	High
17 - 12 (Maenga Point to R. Lalzuava Point)	6 to 10	2017	1.5	High
8 - 9 (Harimandir Intersection to Dr. C Thanthianga Point): One Way	7 to 8	1830	1.5	High
14 - 16 (Zokaithanga Point to Ztu Kamlova Point)	6 to 7	1543	1.4	Moderate
19 - 20 (Za Sanga Point to MULCO Intersection)	7 to 8	1670	1.3	Moderate
25 - 9 (Aizawl Temple to Dr. C Thanthianga Point): One Way	6 to 7	1439	1.3	Moderate
12 - 14 (Lalzuava Point to Zokaithanga Point)	6 to 7	1354	1.2	Moderate
Intersection 4 to Bara Bazaar Area	4 to 5	685	1.2	Moderate
Zuangtui Intersection to RIPANS Area along NH-54	6 to 7	1309	1.2	Moderate
Intersection 21 to Lengpui Airport	7 to 8	1316	1.1	Moderate
12 - 13 (R. Lalzuava Point to Kulikawn)	6 to 7	1133	1.0	Moderate
14 - 15 (Khatla Bazaar Area)	8 to 10	1560	1.0	Moderate

#### Table-6.2: List of road links within core areas of AUA which require immediate attention

Selected measures for improvement of link capacity are listed following:

- 1. Widening of the carriageway, wherever possible
- 2. Creation of pedestrian facilities on both sides to segregate pedestrian and vehicular traffic flow
- 3. Appropriate railing and fencing arrangement along pedestrian walkways
- 4. Illumination of the road links to facilitate night time movement
- 5. Improvement of the road side drainage channels, not only to create additional road space but to protect the pavement from deterioration
- 6. Road surface stabilization and appropriate arrangement for cross-road drainage (water streams and falls)
- 7. Restriction of on-street parking along congested links, especially during peak hours
- 8. Information display for parking availability in nearby off-street/on-street parking lots to reduce search time for parking space
- Bus bay arrangement for passenger loading and unloading at few strategic locations [This facility can be integrated with the building premise design through certain development right concessions to the owners]
- 10. Installation of traffic signage and signals for pedestrian crossing for at-grade pedestrian crossings preferably synchronized with intersection signals). Some busy links might require grade separated pedestrian crossings

#### 6.3.4 Upgradation of pedestrian facilities

Walking is one of the dominant modes of transport, particularly for work and school trips. However, the existing facilities severely lack the basic necessities for safe and secure pedestrian movement. Huge pedestrian volume is observed along one of the most congested routes resulting in serious level of pedestrian-vehicular conflict. This conflict not only makes pedestrian movement unsafe but adversely affects the vehicular traffic flow. A list of road stretches with existing pedestrian volume and facilities present has been listed in **Table-6.3** with priority of intervention. Certain measures listed below must be adopted along road links to improve the pedestrian movement condition.

- Adequate walkways commensurate to the pedestrian traffic volume on both sides of the carriageway to segregate pedestrian traffic from vehicular carriageway. Some of the links have intermittent footpaths which should be converted to continuous stretches as far as possible.
- 2. Complete restriction of on-street parking on pedestrian pathways even if they are lying empty.
- 3. Appropriate at-grade or grade separated pedestrian crossing facilities at intersections, particularly in ones mentioned in previous list of congested intersections (Table-6.1).
- 4. Integration of steps with walkways to create an efficient system of pedestrian network for fast movement, particularly within the core area.
- 5. Improvement of surface condition for steps with due attention to riser/tread width as well as installation of railings and intermediate landing facilities to facilitate pedestrian movement.

- 42 -

Link No.	Link Description	Present Pedestrian facilities	Priority of intervention
1 to 2	Near Axis ATM	Present at certain stretches, 1.2 m footpath on one side	Moderate
1 to 18	Axis ATM to Kapthanga Point	Present at certain stretches, 1.2 m footpath on one side	Moderate
18 to 19	Kapthanga Point to Za Sanga Point	Absent	High
19 and beyond	Za Sanga Point to Selesih via Sihphir	Absent	Moderate
19 to 20	Za Sanga Point to MULCO Intersection	Present at certain stretches,1.2 m footpath on one side of the road stretch	Moderate
20 and beyond	MULCO Intersection to RIPANS Area along NH-54	Absent	Moderate
18 to 21	Westwards from Kapthanga point along the NH-54	Absent	Moderate
21 and beyond	Intersection 21 to Lengpui Airport	Absent	Low
21 to 23	Vaivakawn	Present at certain stretches,1m footpath at certain stretches	High
23 to 2	Vaivakawn to Town Entry Point	Absent	Moderate
23 to 24	Vaivakawn Market Area	Absent	Very High
4 to Barabazaar	Intersection 4 to Barabazaar Area	Absent	Very High
24 to 22	Vaivakawn to FCI Godown/Jail Area	Absent	Moderate
24 to 25	Vaivakawn Market Area to Aizawl Temple Crossing	Absent	Very High
25 to 9	Aizawl Temple to Dr. C Thanthianga Point : One Way	Footpath at certain stretches, varying width	Very High
3 to 2	Near Hrangbana College : One Way	Absent	Very High
1 to 4	Axis Crossing to Hrangbana Traffic Point : One Way	Footpath at certain stretches, varying width	Very High
4 to 3	Near Hrangbana College : One Way	Present at most of the stretch,1.2 m footpath on both sides of the road	Very High
3 to 5	Hrangbana College to Sumkhuma Traffic Point	Footpath present at certain stretches, varying width	Very High
5 to 6	Sumkhuma Traffic Point to Laldailova Point	Present at most of the stretch,1.5 m footpath on both sides of the road stretch	Very High
6 to 7	Laldailova Point to Machhunga Point via Barabazaar : One Way	Present at most of the stretch,1.5 m footpath on both sides of the road stretch	Very High
7 to 8	Machhunga Point to Hari Mandir Intersection via Dawrpui	Present at most of the stretch,1.5 m footpath on both sides of the road stretch	Very High
10 to 11	Brig. C Vankunga Point to Zothasanga Point	Absent	Very High
9 to 10	Dr. C Thanthianga Point to Brig. C Vankunga Point	1.5 m footpath all along one side of the road stretch	Very High
8 to 9	Hari Mandir Intersection to Dr. C Thanthianga Point : One Way	1.5 m footpath all along one side of the road stretch	Very High
11 to 17	Zothasanga Point to Maenga Point	Absent	Very High

#### Table-6.3: Important links requiring improvement in pedestrian facilities within AUA

#### **Aizawl Development Authority**

#### Master Plan for Aizawl: VISION 2030

17 to 12	Maenga Point to R. Lalzauva Point	Footpath present at certain stretches, varying width	Very High
12 to 13	R. Lalzauva Point to Kulikawn	Footpath present at certain stretches, varying width	Moderate
13 and beyond	Kulikawn Intersection to Kulikawn Bus Stand	Absent	Low
12 to 14	Sikulpuikawn Intersection to Zokaithanga Point	Footpath present at certain stretches, varying width	Moderate
14 to 15	Khatla Bazaar Area	Present at most of the stretch, 1.5 m footpath on both sides of the road stretch	High
15 and beyond	Khatla Bazaar Area to New Capital Complex	Absent	Moderate
14 to 16	Zokaithanga Point to Ztu Kamlova Point	Footpath present at certain stretches, varying width	Very High
16 to 25	Ztu Kamlova Point to Aizawl Temple Crossing	Footpath present at certain stretches, varying width	Very High
7 to 6	Machhunga Point to Laldailova Point via Millennium Centre : One Way	Present at most of the stretch, 1.5 m footpath on one side of the road stretch	Very High
7 to 18	Machhunga Point to Kapthanga Point via Electric Veng/Ramhlun	Absent	Very High

Source: Transit and Transportation Survey Report, 2007

#### 6.3.5 Management of parking supply and demand

There is a need to restrict (completely or partially) on-street parking activity on congested links to increase the capacity of the roads and improve traffic flow along them. On the other hand, off-street parking facilities have to be provided at strategic locations to meet the parking demand. A list of interventions has been proposed along selected links presented in **Table-6.4**. A parking management plan must be prepared immediately for the area lying within Hrangbana College intersection – Sumkhuma Point – Laldailova Point – Machhunga Point – Brig. C.Vankunga Point – Ztu Kamlova Point – Zokaithanga Point – R. Lalzauva Point. This plan should stress particularly on the following aspects:

- 1. Parking demand on various locations and sensitivity of the demand to parking fee
- 2. Temporal variation in demand
- 3. Availability of vacant spaces near concentrated parking generation zones where suitable offstreet facilities can be located
- 4. Existing availability of off-street parking facilities in public/private premises
- 5. Parking space information system to reduce searching time
- 6. Parking space provision in building bye laws and examining its adequacy in the context of growing vehicle ownership

Apart from parking of cars, significant numbers of taxi, jeep, LCV, minibuses and trucks are found to be parked along some of the links. Truck parking is rampant along NH-54 which calls for dedicated terminal facility and complete restriction on on-street parking. Idle bus parking should be restricted to dedicated bus stands. Taxi parking should be encouraged only at certain location where its parking will not interfere much with the vehicular flow. Looking at the huge no. of existing taxi parking at

- 44 -

certain location, feasibility of multi-storied taxi parking stand can also be explored. A list of links has been identified along with tentative actions in **Table-6.4** where on-street parking is significant and adversely affects the traffic flow.

Link No.	Link Description	Parking Characteristics	Recommendations	
4 15 40	UTI ATM to Kapthanga	Idle parking of Cars (80-90), Taxis (90-100),	Containment of taxi/LCV	
1 to 18	Point	Jeeps (60-70) and Trucks/LCV (10-15).	parking in off-street locations	
18 to 19	Kapthanga Point to Za Sanga Point	Parking on one side of the road stretch: 15- 20 LCV, 10-15 Cars and 15-20 two- wheelers.	Containment of LCV parking in off-street locations; Creation of off-street parking facility for cars and taxis;	
19 to 20	Za Sanga Point to MULCO Intersection	Parking on one side of the road stretch: 28- 30 Trucks, 35-40 LCV, 125-130 Cars, 45-50 Jeeps and 70-80 two-wheelers.	Restriction on on-street truck parking and loading/unloading	
18 to 21	Westwards from Kapthanga point along the NH-54	Daytime idle parking of around 115-120 Trucks and LCVs, 130-140 Taxis and few two-wheelers, mostly concentrated near Bawngkawn area.	LCV parking facility; Creation of off-street parking facility for taxis	
22 to 24	Vaivakawn Market Area	20 - 30 Taxi and 30 - 40 two-wheeler parking.	Re arrangement of existing parking facility	
24 to 25	Vaivakawn Market Area to Aizawl Temple Crossing	On-street idle parking of 40-50 LCVs, 130- 140 Taxis and around 150-160 two- wheelers.	Re-arrangement of two- wheeler parking; Creation of off-street multi-storied taxi stand	
25 to 9	Aizawl Temple to Dr. C. Thanthianga Point : One Way	Around 40 two-wheelers and 25-30 cars on one side of the road stretch.	Re arrangement of existing 2- wheeler parking facility; restriction of car/taxi parking	
3 to 2	Near Hrangbana College : One Way	Around 20-30 two-wheelers and 10-15 cars on one side of the road stretch.		
1 to 4	UTI Crossing to Hrangbana Traffic Point : One Way	Around 20 two-wheelers and 20-25 cars on one side of the road stretch.	Complete Restriction on on- street car/taxi parking; Creation of off-street multi-	
4 to 3	Near Hrangbana College : One Way	Around 10-15 taxis on one side of the road stretch.	storied car/2-wheeler/taxi parking facility; Re	
3 to 5	Hrangbana College to Sumkhuma Traffic Point	Around 90-100 cars and 150-160 two- wheelers on both sides of the road.	wheeler parking at some	
5 to 6	Sumkhuma Traffic Point to Laldailova Point	Around 20-25 cars and 25-30 two-wheelers on one side of the road stretch.	stretches	
6 to 7	Laldailova Point to Machhunga Point via Bara Bazaar : One Way	Around 70 -80 two-wheelers and 90-95 cars on one side of the road stretch.		
7 to 8	Machhunga Point to Hari Mandir Intersection via Dawrpui	Around 70 - 75 two-wheelers and 55 -60 cars on one side of the road stretch.	Re arrangement of existing 2- wheeler parking facility;	
10 to 11	Brig. C Vankunga Point to Zothasanga Point	Around 50-60 two-wheelers and 20-25 cars on both sides of the road stretch.	restriction of car/taxi parking; creation of off-street taxi/car	
9 to 10	Dr. C Thanthianga Point to Brig. C Vankunga Point	Around 100 two-wheelers and 100 - 110 cars / jeeps.	parking facility at various strategic location (each spaced	
8 to 9	Hari Mandir Intersection to Dr. C Thanthianga Point : One Way	Around 25 two-wheelers and 25 - 30 cars / LCVs on one side of the road stretch.	not more than 200m from one another)	
11 to 17	Zothasanga Point to	Around 25-30 cars on one side of the road		
111017	Maenga Point	stretch.		

 Table-6.4:
 Parking characteristics along selected links and recommendations

- 45 -

17 to 12	Maenga Point to R. Lalzuava Point	Idle parking of around 140-150 two- wheelers, 50 LCVs and over 100 cars/jeeps observed along this stretch.	
7 to 6	Machhunga Point to Laldailova Point via Millennium Centre : One Way	Parking of around 10-15 cars/jeeps, and 40- 50 two-wheelers has been observed.	
7 to 18	Machhunga Point to Kapthanga Point via Electric Veng/Ramhlun	Very high volume of idle parking of cars, jeeps, LCVs and two-wheelers observed along this stretch	
12 to 13	R. Lalzuava Point to Kulikawn	Idle parking of around 150 two-wheelers, 15-20 LCVs and over 80-90 cars/jeeps observed along this stretch.	
13 and beyond	Kulikawn Intersection to Kulikawn Bus Stand	Idle parking of around 20-25 two-wheelers, 35-40 LCVs, 60-70 City Buses and over 40- 50 cars/jeeps observed along this stretch.	
12 to 14	Sikulpuikawn Intersection to Zokaithanga Point	Idle parking of around 45-50 two-wheelers, 15-20 LCVs and over 50-60 cars/jeeps observed along this stretch.	Re arrangement of on-street
14 to 15	Khatla Bazaar Area	Parking of around 30-40 cars, 20-30 taxis and 30-40 two-wheelers has been observed.	parking facility
14 to 16	Zokaithanga Point to Ztu Kamlova Point	Parking of around 70-80 cars/jeeps, 40-50 taxis and 80-90 two-wheelers has been observed.	
16 to 25	Ztu Kamlova Point to Aizawl Temple Crossing	Parking of around 30-40 cars/jeeps, 10-15 taxis and 20-25 two-wheelers has been observed.	

#### 6.3.6 Management of transit facilities

The public transit facility requires upgradation with particular attention to the following aspects.

- Extension of public transit facilities to areas not served by existing routes. Though some of the routes will have not much trip density and operational feasibility will be low, public authorities must step in with appropriate concession agreements with private operators to reap the long term benefits of increased public transit patronage. The allocation of routes as well as the service characteristics must be formulated and monitored by technically competent public authorities to restrain the private operators from profit-seeking malpractices.
- 2. Flexible ticketing system with interchangeability within routes, fare discounts for special categories i.e. student, elderly groups, women etc. will help enhance the acceptability of public transit modes. This will also increase the mobility of certain sections of the population who cannot afford other forms of motorized movement. Given the increasing trip distances with urban growth and spatial expansion, this will go a long way in addressing equity of access to various sections of population.
- 3. Para transit should not be encouraged as an alternative to public transit. Rather, it must be restricted to feeder services for public transit facilities through various means i.e. parking restriction in the CBD area with steep parking charges in taxi stands, restriction on empty taxis entering the congested roads especially during peak hours etc.
- 4. Looking at the road width, geometry and trip density, small capacity carriers (max. capacity up to 30 persons) is recommended.

- 46 -

- 5. Though AUA has linear urban structure with maximum traffic movement between Bawngkawn to Kulikawn, the need for high capacity mass transit alignment is absent for the time being. The future urban structure proposes a shift in the urban structure primarily towards west, with some development towards north and south. This is partly due to unavailability of developable land and partly to decongest the existing CBD along Bawngkawn-Kulikawn spine. Moreover, the topography, instability of land and the congested nature of development presents enormous challenges to construct any rail based (underground or elevated) high capacity transit system Therefore, in future bus transit is expected to remain as the predominant transit mode.
- 6. There is a need to create few bus terminal facilities at strategic location which will also be acting as transit hubs. Location of transit hubs (both existing and proposed) along with the conceptual spine of movement has been shown in **Map-6.3**. Attention has been paid to locate these transit terminals near the proposed development nodes. Smaller capacity para-transit vehicles can connect these hubs to the adjoining region.
- 7. Idle parking of busses and passenger loading/unloading along carriageways often creates significant level of interference to vehicular traffic. Some bus bays can be created along carriageways where ROW is adequate. Constricted road stretches can use innovative alternatives i.e. combining bus stops with public/private building premises allowing certain development rights to the owner etc.

Though road based movement appears to be the most cost-effective solution in short and medium run, exploration of rope-way system as an alternative medium of transport can be weighed for connecting the settlements located sparsely in difficult terrain. However, this should not be encouraged for future settlements as there are some inherent short comings of rope-way system. It is expensive both on capital and operating cost accounts. It requires very reliable and adequate power supply. It may be catastrophic in areas with landslide and seismic disturbances i.e. with unstable geological conditions.

Air transit is one of the most important modes for long distance regional movement. Recently installed Instrumental Landing Systems (ILS) benefited the air connectivity in a much better way, as flight operations were frequently disturbed by poor weather conditions.

#### 6.3.7 Management of freight movement

As there is restriction of daytime entry to Aizawl Town, haphazard parking of trucks along the NH-54 has been observed in absence of any organized terminal facility. A truck terminal facility has been commissioned near Rangvamual (along NH-54) to meet the truck parking needs. One of the major drawbacks of the regional road network in AUA is that the vehicles from the south have to pass through the congested urban links to move from Lunglei to Sairang or Sihphir. The proposed connection from Melriat/Hualngohmun via Samtlang etc. to Sihhmui will act as regional bypass on the western side. The bypass road commissioned by World Bank will be able to bypass the East (Lunglei) bound traffic. New truck terminal facilities with provisions for warehousing and storage facilities are planned near Sairang (confluence point of NH-54 and State Highway towards Lengpui) in the northwest, Zemabawk in the east and Melriat in the south. The locations of the existing and proposed facilities are shown in **Map-6.4**.

- 47 -

Several activities i.e. automobile repairing, godown and warehousing functions has come up along the NH-54 alignment which also acts as crucial urban link. There is an urgent need to relocate the warehousing and storage functions to the proposed truck terminal facilities as parking of freight vehicles, loading/unloading operations severely affect the traffic movement. Restriction on on-street parking for automobile servicing and repairing should be strictly curved. Relocation of some of them can also be accommodated in the proposed terminal locations as they form integral part of freight vehicle operations.

#### 6.3.8 Restructuring of transport management mechanism

There is an urgent need to restructure the transport management mechanism to meet the future demand with satisfactory level of service.

The present system having many parallel authorities with overlapping jurisdiction leads to adhoc decision-making and often contradictory set of policies, strategies and actions. Comprehensive and holistic approach to transport management is needed to cope with the growing complexity of the transport sector as well as its inter-dependence with other urban sectors.

Creation of an Urban Transport Management Authority as an organization to undertake this task has been widely acclaimed as the appropriate solution. The salient tasks of this authority will be:

- 1. To co-ordinate actions of various public and private agencies providing transport infrastructure and services
- 2. To arrive at a regulatory frame work for operations of various service providers, particularly transit and parking facilities.
- Planning for future transport demand and supply management taking proposed land use into consideration
- To monitor the environmental and socio-economic impact of the existing transport system and for future investments
- 5. To effectively control vehicle ownership and dependence through a set of fiscal and regulatory controls
- 6. Capacity building, both managerial and technical, for institutions under its umbrella

#### 6.4 Conclusion

The plan stresses on augmentation of the existing road network to the areas where new development has been proposed. There is limited scope to augment the capacity of existing road network, but some recommendation has been made to use the under-utilized capacity i.e. restriction of on-street parking in certain stretches, realignment of road geometry, installation of signaling, segregation of pedestrian traffic. Specific measures have been made to encourage pedestrian movement and to make it safer. A set of policies has been framed to increase transit patronage within AUA to lessen reliance on private modes. Movement of freight has also been taken into consideration for efficient regional freight movement and storage/distribution functions within AUA. To improve the capacity for implementation of the future plan/projects, organizational restructuring has also been discussed in brief.

- 48 -











Dept. of Architecture & Regional Planning Indian Institute of Technology Kharagpur

### Very High Very High

High

Moderate

High Moderate

\*

\*

River

Other Traffic Intersections

# N Scale - 1:22,000 Meters 100 200 400 6 600









## Chapter-7

# **HOUSING PLAN**



#### 7.1 Introduction

Housing constitutes one of the major components of a city and makes significant impact on its proper functioning and urban form. The existing status of housing in Aizawl is influenced by the rapid urbanization, the breaking up of joint families to nuclear ones, and the subsequent increase in the demand for housing. Aizawl's unique terrain coupled with acute shortage of buildable land adds to the woes of the housing situation. There has been tremendous pressure on the urban land and the land prices. They are encroaching upon vital virgin lands and steep slopes. As the house is a significant element of built environment, it has to be viewed as a planned, functional, secure and aesthetic entity. Aizawl falls under earthquake zone V and it is observed that majority of the structures are not following the NBC building norms and guidelines. It is a matter of great concern and it is advised that all future construction should take the bylaws and guidelines related to earthquake zone V. It is also recommended that prior to seismic strengthening/retrofitting of any existing structure; audit of the existing structure as regards structural vulnerability in the specified seismic hazard zone shall be carried out as an early date.

The Aizawl urban planning area is divided into 10 planning zones which cover an area of 152.77 sq.km. The population of AUA for the year 2001 was 2,61,078 persons and for the year 2011 it is expected to rise to 3,82,000 persons and 8,20,000 persons by the year 2030 (considering the population projections provided by the Economics and Statistics Department, Aizawl). However provisional population of AUA for the year 2011 is only 312317.

#### 7.2 Existing housing Status

After a detailed study, the major issues related to housing have been identified as below:

- Homelessness is not a major problem in Aizawl. Nevertheless, there has been a rapid increase in the demand for housing due to the large scale in-migration, as well as the breaking up of extended families.
- Slums, per se, do not exist in Aizawl though there are some slum pockets declared by the government. These pockets need to be closely studied and environmental improvement projects need to be taken up. The community show a strong cohesion and no relocation seem to be necessary.
- Cost of construction is exorbitantly high. This is largely due to import of building materials, as
   Aizawl does not have adequate building material production centres. This is a major cause of
   concern. With the increasing demand for housing and the real estate boom that is likely in
   near future, this is an area that needs to be seriously addressed.
- The entire area is earthquake prone and lies in Earthquake Zone V. This notwithstanding, the buildings are mushrooming almost everywhere without following any safety code prescribed by the NBC till May, 2008 when the Aizawl Development Authority started enforcing Building Regulations. This could be catastrophic in the event of a natural hazard. A detailed building audit needs to be carried out to identify vulnerable and structurally unstable buildings and

adequate measures should be immediately taken. Further, all construction in future should adhere to building codes.

- Plot coverage is extremely high in Aizawl with some instances of 100% coverage, seriously hampering the light and ventilation. This practice cannot be allowed to continue.
- Government quarters are largely in a poor shape of maintenance. Low license fee is a major cause for this. The rental structure requires to be revised.
- The traditional style of construction is getting lost and often the new construction lacks any definite character. A hybrid style has developed over time. Thus, a detailed study to identify the style and nature of construction that is better suited to Aizawl is required.

#### 7.3 Future growth directions

The city has grown along the north-south spine in a haphazard and scattered manner due to dictation of undulating terrain, steep slopes and scarps conditions. To go from south to north, one has to travel through the city core. Therefore, two parallel north-south spines have been proposed to release the pressure of city core area. One eastern by pass i.e. World Bank road from Zemabawk in the north to Melthum in the south and another proposed western by pass from Sihhmui in the north-west to Melriat/Hualngohmun in the south via Sakawrtuichhun, Tanhril etc. Residential corridors will naturally follow these roads. While normal housing development will take place in most Planning Zones except those already saturated, there is scope for housing development in the north, south, east and north-western sides of the AUA.

#### 7.3.1 Housing requirement in AUA

The future housing requirement for the AUA has been assessed considering both, the quantitative housing shortage and the qualitative housing shortage. The future household formation, including natural growth and in-migration have been considered, the current housing backlog as well the obsolescence component, have also been considered.

**Table-7.1** below shows the phase wise projected population and the quantitative housing requirement for the AUA in 2031 as a whole as well as planning zone wise, individually.

It is evident from the **Table-7.1** that the total future additional housing requirement in AUA region is 41280 (additional hh in 2021 from provisional hh in 2011) + 43334 (additional hh in 2031) = **84,614** DUs.

The current housing backlog is **6,700** DUs which have been calculated by extrapolating the backlog trends of 2001 with suitable adjustments.

According to Socio-Economic Survey, 2006, 54% (27720 households) of total household (51333) resides in kuchcha housing. It is assumed that, 20% of 27720 hh (5544 DUs) will require total replacement while the rest will be upgraded. Therefore the qualitative housing shortage is computed at **5544 DUs**.

- 50 -
The total housing requirement for AUA is thus the summation of the following:

Future housing requirement 84,614 + existing housing backlog (6700) + obsolescence (dilapidated) (5544) = **96,858 dwelling units** 0 **96, 860 dwelling units**.

Table-7.1: Future Dwelling Unit Requirement in AUA

Planning zone	Popn. 2001	Popn 2011	Popn 2021	Additional Population 2021	Additional Household 2021 (Avg. HH Size=6)	Popn 2031	Additional Population 2031	Additional Household 2031 (Avg. HH Size=6)
Aizawl N-I	38206	55000	74000	19000	3167	130000	56000	9333
Aizawl N-II	32643	52000	64000	12000	2000	64000	0	0
Aizawl E-I	31162	40000	40000	0	0	40000	0	0
Aizawl E-II	22734	28000	28000	0	0	28000	0	0
Aizawl W-I	36190	56000	100000	44000	7333	100000	0	0
Aizawl W-II	30303	50000	88000	38000	6333	158000	70000	11667
Sairang	5034	6000	18000	12000	2000	50000	32000	5333
Aizawl S-I	29823	46000	59000	13000	2167	60000	1000	167
Aizawl S-II	29152	42000	69000	27000	4500	100000	31000	5167
South Extension	5831	7000	20000	13000	2167	90000	70000	11667
AUA	261078	382000	560000	178000	*29667	820000	260000	43334

\*provisional population of AUA for the year 2011 is 312317. Therefore additional hh in 2021 from provisional hh in 2011 is 41280.

# 7.3.2 Land requirement for future housing

According to proposed land use plan 2030, an area of 4069 hectares (26.62%) of planning area has been earmarked for residential use **(Table-4.2, Fig-4.3 in Chapter-4)**. Out of total urbanized use which excludes natural reserves, share of residential use is 57.71% **(Table-4.2, Fig-4.2 in Chapter-4)**. Hence overall gross residential density is likely to be around 200 persons (Around 34 DU, considering household size 6) per hectare.

The future land requirement for AUA has been computed considering the phase wise population divided by the proposed planning zone wise net density **(Table-7.2)**. In Aizawl North-I a housing corridor to cater to the additional population is proposed for which around 250 hectares of land is required. In Aizawl West-I and II, housing corridor with institutional and government housing are envisaged on 400 hectares of land. Aizawl South-II and South Extension has the potential for future growth according to the slope analysis, connectivity and availability of water.

Table-7.2: Future Housing Area Requirement in AUA

Planning Zone	Population 2001	Permissible Residential Density Population/Ha	Population 2011	Area required 2011 (Ha)	Population 2021	Area required 2021 (Ha)	Population 2031	Area required 2031 (Ha)
Aizawl N-I	38206	320	55000	172	74000	231	130000	406
Aizawl N-II	32643	400	52000	130	64000	160	64000	160
Aizawl E-I	31162	500	40000	80	40000	80	40000	80
Aizawl E-II	22734	500	28000	56	28000	56	28000	56
Aizawl W-I	36190	450	56000	124	100000	222	100000	222
Aizawl W-II	30303	450	50000	111	88000	196	158000	351
Sairang	5034	350	6000	17	18000	51	50000	143
Aizawl S-I	29823	450	46000	102	59000	131	60000	133
Aizawl S-II	29152	450	42000	93	69000	153	100000	222
South Extension	5831	450	7000	16	20000	44	90000	200
AUA Total	261078		382000	*902	560000	1325	820000	1974

\*provisional population of AUA for the year 2011 is 312317. Therefore proposed 2011 housing area requirement is in higher side.

# 7.3.3 Future housing locations

In order to cater to the demand for housing, areas for residential use have been proposed as per the availability of developable land in planning area.

**Residential hubs** are identified at Durtlang and Lungleng and **Residential corridors** along the bypass roads from Selesih-Muanna Veng-Thuampui-Falkland-Mualpui to Melthum in the east and from Sihhmui-Sakawrtuichhun-Tanhril-Lawipu-Tlangnuam-Hlimen-Samtlang to Melriat/Hualngohmun in the west. However, there are vast stretches of land adjoining the areas included in the AUA and belonging to these villages – stretching right up to Tlawng River. These stretches of land can be included in the AUA by issuing a notification under section 1(2) of the ADA Act, 2005.

**Administrative hubs** are located at New Secretariat Complex and Lawipu for State-level functionaries and District-level functionaries.

The central Aizawl has become over crowded. Population density in few pockets of central Aizawl is above 500 persons per hectare. For balanced development, new activity centers are proposed in the western periphery like the future capital complex, knowledge hub, new CBD. Similarly, in the southern fringe area new activities proposed range from hospital and health care and in the northern fringes food processing units and allied activities are proposed.

In Aizawl West-I and Aizawl West-II, on about 700 hectares of land, a residential corridor has been proposed with High end housing, Institutions, campus style, studio apartment, government housing

- 52 -

along with New Capital Complex CBD and mixed land use. This area has carrying capacity of around 1,80,000 population.

Around 500 hectares residential corridor at Neihbawih, Sihphir, Durtlang and Muanna Veng along proposed north-south roads from Neihbawih to Muanna Veng has been delineated with carrying capacity of 80,000.

At Zuangtui industrial estate, godowns and warehouses have been envisaged with reasonable number of workers houses and vocational and other training institutes.

In view of proposed State Level Medical Hub, a 300 hectare residential corridor has been proposed at Falkawn-Muallungthu-Melriat-Kelsih. Around 200 hectares housing area has been introduced at Lungleng with Cottage and small scale industries and along proposed western bypass, around 200 hectares housing area at Samtlang has also been proposed. This 700 hectare of housing area is to accommodate around 1,50,000 population.

Proposed locations for new housing in AUA are shown in Map 7.1.

# 7.4 Rate of Urbanization – A Profile

In 2001, the urban population of India was about 286 million representing 28 percent of the country's total population of 1029 million. Population projections for 2021 expect the urban population to increase to about 473 million and by 2041 to about 700 million. The NSS 61st round data reveals that about 81 million of the urban population lived below the poverty line in 2004-05. The ratio of urban to rural poor has gone up from 1:4.45 in 1993-94 to 1:2.73 in 2004-05.

The World Bank projections show urban centers to be accounting for 40 per cent of India's population by 2030 which is likely to cross 50 per cent mark by 2040-45. According to a recent McKinsey report, 59 million people will be living in cities by 2030 and 68 cities will have a population of more than a million. By 2020, there will be a shortfall of more than 30 million urban dwelling units.

# 7.4.1 Mandate of Ministry of Housing and Urban Poverty Alleviation (HUPA)

In the above context, the Ministry of Housing and Urban Poverty Alleviation (HUPA) has developed the following vision:

An equitable, inclusive and sustainable civic sensitive growth of towns and cities free from slums, which provides means of productive employment, dignity and a decent quality of life to all inhabitants, including the poor.

A threefold purpose of the Ministry of HUPA, which is to be achieved in coordination and cooperation with State Governments, Urban Local Bodies and other related Ministries, is mentioned below

A. The creation of a slum-free India, by the up gradation, redevelopment and where there is no alternative, relocation of all existing slums so as to provide access to basic civic amenities, shelter, property and land titling and a decent quality of life to all slum dwellers. This is to be done through the realignment of State policies, planning and institutional structures for urban development, land use and town planning so that future urban growth accommodates the living and working needs of the poor, within planned spaces.

- B. The access to affordable housing for all and the creation of conditions that facilitate a continuous addition of adequate serviced land and housing to meet the needs and aspirations of all urban citizens.
- C. An accelerated rate of poverty reduction, by the convergence of different programs and services relating to skill development, creation of livelihoods, social security and social services including health and education, in order to address poverty in all its aspects, and to do so in a transparent, participatory and citizen centric manner.

As part of the Millennium Development Goals, the implementation of the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), the revamping of the Swarna Jayanti Shahari Rozgar Yojana (SJSRY) and the Rajiv Awas Yojana (RAY) have been initiated. The focus of these goals is

A. Inclusive and equitable urban planning;

- B. Community voice and consensual decision-making;
- C. Assignment of property rights to the urban poor;
- D. Provision of basic services to the urban poor;
- E. Financial inclusion of the urban poor;
- F. Forging a role for the private sector in affordable housing;
- G. Promoting gainful livelihoods for the urban poor;
- H. Creating a reliable database on key urban poverty statistics.
- I. Developing partnerships with the urban poor for upgrading and redevelopment of slums.

Urban Development being a State subject, it is up to the Mizoram State Government to construct residential units and distribute them to Below Poverty Line families depending on their priorities and available financial resources. However, under the Basic Services to the Urban Poor (BSUP) and the Integrated Housing and Slum Development Programme (IHSDP) - components of Jawaharlal Nehru National Urban Renewal Mission (JNNURM), the Government of India provides additional Central Assistance to States to undertake affordable housing and basic amenities to the urban poor.

- 54 -

Master Plan for Aizawl: VISION 2030

7.4.2 Overview of the Rajiv Awas Yojana

The Rajiv Awas Yojana aims to make a slum-free India. The proposal followed a ministry-sponsored survey which pointed out that India's urban slum population is expected to touch the 93.06 million-mark by 2011 from 75.26 million in 2001. The ministry has also estimated a shortage of 25 million houses in the country. The government intends to construct about 10 million houses under the Yojana and it is expected to approve Rs 6,000 crore for the scheme for the next financial year (for the remaining period of the 11th Five Year Plan). The scheme, which will ensure legal property rights to the poor, will be implemented with the state governments in a phased manner.

The Rajiv Awas Yojana (RAY) scheme is expected to achieve the following aims:

- · Formalization of existing slums and universalisation of basic amenities in identified slums
- · Identification and redressal of institutional failures which result in creation of slums
- · Tackling the shortages of urban land and housing that keep shelter out of reach of the urban poor
- · Development of basic infrastructure for affordable housing projects.

RAY envisages the achievement of above goals through provision of central support for slum redevelopment and construction of affordable housing conditional to a set of reforms for inclusive urban development.

The recommended Plan of Action for RAY that may be applied in AUA is two-pronged:

#### I. Up-gradation of existing slums would include:

- Survey and mapping of all existing slums (notified / non-notified)
- Holistic redevelopment of each of the identified slums through provision of all basic civic infrastructure and services, decent housing, reconfiguration of plots wherever necessary and total sanitation.

#### II. Action to prevent new slums shall involve:

- Assessment of the rate of growth with a twenty year perspective
- Form a detailed Action Plan to formulate Strategy for procurement of commensurate lands, to promote the construction of affordable EWS & LIG housing and Identify, propose and legalize the necessary legislative and administrative changes for enabling slum free cities.

The state of Mizoram is required to form a State Level Technical Cell (SLTC) at the State Level and the city of Aizawl is required to form a City Level Technical Cells (CLTC's) at its ULB's for implementation of RAY.

With this framework, a vision for redevelopment of slums has been envisaged for the city of Aizawl.

# 7.5 Vision for Redevelopment of Slums

The vision is based on the National Slum Policy. It shall strive to achieve the following:

i. Ensuring all households shall have access to basic minimum services.

- 55 -

- ii. Ensuring continuous supply or recycling of serviced & semi-serviced land for high density occupation by LIG.
- iii. Building capacity of the EWS & LIG and empowering them to improve their living conditions.
- iv. Encouraging participation of communities & civil society in all areas of planning & development.
- v. Neither a mono strategic approach, nor a top-down strategy, for settlement up gradation, will work.
- vi. There can be no absolute choice of strategy and it has to be situation specific.
- vii. Experience from across the globe shows that the people have to be involved in the entire process of planning, implementing and maintenance.

# 7.5.1 Slum Redevelopment Policy for AUA

A **detailed project report** on the slum population needs to be prepared to study the various factors such as the slum population, location, the residential status, occupational pattern and the income levels etc. in order to implement the various slum rehabilitation schemes.

The entire proposal will be feasible only on implementation by the government authorities either in the public, private or PPP mode.

An integrated slum development policy for Aizawl Urban Area has been derived in lines with National Slum Policy.

#### **Objectives:**

- i. Integration of slum and their communities into the urban area
- ii. Strengthening of legal and policy framework
- iii. Establishing of a framework for smooth implementation of policy

#### **Governing Principles:**

- i. Upgradation and improvement of slums instead of slum clearance
- ii. Access to minimum services in all urban informal settlements
- iii. Goal of city without slums

#### Strategy:

#### i. Inclusive Approach to Definition of Slum/Informal Settlement:

In general, all under-serviced settlements, be they unauthorized occupation of land, congested innercity built up areas, fringe area unauthorized developments, villages within urban areas and in the periphery, irrespective of tenure or ownership or land use shall be covered under the definition of a slum/informal settlement.

- 56 -

# Master Plan for Aizawl: VISION 2030

#### ii. Comprehensive Listing of Slums/Informal Settlements:

For the purpose of providing basic urban services, all under-serviced settlements characterized by poor physical and socio-economic conditions, should be identified and demarcated from regular planned neighbourhoods. These settlements should be listed by the urban local body.

# iii.Registration of Slum Dwellers:

All people residing in such listed settlements should then be registered with the ULB in order to prevent ineligible beneficiaries being included in development programmes.

# iv.Identity Card:

A suitable identity card shall be issued to all households in listed slums. The identity card may contain a few details such as household name, address, details of family members etc.

# v. De-listing

The urban local bodies should de-list those settlements which have been provided with a sustainable level of basic services and where socio-economic indicators have reached defined acceptable norms.

# vi. Classification of Land Status / Tenability

The land status of all listed slums/informal settlements should be classified by the ULB as either Tenable or Untenable in order to determine whether or not regular planned service provision will be undertaken on an in-situ or re-settlement basis.

# vii. Granting of tenure

- i. Tenure on Government Owned Land: Tenure shall be granted to all residents on tenable sites owned or acquired by government. Full property rights shall be granted on resettlement and/or rehabilitation sites.
- ii. Tenure on Privately owned lands
- iii. Land Acquisition: All Tenable settlements on private land should be acquired unless the ULB decides to pass a resolution otherwise.
- iv. Negotiated Compensation: The acquisition of land from private parties should be undertaken on a negotiated basis. All the stakeholders (residents, urban local bodies, public agencies, others) may be invited to participate in the negotiation to promote transparency and equity.

# viii. Resettlement and rehabilitation

Draw up comprehensive resettlement and relocation guidelines for urban dwellers and all relocation or resettlement of dwellers residing in untenable sites shall be implemented strictly in accordance with such guidelines which should ensure that:

- 1. Alternatives to resettlement should be fully explored before any decision is taken to move people.
- 2. Relocation distances should be minimised to reduce the impact on livelihoods.

#### - 57 -

- 3. Resident dwellers must be provided with some choice of alternative sites and where feasible, an alternative rehabilitation package.
- 4. All resettlement sites should be adequately serviced and provision should be made for public transportation prior to settlement.
- 5. The livelihoods of affected people must be sufficiently compensated within a fixed period.
- 6. Participation of primary stakeholders, particularly women, in planning and decision making is a pre-requisite for any resettlement process.
- 7. Women's particular needs and constraints must be specifically addressed.
- 8. Any urban development project that leads to the involuntary resettlement of communities must make provision to cover the costs of R & R.
- All stages of the resettlement process including the transition and follow-up periods should be closely monitored and supervised by the ULB with community representatives. (Also see section 16 on monitoring and evaluation).

# ix. Environmental improvement

The Provision of physical infrastructure components such as water supply, drainage, sanitation, improved access, electricity etc, should support the ultimate objective of improved quality of life. The evidence from existing slum improvement projects clearly shows that an improved physical environment greatly facilitates the integration of the settlement in the wider urban area and at the same time, contributes to improved livelihoods and health and well being of the community.

#### x. Improving access to social services

It will be desirable to bring Municipal Services under the Consumer Protection Act to monitor quality and reliability of basic infrastructure services delivered at settlement level. This should be uniformly applied irrespective of tenure and land status of the settlement, with a specific mandate to monitor absolute levels of service coverage and differential levels of service availability throughout the ULB area.

#### xi. Economic empowerment

Economic Support/Enterprise Development:

There is a need for ULBs to support interventions designed to address livelihood needs of the urban poor. This will include:

- i. the provision of vocational training facilities
- ii. implementation of savings and credit schemes for self-employment
- iii. addressing constraints in the labour market
- iv. providing improved access to raw materials and marketing support
- v. legal rights and redressal systems

It would be desirable for the ULB to involve the private sector in such initiatives wherever possible.

- 58 -

Master Plan for Aizawl: VISION 2030

# 7.6 Strategy for residential housing and land development

The additional 85,500 housing units can be achievable by the participation of Government Departments/Agencies and Private Agencies under the following strategies:

- 1) State Government should provide proposed developable land in the Master Plan for government agencies and private sectors.
- 2) Major infrastructures like major roads, water supply lines, sewage channels, power lines and other basic infrastructure to be developed.
- 3) Private sectors should be encouraged to construct new houses with basic lower order infrastructures.
- 4) Use of local available building materials should be encouraged by the government.
- 5) More development in the central part of planning area to be avoided except the areas where proposals have been given in Master Plan.
- 6) Clearance of Building Plan and Land Development/Layout Plan before construction/ development should be strictly imposed by the Government under the Aizawl Development Authority Act and Rules and Aizawl Development Authority Building Regulations, 2008/ Municipal laws.
- 7) Strict compliance of the ADA Building Regulations/Municipal laws in regard to the following:
  - i) Structural Design
  - ii) Structural Design Basis Report
  - iii) Seismic Strengthening/Retrofitting
  - iv) Certification Regarding Structural Safety in Design
  - v) Constructional Safety
  - vi) Quality Control and Inspection
  - vii) Structural Requirements of Low Cost Housing
  - viii) Inspection.

# 7.7 Land Management Techniques

Since land has been the most important resource for housing since decades, land acquisition models have been developed so as to acquire land for public purposes, growth of future townships, industries and so on. Some of the oft repeated urban development models like gentrification and urban renewal lead to land speculation and ousting of low income people. There has also been an increasing concern towards developing a proper Resettlement and Rehabilitation package. Under the present situation of land market where much land is in private hands, government intervention can be through mechanisms listed below.

- 59 -

# 7.7.1 Land Banking

Land banking involves advance acquisition of land for government use, or large scale public ownership of undeveloped land for further use. A revolving fund can be developed by acquiring fringe areas at low prices, developing it, and disposing it off at a higher price. With the surplus money thus generated, further parcels of land can be acquired. For instance, in Sweden and the Netherlands it has been possible to maintain government monopoly on the conversion process.

#### 7.7.2 Land Readjustment

This concept has been successfully tried in Korea, Japan, and Taiwan. The process may start with either the government or the people (at least 80% of land owners) petitioning for readjustment of fringe land from rural to urban category. A site plan is prepared, infrastructure and services are provided and the enhanced market value of new sites is estimated. Government retains just enough plots to repay costs of infrastructure and services. Original owners get back remaining sites in proportion to initial contribution.

#### 7.7.3 Land Pooling

This is another form of land acquisition. Private land is acquired by public authority with multiple plots and owners. The public authority then consolidates the area, organizes the plots, develops the area with provision of services. Finally plots are given back to the original owners in proportion to their original plot size. The reduced area is compensated by the increase in the land value due to development. This was tried in Australia as early as 1928. A participatory process was adopted, where public authority prepared draft layouts with redistribution arrangements in consultation with the land owners. When a planned layout is prepared with services and new plot subdivisions, extra plots are made available that are sold at market prices to offset the cost of development.

# 7.7.4 Land Sharing

It has often been found that the security of tenure is the single most important factor for poor people to improve their own living conditions. Action taken by the government for any site development increases its market value especially in the area of slum and squatter settlement. In an attempt to establish the land rights in slums and squatter areas, government is often caught as an arbiter between the slum dwellers on one hand and the land lord on the other. The option available in that case is a spectrum of five options as follows: (Angel, 1985).

- Resist eviction and occupy the entire land.
- Negotiate on a land sharing agreement and resettle on a part of the land making the rest of the land available for development.
- Agree to resettle on alternative site.
- Agree to a compensation for land clearing.
- Leave the site without any compensation.

In this case the landlord would desire the options available at the bottom of the spectrum while the slum dwellers would like the options at the top. This results in a stale-mate situation. The land sharing example has been particularly successful in Bangkok in such situation. It is acceptable to both parties

- 60 -

since slums are not wholly uprooted and they get resettled in the same location thus keeping their work to home equation more or less the same. The landlord finds it acceptable since he can immediately put the land to development instead of a long and uncertain period of litigation.

# 7.8 Housing policies and programmes

The housing strategy envisages:

- i. Increase housing availability and affordability.
- ii. Increase land under gross residential area from the existing 7.55% to about 25.43% in AUA.
- iii. Move to market-based auctions to choose the developer:
- iv. Upgrade other infrastructure at community, neighbourhood and city level.
- v. Development of new housing areas and new townships in the identified residential zones. This will include apartments, group housing, govt. housing, row housing, semi-detached.
- vi. Augmentation of the existing housing schemes under NBCC.

# 7.8.1 Rental housing policy

According to the Socio-Economic Survey, the majority of the households in AUA (64.95%) reside in their own houses and another 32.69% in rented houses. In Aizawl E-I (50.91%), Aizawl S-I (40.91%) and Aizawl N-II (40%) have high percentage of households residing in rented houses. The rental housing is mostly of private ownership though a small percentage of government rental housing also exists. The rents of the government housing are reported to be low and, as a result, it is increasingly difficult to maintain this housing stock. On the other hand, there is no effective control over the private rental housing due to absence of effective Urban Rent Control Act or Rules. The rents are high compared to the minimal services and facilities they provide and structural conditions of rental buildings are often unsafe.

Among new schemes for rental housing, the National Housing Bank has introduced the concept of 'reverse mortgage' for senior citizens under which the house owner can avail of a monthly stream of income while remaining owner and occupying the house.

# 7.8.2 Policy on Building Material

Major building materials like cement, steel, bricks, corrugated sheets, are largely imported from neighbouring States. Consequently, cost of building materials is prohibitively high. A government intervention into this aspect is necessary to curb the rising construction cost. Some of the steps may include:

- Setting up of more number of building centres.
- Incentive for research on alternative building material

- 61 -

- Material banking by bulk purchasing materials in lean price period and passing the benefit to consumers
- Government subsidy on material used for the construction of housing for EWS/LIG category

# 7.9 Some Emerging Concepts in Housing

# 7.9.1 FDI in Townships

To boost Foreign Direct Investment (FDI) in townships, housing built-up infrastructure and construction of development projects, the Government has reduced the minimum area to be developed from 100 acres to 25 acres (approx.) or built up space of 50,000 sq. meters and with a minimum capitalization of \$10 million for wholly owned subsidiaries or \$5 million in the case of a Joint Venture with Indian partners. FDI could be a viable means of developing townships in Aizawl.

# 7.9.2 Concept of SRZ and SRC

The Confederation of Real Estate Developers in India (CREDAI) has recommended the concept of Special Residential Zones (SRZ), to the Ministry of Urban Development, Government of India. This is similar to the concept of Special Economic Zones (SEZ). Along with proposed residential corridor at Tanhril area and at Durtlang area, Special Residential Zones are also recommended to accommodate corporate and industrial population.

In another proposal, the **National Real Estate Developers Consortium** (NaREDCo) has proposed that land for affordable housing should be made available by the government at controlled prices. They have proposed the concept of Special Residential Corridors (SRC) which should be located next to SEZs to benefit from the available infrastructure.

With soaring land prices, it is getting increasingly difficult to keep the house price in that range. Real estate developers feel that it is not possible to provide low-cost housing with surging land prices. They state that for consumers to benefit, the government has to provide builders land at a reasonable price; otherwise it is not possible to provide houses at affordable prices. Such SRZs can be proposed in AUA especially where affordable housing for the urban poor is to be developed.

# 7.9.3 Low-Income Housing Tax Credit

The low income housing tax credit programme (LIHTC), according to the US Department of Housing and Urban Development (HUD), 2003, is a massive rental housing programme designed to provide a mixed income development. The programme stipulates builders to construct a specified number of affordable homes for low income groups as part of an inclusive approach. This would entitle the builder to tax credits. The LIHTC provides funding for the development costs of low-income housing by allowing a taxpayer to take a tax credit equal to a large percentage of the cost incurred for development of the low-income units in a rental housing project. To take advantage of the LIHTC, a developer will typically propose a project to a state agency, seek and win a competitive allocation of tax credits, complete the project, certify its cost, and rent-up the project to low income tenants. This approach may be applied to woo realtors into making affordable housings.

- 62 -





# Chapter-8

# **PUBLIC UTILITIES PLAN**



# 8.1 WATER SUPPLY

"Water is free when it falls from the sky but the price one has to pay for its mismanagement is enormous, which no one in the world can afford."

# 8.1.1 Introduction

Of all the planet's renewable resources, water has a unique place. Water resources of a country constitute one of its vital assets. It is essential for sustaining all forms of life, food production, economic development, and for general well-being. The surface water and groundwater resources of the country play a major role in agriculture, hydropower generation, livestock production, industrial activities, forestry, fisheries, navigation, recreational activities, etc. According to National Water Policy, in the planning and operation of systems, water allocation priorities should be broadly as:

- (i) Drinking water
- (ii) Irrigation
- (iii) Hydropower
- (iv) Ecology
- (v) Agro-industries and non-agricultural industries
- (vi) Navigation.

In this drinking water is given the highest priority. Supply of clean and treated water for drinking should be the first and foremost priority of any local self government for the healthy habitation of people over there.

# 8.1.2 Water Supply Scenario of Aizawl

The hill-tops of Mizoram were chosen as habitation sites due to the prevailing healthy and bracing climate. The haphazard and unplanned settling pattern of the area has made water supply a challenging task in Aizawl. Also Aizawl is having the most expensive water supply scheme in India.

In Aizawl, rainy season is from May to September and dry season the rest of the year during which water supply will only be for a few hours a week. Currently Aizawl water supply is done by the Public Health Engineering (PHE) section of Aizawl from the River Tlawng. The Greater Aizawl water supply scheme envisaged the supply of 4.8 MGD treated water at a rate of 135 lpcd to a population of 1,60,000. But at 2001 the population of Aizawl was much more than expected (2, 35,171) and hence the supply rate is very less. To augment the supply, water supply scheme Phase II was started. Presently state PHED is tapping water from the following sources.

- 1. Tlawng river
- 2. Tuirial river (through tanker lorries)
- 3. Tlawng river at Sairang (through lorries)

The water from these sources is fed directly to one main reservoir located at Tuikhuahtlang. The general characteristics of surface water from Tlawng River analyzed by PHED is given in **Table-8.1**.

#### - 63 -

AUA

70.89

0.59

0.05

0.30

27.16

1.01

100

24.98

1.35

100

Physical Characteristics		Chemical Properties		
рН	7.0	P-Alkalinity	NIL	
Odour	Odourless	Total Alkalinity	40.0	
Taste	Tasteless	Total Chloride	10.0	
Colour	Colourless	Total Hardness	80.0	
Turbidity	Less than 1.0 NTU	Total Iron	Trace	
Conductivity(in micro mho/cm)	179.2 at 18.1 <sup>0</sup> C	Fluoride	Trace	

Table-8.1: General characteristics of surface water from Tlawng River

As stated before the main source of water supply for Aizawl is from Tlawng River. Other sources includes tube well, Rain water and spring water. The relative proportion of each used in different planning zones of Aizawl are given in Table-8.2. Ground water availability is very scarce in the area and hence surface water is the main source of supply. It was learned that out of 320 drilled holes (at an average depth of 28 m), only 194 were successful,78 drilled holes yielded water only during the monsoon season and remaining 48 drilled holes were non-functional.

<b>able-8.2:</b> Pe	able-8.2: Percentage distribution of households by source of water											
		Planning Zone										
Source of	1	2	3	4	5	6	7	8	9	10		
Water	Aiza wl N-I	Aizawl N-II	Aizawl N-III	Aizawl E-I	Aizawl E-II	Aizawl W-I	Aizawl W-II	Aizawl W-III	Aizawl S-I	Aizawl S-II		
Own Tap	48.02	77.04	78.47	61.44	56.25	66.60	78.36	96.57	73.08	73.08		
Community tap	0.12	0.26	0.30	0.59	0.58	2.90	0.33	0.06	0.35	0.35		
Own tube well	NA	NA	0.11	0.07	NA	0.08	0.04	0.03	0.09	0.09		
Community tube well	0.21	0.54	0.16	0.38	0.04	1.28	0.11	NA	0.15	0.15		

42.66

0.47

100

26.93

2.21

100

36.57

0.95

100

20.55

0.41

100



50.80

0.85

100

Rain water Spring

water

Total

21.35

0.81

100

It was reported that more than 90 % of the households are getting less than 1hr water supply per week. This condition is very pathetic. Only 0.77% of the households are receiving water supply for more than 2 hours a week. Table-8.3 shows the percentage distribution of households by average hours of water supply per week. The percentage dependence of people of AUA on different water supply sources is shown in Fig-8.1.

2.76

0.58

100

20.04

1.12

100

24.98

1.35

100

- 64 -

Hrs of	Planning Zone										
Тар	1	2	3	4	5	6	7	8	9	10	
Water supply per Week	Aizawl N-I	Aizawl N-II	Aizawl N-III	Aizawl E-l	Aizawl E-II	Aizawl W-1	Aizawl W-II	Aizawl W-III	Aizawl S-I	Aizawl S-II	AUA
< 1Hr	97.82	92.26	70.20	88.27	96.97	94.22	89.68	89.45	91.75	100	91.06
1Hr - 2Hrs	1.43	6.12	29.24	9.85	2.76	5.74	10.32	9.68	6.55	0.00	8.17
>2 Hrs	0.75	1.62	0.56	1.88	0.27	0.04	0.00	0.87	1.7	0.00	0.77
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100	100.00

Table-8.3: Percentage distribution of households by average hours of water supply per week

NR= Not Reported

A Pie chart showing the percentage distribution of household by average hrs of water supply per week for total AUA is shown in **Fig-8.2**.

Also it was found that more than 60% of the households are getting water supply at less than 50 m distance from their houses. This indicates the availability of welldeveloped distribution network. Only Aizawl North I and South Extension are a bit backward in this aspect. Table-8.4 shows the % distribution of households by distance of source of water from house. A Pie chart showing the percentage distribution of household by distance of source of water from house for total AUA is shown in Fig-8.3.



**Fig-8.2:** Percentage distribution of households in AUA by average hours of water supply per week



distance of source of water from house

Table-8.4: Percentage distribution of households by distance of source of water from house

Distance	Planning Zone										
of	1	2	3	4	5	6	7	8	9	10	A11A
Water	Aizawl	Aizawl	Aizawl	Aizawl	Aizawl	Aizawl	Aizawl	Aizawl	Aizawl	Aizawl	AUA
Source	N-I	N-II	N-III	E-I	E-II	W-1	W-II	W-III	S-I	S-II	
< 50 M.	68.27	54.75	67.95	43.22	64.56	75.47	62.18	60.70	43.22	77.59	61.79
50- 100 M.	28.21	34.70	24.10	40.15	31.68	21.00	34.85	30.84	48.09	18.93	31.26
>100 M.	3.52	10.55	7.95	16.63	3.76	3.53	2.97	8.46	8.69	3.48	6.95
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Department of Architecture & Regional Planning, Indian Institute of Technology Kharagpur - 721302

- 65 -

#### 8.1.3 Demand Gap Assessment

As per CPHEEO manual, per capita water supply shall be 70 lpcd for towns without sewerage system and 135 lpcd for cities where sewerage system exists/contemplated. For a city like Aizawl, providing an allowance of 35% for losses, the per capita water supply shall be 182 lpcd. The projected population of Aizawl city in 2007 is 3.42 lakhs (@ 4.6 annual growth rate) and the demand of water at the rate of 182 lpcd would be around 62.24 MLD; but the rate of supply in 2007 was only 22.9 MLD and the demand gap was 39.34 MLD. This clearly shows the scarcity of water in this area and hence immediate measures have to be taken up to augment the current supply of water and to increase the time period of supply. Table-8.5 shows the Planning Zone wise demand of water in Aizawl for 2011 and next 2 decades. **Fig-8.4** shows the comparison of water demand of various planning zones of AUA for the year 2011 and 2031.



Table-8.5: Planning Zone wise demand of water in Aizawl

Planning Zones	Water Demand in MLD at 182 lpcd						
	2011	2021	2031				
Aizawl N-I	10.01	13.47	23.66				
Aizawl N-II	9.46	11.65	11.65				
Aizawl E-I	7.28	7.28	7.28				
Aizawl E-II	5.10	5.10	5.10				
Aizawl W-I	10.19	18.20	18.20				
Aizawl W-II	9.10	16.02	28.76				
Sairang	1.09	3.28	9.10				
Aizawl S-I	8.37	10.74	10.92				
Aizawl S-II	7.64	12.56	18.20				
South Extension	1.27	3.64	16.38				
Total AUA	69.52	101.92	149.24				

- 66 -

# 8.1.4 Proposals

Aizawl Water Supply scheme phase I is presently supplying 10.8 MLD of water and Aizawl water supply scheme phase II is designed to supply 24.1 MLD of water. Hence after the completion of Aizawl Water Supply Scheme phase II, the total quantity of water supplied will be 34.9 MLD. The water demand in 2031 is estimated to be around 149.24 MLD. Therefore it is essential to provide an additional minimum amount of 114.34 MLD water to meet the drinking water demand of Aizawl Urban Area. Since the availability of ground water is less it would be better to make use of the available water from Tlawng and Tuirial Rivers. It has been noticed that the area is obtaining abundant rainfall from June to November. The annual average rainfall of AUA is about 2350 mm. This could be one possible source of water. Rain water harvesting system should be made extensive for tapping the rain water for further use.

- Improvement and further enhancement of rain water harvesting system in household level has to be done. These individual systems will be able to relieve the water stress to a very good extent since Aizawl is experiencing very good monsoon during June to November. Individual, as well as, community level rain water harvesting system should be promoted to collect the rain water as a supplementary source of water. The local body should provide funds for this system.
- 2. Around 15 MGD of treated water could be reused. The split ups for amount of reusable water from STPs is given in **Table 8.6**.

Activity	Quantity of sewage to be utilized
Flushing of sewers	0.1 MGD
Flushing of toilet	7.3 MGD
Irrigation of lawns, street washing and other non potable uses.	4 MGD
Irrigation and ground water recharge (after series of UV disinfection)	2.6 MGD

**Table 8.6:** Split up for reusable water from STPs

- 3. The major growth areas proposed in the master plan is to the western side of the city centre. The Sairang area, Aizawl West-I and South Extension can have collector wells and treatment plants located near the Tlawng River to supply water for that area as these areas are in close proximity of the River (Map-8.1).
- 4. RWH could be primary source of water supply for Aizawl North-I where altitude is very high; treated water from River Tuirial could be used as a secondary source. Pumping of water from Kawrbel Lui (below Sihphir Village), Tuipawl (Durtlang) and the confluence of Tuirivang and Tuirial Rivers in the South Extension should also be taken into consideration.
- 5. The possibility of check dams to store water can be investigated beside in ten locations like Check Dam-1 on Kawrbel Lui below Sihphir, Check Dam-2 on Muthi Lui in Zuangtui village near PWD Complex, Check Dam-3 on Melnga Lui in Rangvamual village near BRTF camp,

Check Dam-4 on Thuithum Lui in Govt. Complex, Check Dam-5 on Zawngkawt Lui in Mawbawk village, Check Dam-6 on Ramri Lui in Tlangnuam village, two Check Dam-7 and 8 in Melthum village near Chite Lui, Check Dam-9 in Hlimen near Presbyterian School, Check Dam-10 on Serlui hnar at Lungleng and location for impounding reservoir at Tuipawl (Durtlang) has to be investigated. But thorough investigation in all respects has to be done before going for the project as Aizawl is located in seismic zone V and the occurrences of land slides are common in the area.

# 8.1.5 Action Plan

- i. Planning and implementation of water distribution systems based on available surface, rain water and spring water sources.
- ii. Covering the entire AUA with a continuous water supply system assuring 24 hr supply with adequate pressure in the distribution system even at the tail ends.
- iii. Public awareness against misuse of water.
- iv. Promotion of Rainwater Harvesting Schemes.
- v. Adequate reforms so as to balance the Annual O&M cost with the revenue out of the water supply distribution. All the water supply connections should be metered and charged in terms of water used. The charge shall be fixed by AUA authorities considering the cost of production of water and subsidy based on fund availability.

- 68 -

# 8.2 SEWERAGE SYSTEM

# 8.2.1 The background

In any urban agglomeration, collection conveyance and treatment of sewage generated cannot be neglected considering the health and well-being of the society. This is the reason why the planning commission has emphasized in its 10th five year plan that all cities and urban areas should have compulsory sewage treatment facilities.

In a modern society, proper management of wastewater is a necessity, not an option. A wide range of communicable diseases can be spread through elements of the environment by human and animal waste products, if not disposed properly. Developing countries like India, where treated water is not available to majority of population, still experiences epidemics like cholera and typhoid.

The hygiene consciousness among the people of Aizawl is reflected in the widespread use of household sanitation facilities. It was observed that most of the houses have individual latrine either inside or outside of their house, depending on the space availability. Also, the reported minimum level of open defecation (compared to many other states of India) indicates the awareness of people about the role of sanitation in the healthy living of the community. But still the disposal of the effluents into open drains which ultimately reaches the rivers is not a healthy practice and it is required to provide integrated sewerage system. The development of effective water and waste treatment methods has virtually eliminated major water borne epidemics in developed countries. Advanced wastewater treatment processes are currently being so developed that it will produce palatable water from domestic wastewater. Thus proper design, construction and maintenance of sewerage system should be given equal importance as other infrastructure projects for the healthy existence of the society.

# 8.2.2 Existing Sewerage System

At present there is no integrated sewerage system in Aizawl. Out of total households about 92% of the individual buildings such as residential, commercial and institutional have their individual toilets provided with the septic tanks. These septic tanks are either with soak pit or with effluent entering into the main drains along the road network. This effluent finally drains into the natural valley portions at the downstream. The remaining 7% households are depends on the shared toilets or community toilets and 1% don't have toilets so they uses open lands and drains. The households mainly have septic tanks for treatment of human excreta but the sullage (i.e. kitchen and bathroom waste) is discharged into drains which ultimately pollutes the fresh water sources. The current status of septic tank effluent from the septic tanks either percolates through the soil to ground water or find its way through drains and cross drains to the rivers, which are the sources of water supply. As the soil planning zones of the locality are rocky, the wastewater does not get adequate treatment even by the soil bacteria. The main issue about ground water pollution is that once it is polluted, it cannot be treated and hence the source has to be abandoned. This will be a significant problem in an area like Aizawl where the water supply rate is very low.

The untreated wastewater reaching the rivers is of serious health concerns. Water borne diseases are spreading frequently in areas with no proper sanitation facilities and in recent future, if the trend

- 69 -

continues, Aizawl will also have to face grave problems of water borne diseases like cholera, dysentery etc. So it is of at most importance to propose and implement sewerage system for Aizawl area.

It is learned that Public Health Engineering Department (PHED) has proposed a 193 crore sewerage scheme for a targeted population of 4.27 lakhs for Aizawl dividing it into 3 sectors and providing 3 treatment plants of total capacity of 59 MLD. Due to difficult terrain and growth pattern, a fraction of total population may prefer or are liable to remain outside coverage, but with septic tank or such conventional system. It needs mentioning here that about 80% of total city population will be covered under the above. The prepared scheme as above is yet to set on move for sanctioning.



# 8.2.3 Wastewater management in 2031

#### 8.2.3.1Expected Sewage Generation in Aizawl

The population of Aizawl as on 2011 is projected as 3, 82,000. Considering a per capita demand of 182 lpcd (with 35% losses) the water supply requirements of the area will be around 69.52 MLD (18.37 MGD). In general, 80% of water supply is expected to reach the sewerage system based on the design procedures applied in India. So, the total sewage generation in 2011 will be 55.62 MLD (14.69 MGD). Similarly the wastewater generation in 2031, (Fig-8.6)



- 70 -

for a population of 8,20, 000, would be around 119.39 MLD (~31.54 MGD).

#### 8.2.3.2Special design considerations for hilly area

The design and implementation of a sewerage system in Aizawl will be technically complicated due to less managed land use, over congestions, shortage of road width, sharp slope, and soil/rock nature terrain.

The sewerage system is designed as gravity flow systems. In hilly areas the main problem occurring while locating the treatment plant and the conveyance network is the transport of the sewage from one watershed to another. Pumping the sewage from one watershed to another is not advisable. So it is better to have decentralized system for sewage treatment.

Also the velocity of flow through the pipes should not exceed non-scouring velocity (3 m/s as per CPHEEO manual) to prevent scouring of the pipe material. But for hilly terrain with steep slopes it will be difficult to control this velocity and special devices may have to be used to dissipate the excess energy (CPHEEO manual).

Usually in plain areas the minimum diameter of pipe required is 150 mm but for hilly areas where extreme slopes are prevalent the minimum diameter given can be 100 mm as per manual recommendation.

#### 8.2.4 Proposals

- Since it is necessary to provide sewage treatment facilities for 119.39 MLD of wastewater, a
  decentralized wastewater treatment system would be more appropriate. The centralized sewage
  treatment system appears inappropriate as it may end up with very huge sizes of sewers and
  various issues of conveyance in handling this huge quantity of wastewater. Also in a hilly terrain
  like that of Aizawl conveyance of water from one area to another will involve lot of pumping
  leading to an increase in both capital and operation and maintenance cost.
- It is proposed that, since Aizawl is now providing water supply from Tlawng River which requires very high head of pumping, reuse of the treated wastewater for secondary purposes can be considered as an alternative. A detailed treatment chain for treatment of wastewater for reuse purpose is given in the section treatment options.
- Minimum obstructions for laying sewers, minimum pumping requirements and the possibilities of acquiring land for sewage treatment plants (STPs) turns important in orienting and locating the plants.
- It is proposed that, since due to terrain characteristics and smaller road width it is difficult to get space to lay sewers through the side of the road, the sewer line may be provided through the centre of the road.
- Keeping in view of these aspects, it is proposed to divide Aizawl into 9 sewage centers with individual treatment plants. The tentative locations of the treatment plants are shown in the Map-8.2 and Table 8.7. However, the exact locations of these treatment units and its extent of land

coverage could be finalized only after a thorough reconnaissance survey. The treatment plants are located near the human habitations keeping reuse potential in mind.

- The proposed system covers an area of around 112 sq. km (Map-8.1). The areas of South Extension and Assam Rifle area of Aizawl South-I are not considered in the design. In those areas individual level septic tanks has to be provided as the treatment option.
- For reuse, separate tanks has to be given for collection of the effluent after disinfection and it should be circulated back to the city using separate pipe system without interfering with drinking water supply system. The treated water can be used for secondary purposes like gardening, horticulture, flushing, irrigation, street washing etc.
- The construction of treatment plants could be carried out in a phased manner on a modular/zonal basis in the planning area consistent with the future development/demand.

#### 8.2.4.1 Treatment Options

Sewage treatment, or domestic wastewater treatment, is the process of removing contaminants from wastewater and household sewage. It includes physical, chemical, and biological processes to remove physical, chemical and biological contaminants. Its objective is to produce a waste stream (or treated effluent) and a solid waste or sludge suitable for discharge or reuse back into the environment. Sewage is created by residences, institutions, and commercial and industrial establishments. Raw influent (sewage) includes household waste liquid from toilets, baths, showers, kitchens, sinks, and so forth that is disposed of via sewers.

STP No:	Planning zone	Village Council	
1	Sairang	Sihhmui	
2	Aizawl North II	Edenthar	
3	Aizawl North I	Durtlang	
4	Aizawl North II	Ramhlun Vengthar	
5	Aizawl East I	Ramthar North	
6	Aizawl East II	Bethlehem Vengthlang	
7	Aizawl West II	Zonuam	
8	Aizawl West I	LawipuVeng	
9	Aizawl South II	Tlangnuam	

#### Table-8.7: Tentative location of STPs

Selection of suitable least cost process for treatment of sewage is governed by factors like raw sewage characteristics, capacity of plant, availability of land, required effluent quality, capital cost, O&M requirement and other local factors. The different treatment options available includes Activated sludge process(ASP), Up-flow anaerobic sludge blanket (UASB) reactors, Fluidized aerobic beds, Trickling filters, waste stabilization ponds and membrane processes. Considering the different treatment options and its feasibility in the current scenario Activated sludge process followed by disinfection or membrane separation process like membrane bioreactor can be adopted as the treatment option.

- 72 -

The conventional ASP system is a widely used wastewater treatment option in major cities of India. This is the most common option in secondary treatment and is also a method of suspended cell sewage treatment method. It assures a removal rate of more than 90-95% of organics from wastewater. Treatment drastically reduces the number of intestinal pathogens in sewage (through competition, adsorption, predation and settling). Numbers of E.coli and enteroviruses are 90-99% lowered in the effluent by the ASP than in the incoming raw sewage. ASP is an efficient and flexible method. It is able to withstand variation in sewage flow rate and concentration. ASP is widely used for the treatment of domestic waste and industrial effluent. Also different studies have proven that the effluent from ASP after disinfection can be reused. Membrane bioreactor is the combination of a membrane process like micro-filtration or ultra-filtration with a suspended growth bioreactor, and is now widely used for municipal and industrial wastewater treatment. When used with domestic wastewater, MBR processes could produce effluent of high quality enough to be reclaimed for reuse purposes. Other advantages of MBRs over conventional processes include small footprint and removal of Chlorine resistant pathogens like Giardia, Cryptosporidium etc. But cost of the system is high when compared to conventional methods. The success of the ASP systems elsewhere, with its easy maintenance and management makes it an appropriate choice for Aizawl. However, with the upcoming of improved treatment technologies on the conventional treatment system, choice of appropriate technology may be left open.

If ASP system is adopted, it may contain the following units:

- 1) Screen
- 2) Grit chamber
- 3) Primary Sedimentation tank
- 4) Aeration tank or ASP tank
- 5) Secondary clarifier (SC),
- 6) Sludge digesters

7) Sludge drying bed for the treatment of sludge obtained from primary clarifier and secondary clarifier and

8) Disinfection unit.

A schematic diagram of the ASP treatment system is given in Fig-8.7.



- 73 -

# 8.3 DRAINAGE

Nowadays due to urbanization the demand for residential, commercial, industrial and recreational areas has increased and to make living and transportation possible large impervious areas are constructed. This results in a change in hydrological cycle, decrease in infiltration and ground water recharge. The change in the pattern of surface and river runoff imposing high peak flows, large runoff volumes with increased transport of pollutants and sediments necessitates implementation of integrated storm water management techniques to protect the locality from flooding and to conserve the receiving water bodies ultimately.

Landslips are a major problem in Aizawl. These are created by the removal of natural soil binders, increased penetration of soils by water, increased weight on soils created by buildings and other structures and the erosion and bank cutting by existing drains. Proper drainage for surface storm water is one of the most important factors for the stability of slope and environmental sanitation. Absence of proper drainage works result in destabilization of earth materials and causes landslide and soil erosion. Excessive moisture getting into the foundation soil has a serious detrimental effect on super structure like massive land slip sinking of soil or foundation of superstructures and so on. To prevent these ill-effects a properly planned drainage system is a necessity.

# 8.3.1 Existing drainage system

Aizawl Urban Area is highly undulating and it is conspicuous by the presence of N-S, NNE-SSW trending linear hill ridges with steep slope representing a very rugged and immature topography. Normally, the western slope is steeper than the eastern slope. The slope angle varies from 300 to 450 forming concave shape in the middle, but is steeper near the banks of the streams and nullahs. Aizawl city being under the direct influence of south west monsoon, there is ample rainfall during the summer. The average annual rainfall in Aizawl is 209 cm. The soil type generally found within the city area varies from sandy loam to clayey loam mixed with broken angular shaped pebbles of varying size. The soil in and around the city is young and in a loose state. Hence it is very susceptible to erosion by rain water. The local hills are formed of mostly sedimentary rocks of tertiary (surma) group.

The drainage system of Aizawl is mainly governed by the natural slope of the hills. The natural drainage system is divided into two parts based on the geomorphology of the areas, viz. eastern portion and western portion. For the eastern portion of the city the drainage is mainly by the streams Chite-lui, Muthi-lui and Tuipawl-lui flowing on the same direction in the form of parallel to sub parallel system. Chite-lui is the most important single stream as nearly more than two-third of eastern portion drains into it. It has many incoming tributary streams of which the most important are – Chanmari-lui rising from the heart of the city, Ramtharlui, Mirawng-lui, Tlak-lui, Bangla-lui, Taite-lui, Bethlehem veng-lui, Lawibual-lui, Hmawngkawn-lui, Zemabawktuikhur-lui, Zuangtui-lui, Kawmthlang-lui etc. The western portion of the city is drained mainly by a number of streamlets which join Ser-lui at the lower level. Ser-lui in the south is joined by streamlets such as Ramri-lui, Tuikal-lui (rising from the heart off the city), Vai-lui, Zawngkawt-lui etc.

Chite-lui, Chanmari-lui, Theihai-lui, Bethlehem-lui, Tuikhurhlu-lui, Mirawng-lui, and Bangla-lui are turbulent with high velocities of currents during the monsoon season and they are very destructive for

- 74 -

human life and property within their respective catchment areas. On the western portion Khatla-lui, Tuikual-lui, Vaivakawn-lui, Chanmari west-lui and its tributaries are the worst destructive streams and nullahs.

67% of Aizawl Urban Area is having kutcha drains and 18% are without any drainage system at all. Only 15% of the area is provided with pucca drains. Some planning zones like Aizawl N-II, Aizawl South I and Sairang are without any pucca drains. Aizawl E-1 and Aizawl S-II has 43-55% of pucca drains mainly along the road side and some hill slope. Planning zones like Aizawl N-II, Aizawl E-II, Aizawl W-I and South extension have 80 - 90% kutcha drains. Aizawl N-I have poor situation with more than 50% of the villages without drains. A graphical representation of the extent cover of drains in various planning zones is given in **Fig-8.8**.

In addition to their function as channels for storm water drainage the drains serve as channels for disposal of both solid wastes and wastewaters. The habit of depositing solid wastes leads to clogging of drains. The use drains to carry wastewaters away from the city is also not a satisfactory or hygienic method to be adopted.

# 8.3.2 Water logging

As such there is no major water logging in Aizawl as it is situated in sloppy ground. Although big outlet channels are not quite present in the area during heavy rains, drain water does not flood the area. Only in some planning zones like Aizawl W-I, the problem exists where 33% of the area remained water logged for several days or for hours. Aizawl N-I, Aizawl E-I and Aizawl W-I have water logged areas which stay flooded for days other than these other planning zones does not suffer from water logging as major civic problem. One of the major reasons of water logging in some area is due to the fact that the residences are throwing the solid waste in the road side drains which goes to natural drains and ultimately blocks the same.

# 8.3.3 Pollution and drainage maintenance

In absence of sewerage system, people are using septic tanks and soak pits. In most of the places sewage is discharged into open drains without any treatment, which ultimately gets discharged to rivers. It is generally observed that people still practices throwing the wastes on streets or open drains which results in clogging of the drains.

The maintenance or regular cleaning operations of drains in most of the planning zones are in very poor condition. Only Aizawl E-1, Aizawl W-I and Aizawl S-II has some trends showing regular and periodical maintenance system. Only 8% of the villages have open drains with regular maintenance and 40% with periodic maintenance while 52% of villages have drains with no maintenance at all. **Fig-8.9** shows the percentage distribution of villages by maintenance of open drains.

- 75 -





# 8.3.4 Proposals

 The drains are getting silted up frequently due to insufficiency in the hydraulic design of the channels. This results in the growth of weeds, shrubs, water hyacinth and other plants, which make these drains non-functional. Illegal encroachments, construction of pucca houses in the close proximity, inadequate space for periodic cleaning, maintenance and repair, construction of structures like bridges, culverts etc. are found affecting the efficiency of the drainage system. Immediate actions have to be taken in this regard.

- 76 -

- 2. It was observed that the surface water runoff and domestic wastewater is discharged into the road side surface drains. Most of these drains have lost their original flow carrying capacity due to the indiscriminate dumping of garbage in the drain and also due to the accumulation of sand and grit. Also the high rate of urbanization has led to higher quantity of surface runoff as infiltration to the sub soil is reduced with increase in built up area. The situation points to the necessity for public awareness against dumping of solid waste and discharge of sewage/sullage from households into the natural drains. However, only by providing a systematic solid waste disposal and collection system this can be curbed.
- 3. Since most of the areas are not having any sewerage system, septic tank effluents is found flowing into the open drains. Only by providing a systematic sewerage system and sewage treatment plants, this issue could be solved.
- 4. It is proposed that the existing drainage alignment within urban area be made permanent and also the natural drainage system be improved and protected with treatment facilities at the outfall points to reduce the pollution from storm water which is found containing domestic effluents. Works on reconstruction and repairing, channel widening and deepening, providing RCC surfaces for channels and drainage pumps, extension of existing drainage channels, providing additional secondary and tertiary channels, providing coverage to existing channels, widening or removing the channel cross culverts etc. are to be considered.
- 5. The main open drainage channels for the various drainage basins within the urban areas are to be properly aligned to provide efficient drainage network.
- 6. The reported cases of flooding in some planning zones are due to the blocking of the drainage channels with solid waste thrown into it. More emphasis has to be given on the management of drains which involves the prevention of flooding and illegal encroachments, periodic maintenance, and provisions of adequate lands for future reconstruction and augmentation activities.
- 7. A network of proposed drains with catchment areas and check dams for the whole Aizawl area is given in **Map-8.3**.
- 8. An organized drainage system is invariably associated with the implementation of a systematic solid waste and wastewater collection and treatment system. So along with drainage solid waste management and sewerage system has to be properly developed and well maintained.
- 9. The drains need to be maintained on a routine manner to achieve optimum capacity. The drains need to be cleaned every year before the onset of monsoon.
- 10. Perimeter protection of all the major drains should be checked before every rainy season.

- 77 -

# 8.4 SOLID WASTE MANAGEMENT

Like most of the urban centers of our country, the Municipal Solid Waste Management (MSWM) remains as one of the most neglected areas of urban development in Aizawl Urban Area (AUA). The Local Administration Department (LAD) of Aizawl is found to have a conventional and primitive system of solid waste management maintained and managed by a team of health and sanitary officers. As expected, apart from domestic sources, public and vegetable markets, hotels and restaurants, fish and meat shops, street sweepings, hospitals, other office/institutions, etc. are contributing to the SW load. A systematic and scientific SW collection, disposal and management are found to be absent in Aizawl. People still adopts the practice of throwing wastes on streets or open drains and sloppy areas of hills. As a result, the solid waste is going down the hills and ultimately gets deposited in the river beds. This is a more acute problem in Aizawl due to throwing of plastics to sloppy areas. Plastics get mixed up with soil, clogging natural flow of water through soil. This loosens the soil bond and cohesion which ultimately leads to landslides.

#### 8.4.1 Quantitative assessment of MSW

In India, the amount of solid waste generated by individuals is quite low between 300-600gm/person/day. It is estimated that the solid waste generation increase at 1.33% per year (Report of the high power committee, urban solid waste management in India, planning commission, Government of India, 1995). The population of Aizawl as on 2011 is 3,82,000. The expected average SW generation rate is 400 gpcd. It is estimated that Aizawl produces MSW approximately at the rate of 152.8 MT/d. The MSW generated in the city mainly consists of domestic refuses, wastes from commercial areas, vegetable fruit market, slaughter houses, bio-medical waste and wastes from hotels and restaurants. Apart from wastes generated from these areas, wastes are also collected from drains in the form of wet silts, which are dried along road sides. It is reported that the collection of solid waste is 75 MT/d indicating a collection efficiency of around 57 %. The expected population of Aizawl in 2031 will be around 8,20,000. At the SW generation rate of around 500 gpcd it is estimated that Aizawl will produce MSW approximately at the rate of 410 MT/d during that time (Fig-8.10). Sector wise solid waste generation in 2011 and 2031 is given in **Table-8.8**.

Planning zone	Population as on 2011	Population as on 2031	SW in MT/day as on 2011 @ 400 gpcd	SW in MT/day as on 2031 @ 500 gpcd
Aizawl N-I	55000	130000	22.00	65.00
.Aizawl N-II	52000	64000	20.80	32.00
Aizawl E-I	40000	40000	16.00	20.00
Aizawl E-II	28000	28000	11.20	14.00
Aizawl W-I	56000	100000	22.40	50.00
Aizawl W-II	50000	158000	20.00	79.00
Sairang	6000	50000	2.40	25.00
Aizawl S-I	46000	60000	18.40	30.00
Aizawl S-II	42000	100000	16.80	50.00
South Extension	7000	90000	2.80	45.00
AUA	382000	820000	152.80	410.00

Table-8.8: Expected Solid waste Generation in 2031 for Aizawl urban area (AUA)

- 78 -



**Fig-8.10:** The expected solid waste generation in Aizawl in 2011 and 2031

# 8.4.2 Composition of SW

The compositions of SW generated in AUA (Fig-8.11) suggest the need for its segregation. The comparatively higher percentage of biodegradable portion of the waste demands composting. The density of solid waste is reported to be 350 kg/m3. A survey conducted by CPCB suggested a calorific value of 3766 Kcal/kg, C/N ratio of 27.45, and a moisture content of 43%.

The performance of the existing system could be well evaluated through some of the service levels



selected as in **Table-8.9**, as against the standard requirements. The standard values represent the requisite level of provision/delivery to be provided as per CPHEEO guidelines and MSW management and handling rules, 2000. As demonstrated in **Table-8.9**, it is clear that the present system fails miserably in providing the minimum service levels in SW collection and treatment expected out of a city of today's world.

- 79 -

SI. no.	Parameter/Component	Service Level	Standard	Remarks
1	Per-Capita Generation	300-400gpcd	210 gpcd	High
2	Collection performance	57% in (2007)	100%	Needs drastic
				improvement
3	Spacing of collection bins	Irregular	500m	Grossly inadequate
4	No. of sanitary workers/1000	<1.8	1.8	Inadequate
	population			

Table-8.9: Performance evaluation of SWM scenario of Aizawl city

#### 8.4.3 Collection and transportation system

The solid waste management system of Aizawl city is handled by Local Administration Department (LAD) of Mizoram. The primary collection system of solid waste in the city is reported to be unsatisfactory and inefficient. Since the city is of undulating terrain, totally motorised vehicles are being used for collection and transportation of waste. The wastes from household are brought by the residents to a fixed point where transport vehicle halts to collect it. No bins are found visible for storing waste, and as a result, residents throw the waste at the road side at some designated locations. Collection of waste from those points are reported and found to be irregular. SW from shops and establishments are also getting dumped on the road sides (sometimes even on roads), open drains, and sloppy hilly areas. The Local Administrative Department has placed 20 mobile garbage trailers of 3.375 m<sup>3</sup> capacity each along the central road of city between Raj Bhavan to Chanmari as a pilot project. The collection and transportation of waste for this pilot project have been privatized. These containers are serving the commercial area including some residential zones. The physical condition of these trailers is not satisfactory. Every time these containers are found to be overloaded. Recently, the Clean Mizoram Society placed 50 litter bins at different locations of the city hanging them at light posts and walls. But, it was observed that around 40% of the solid waste, getting dumped into road side, open and sloppy areas, remains unattended. In low income group residential areas, collection and transportation system is found to be totally absent.

The collection of SW in Aizawl city is being done by 18 trucks each of 3.0 m<sup>3</sup> capacity. The numbers of these trucks is inadequate and their conditions are poor. Most of the vehicles are found to be old and inefficient, resulting in frequent breakdowns and heavy operational and maintenance costs. Further, most of the roads are narrow; posing difficulties to the movement of trucks. These vehicles are insufficient for collection and transportation. The collected wastes are transported to the disposal site at Tuirial and Durtlang (Sakawrhmuituai). It was reported that the transportation of MSW to the dumping site from the city is also irregular.

# 8.4.4 Treatment and disposal of Solid Waste

There is no systematic procedure for the treatment of solid waste. Open dumping and open firing are usually practiced, which causes environmental pollution. The rag pickers used to collect the recyclable waste matters from the disposal sites. There are two sites for disposal of solid waste in the city. It is reported that 90% wastes are disposed at Tuirial site which is located on the western side of Aizawl

- 80 -

city at a distance of 27 km from the heart of the city. Remaining 10% wastes are disposed at Durtlang site, which is 20 Km from city, located at Aizawl to Silchar road towards the north side. Both disposal sites are situated outside the city limits. The locations of existing/proposed solid waste disposal sites with composting plants are given in **Map-8.4**. The existing disposal sites are unscientifically developed leading to possibility of various environmental hazards. The absence of liner system at the base of the disposal site accelerates the contamination of ground water and pollution of the nearby river Tuirial. The dumping site is not fenced. No environmental impact assessment studies have so far been carried for the existing disposal site. Sometimes it is observed that the transport vehicles do not dump wastes at specified location, rather prefer to dump the wastes at available sloppy areas. No segregation and compaction are done on the dumped waste as recommended in MSW management and handling Rule 2000. Apart from MSW, this disposal site facilitates dumping of bio-medical wastes, which are not legally recommended.

# 8.4.5 Health hazards

Indiscriminate littering of waste everywhere in the city leads to growth of unhygienic condition in the city. The degrading wastes may lead to growth of various diseases and insects like flies and mosquitoes. The biodegradable wastes will lead to bad odour in the locality. Unattended wastes encourage the rag pickers to collect the discarded plastic bottles and other recyclable wastes which are brought to the market again. These are dangerous for further utilization in health perspective. The needles, syringes and other usable wastes in the form of bio-medical wastes are again brought back in the market by the rag pickers and local agencies which are again illegal as well as dangerous. Water contamination due to solid waste leads to various water borne diseases to the consumers. Solid wastes in the drains chock the flow of water as experienced in many areas of Aizawl causing unhygienic condition and growth of various diseases.

# 8.4.6 Bio-medical Waste generation and management

Prior to 1998, the bio-medical wastes generated from medical establishments were considered as municipal wastes and was disposed in disposal site along with other municipal wastes. According to All India Institute of Health and Personal Health Hygiene (AIIHPH) 47.2 % of the total bio-medical wastes are infectious in nature. Bio-medical wastes consist of waste sharps, discarded glass wares and disposables, human infected and discarded parts. The Bio-Medical Waste (Management and Handling) Rule 1998, stipulated special consideration for the disposal of bio-medical wastes under which wastes are grouped into 10 categories along with its treatment and disposal options. Health care establishments are supposed to have full fledged bio-medical waste disposal system individually or on a common basis. At present, bio-medical wastes (from around 67 medical establishments) are getting dumped along with municipal waste in the dumping yards of Aizawl. It is reported that the medical establishments are diverting the wastes into the municipal waste stream.

- 81 -

# 8.4.7 Action plan for a sustainable SWM programme

#### 1. Need for a decentralized solid waste treatment system

The developmental pattern of all the areas, especially the urban centers under Aizawl city demands the implementation of an integrated solid waste treatment system. It is felt that only a decentralized MSWM system could help solve the seemingly intractable problem of solid waste treatment in this area in an economically viable, socially desirable and environmentally sound manner.

#### 2. **People participation**

Public awareness and attitudes to waste can affect the population's willingness to cooperate and participate in adequate waste management practices. If people keep on throwing waste on the streets indiscriminately, the local body alone cannot keep the city clean in spite of their best efforts .Thus, it is very important to make people understand that the treatment and management of solid waste is a collective responsibility of the local authority and the community. Municipalities or local governments through participatory programs should convey this message to the people. Solid waste management practice billboards may be posted at strategic locations

#### 3. Enhancement of collection facilities

- Old masonry type dustbins are to be replaced with different types of covered dustbins made out of cast iron, which reduces the time of pickup and improves the process of primary collection of wastes.
- The sweepers of Municipalities may be provided with handcarts and detachable containers and be allotted a fixed area or number of houses for door to door collection. They should also be provided with safety gears and proper uniforms.
- It can be made compulsory for the management of societies/complexes to keep covered bins in which waste is to be stored at acceptable locations to be picked up by the municipal staff.
- The local body may collect waste from community bins by using container handcarts or tricycles whichever may be convenient for transferring the wastes to the waste storage sites by using municipality sweepers.
- The collection service can be provided on a full-cost recovery basis using contractor services on a day to day basis from individual houses.
- The collection service can be provided on a full-cost recovery basis using contractor services on a day to day basis from individual shops also. The service of rag pickers and part time sweepers can also be used in adjustment with the shop owners.
- Sweeping of all public roads, streets, lanes, by-lanes where there is habitation or commercial activities on both sides or on either side of the street should be done daily. A list of such streets and roads together with their length and width should be prepared. The local body, keeping in view the norms of work prescribed should work out a program for their daily cleaning. However, roads and streets where there is no habitation around and do not require daily cleaning may be put in a separate group.

- 82 -

# 4. **Provision of storage facilities**

One of the immediate measures to revamp the existing collection services structure would involve provision of covered community waste bins at proper distances for the people to deposit domestic waste. This is the first step that will ensure that people do not throw their garbage on the roads and hence do not create open dump sites. This will enable the sanitation workers to transfer waste to the transportation vehicle quickly and efficiently with minimum health risk which will help to maintain aesthetics of surroundings.

# 5. Segregation of SW

The expected percentage compositions of the solid waste in the planning areas of AUA are shown in **Table-8.10**. These compositional characteristics of the solid waste underline the need for proper segregation before treatment. Proper segregation of waste into different components and their separate collection can definitely lead to remarkable changes in the entire system.

	Type of solid waste produced (MT/d)							
Planning zone	Biodegradable	Non-biodegradable	Recyclable	Total				
	(48.37%)	(47.29%)	(4.34%)	(100%)				
Aizawl N-I	31.44	30.74	2.82	65.00				
.Aizawl N-II	15.48	15.13	1.39	32.00				
Aizawl E-I	9.67	9.46	0.87	20.00				
Aizawl E-II	6.77	6.62	0.61	14.00				
Aizawl W-I	24.19	23.65	2.17	50.00				
Aizawl W-II	38.21	37.36	3.43	79.00				
Sairang	12.09	11.82	1.09	25.00				
Aizawl S-I	14.51	14.19	1.30	30.00				
Aizawl S-II	24.19	23.65	2.17	50.00				
South Extension	21.77	21.28	1.95	45.00				
AUA	198.32	193.89	17.79	410.00				

Table-8.10: Quantification of the expected solid waste composition in 2031 in different areas of AUA

The segregation of the waste would be a long drawn exercise as it involves attitudinal changes in people and will have to be done with careful planning, in a phased manner. The general public is to be first sensitized towards the whole concept and educated about the need and advantages of doing the segregation. Segregation of waste at the source itself is extremely important as municipal solid waste, which is otherwise environmentally benign on getting mixed with hazardous waste like paints, dyes, batteries, human excrete turns hazardous. The recyclables like paper and plastic etc. become unsuitable for recycling as these get soiled by the organic matter. Although, it would be more fruitful to sort and place different kinds of recyclables in separate receptacles, the waste could be segregated into at least two categories of biodegradable and non-biodegradable initially.

The recyclables obtained through segregation could be straightway transported to recycling units which in turn would pay certain amount to the local bodies, thereby adding to their income. This would help in formalizing the existing informal set up of recycling units, and this formalization in turn could

lead to multi-advantages. The biodegradable matter could be disposed off either by aerobic composting, anaerobic digestion or sanitary land filling. Depending upon land availability and financial resources, either of these disposal methods could be adopted. Though simple land filling is the traditionally practiced system of solid waste management in the planning area, aerobic composting by wind-rose method will be an appropriate option.

#### 6. Reuse and recycling

The concepts of reuse and recycling can well be applied in solid waste management as solid waste is basically a heterogeneous mixture. In typical Indian municipal solid wastes, as shown in **Fig-8.14**, there is a small percentage of recyclable material and more of compostable and inert materials like ash and road dust. There is a very large informal sector of rag pickers, who can collect recyclable wastes (paper, plastic, metal, glass, rubber, etc) from the streets, bins and disposal sites for their livelihood. Thus, the rag pickers can be effectively used for the collection of reusable materials especially because the use of non recyclable packaging materials like PET bottles for soft drinks, mineral wastes, and soft –foam products and metalised plastic film coated food packing materials are on the rise. During recycling, many of which will release toxic gases and ozone depleting products. So it is advisable to educate people to replace these items with eco- friendly packaging materials. The desirable home sorting mechanisms includes dry recyclable materials (e.g. glass, paper, plastic, cans etc.), kitchen and garden wastes, bulky wastes, hazardous wastes, construction and demolition wastes. Sorting can also be done just prior to waste processing or land filling.

#### 7. Energy from solid waste

Electricity can be produced by burning MSW as a fuel. MSW power plants, also called waste to energy (WTE) plants, are designed to dispose of MSW and to produce electricity as a byproduct of the incinerator operation. Mass Burn is the most common waste-to-energy technology, in which MSW is combusted directly in much the same way as fossil fuels are used in other direct combustion technologies. Burning MSW converts water to steam to drive a turbine connected to an electricity generator. Burning MSW can generate energy while reducing the volume of waste by up to 90 percent, an environmental benefit. However, this burning MSW in WTE plants produces comparatively high carbon dioxide emissions, a contributor to global climate change. The net climate change impact of these emissions is lessened because a major component of trash is wood, paper and food wastes that would decompose if not burned. If left to decompose in a solid waste landfill, the material produces methane, a potent greenhouse gas. The concept of producing energy from MSW derives significance as it is given high priority by the Ministry of Non-conventional Energy sources (MNES), Government of India.

#### 8. Instructions for public

- The citizens must be directed not to throw away the solid waste in their neighborhood or in open spaces.
- The citizens must be directed to keep the waste as and when generated in two covered domestic waste containers one for biodegradable and the other for non-biodegradable.

- 84 -
- All private sectors, association of flats, lodges, multistoried buildings etc must be directed to
  provide a community bin facility for storing solid wastes and to facilitate its collection by the
  local body.
- All shops/offices/Institutions are to be directed to refrain from throwing their solid waste on footpaths, streets and open spaces. They should be encouraged to keep the wastes in containers of appropriate capacities for easy handling.
- The footpath dwellers, people engaged in serving eatables on the road side must be directed to keep bins for their wastes.
- The marriage halls, religious places and all such places which are frequently used for serving food must keep containers for the disposal of SW through private sweepers.
- The vegetable and fruit markets produce large volumes of solid waste. The local body should provide adequate size bins for storage.
- The disposal of construction wastes/ debris on the streets/open spaces should not be permitted without prior approval of the concerned authority. The authority must prescribe the rate per metric ton for the collection, transportation and disposal of such wastes.

# 9. Treatment options

The biodegradable portion of the waste is considerably high as shown in **Table-8.10**. So, aerobic composting of SW after proper segregation will be more appropriate. In selected locations especially in rural areas, Vermi-Composting can also be recommended. The manure obtained by these methods can be sold to the local public as fertilizer. Though costly, sanitary land filling can also be practiced at selected urban locations where the recovery from the waste will be very high, serving minimum ecological damage. It appears that the aerobic composting by WINDROW method may be a desirable option for the management of the solid waste. The possibilities of generating energy from SW could be looked into on an experimental basis.

# 10. Biomedical wastes and its management

Biomedical waste has been a growing concern because of the awareness in public regarding HIV, AIDS and Hepatitis B and exposure to discarded needles, syringes and other medical waste from municipal garbage bins and disposal sites. The management of biomedical waste turns important as it has serious bearing on the quality of human life. This becomes more significant especially in the context of the recent trend of establishing multi-specialty hospitals in urban centers. Biomedical waste can be regarded as any waste generated during the diagnosis, treatment or immunization of human beings or animals or produced due to activities of biological research, human anatomical waste, animal waste, microbiology and biotechnology waste, waste sharps, discarded medicines and cytotoxic drugs, solid wastes, liquid waste, incineration ash, chemical waste, etc. Medical wastes contain pathological waste (such as human tissues such as limbs, organs, foetuses, blood and other body fluids), infectious waste (soiled surgical dressing, swab material in contact with persons or animals suffering from infectious diseases, waste from isolation wards, cultures or stocks of infectious agents from laboratory, dialysis equipment, apparatus and disposable gowns, aprons, gloves, towels, etc.), sharps (any item that can cut or puncture such as needles, scalpels, blades, saws, nails, broken

- 85 -

glass, etc.), pharmaceutical waste (drugs, vaccines, cytotoxic drugs and chemicals returned from wards, outdated drugs, etc.), chemical waste (any discarded solid, liquid or gaseous chemicals from laboratories, cleaning and disinfection) etc.

If a small part of these infectious hospital wastes are mixed with other hospital wastes or municipal solid wastes, the entire waste will have to be treated as infectious. Segregation helps in reducing the total treatment cost, stops general waste becoming infectious, reduces the chances of infecting Health Care Worker, etc. All these wastes after segregation must be stored in colour coded containers. Infectious waste should be disinfected before disposal. It has been observed that majority of the hospitals, nursing homes, pathology laboratories and health care centres located in these areas are not taking adequate measures for safe disposal of their bio-medical wastes. These hospitals generate waste in substantial quantities, which needs to be managed by the hospitals themselves. Many large hospitals dispose of their mixed wastes within the hospital premises, where waste remains unattended in the open for a long time. Some hospitals and nursing homes have set up low-temperature incineration plants for the disposal of wastes, which quite often remain out of order as they are not managed and maintained properly. Infectious and non-infectious wastes are generally not segregated at source and instead the mixed (often wet) waste is taken to the incineration plant in a very unhygienic manner. The system of collection, transportation and disposal of bio-medical waste is thus not scientifically designed and practiced in these areas.

#### 11. Implementation of Bio-medical wastes (Management and Handling) Rules, 1998

The Ministry of Environment and Forests issued the Bio-medical wastes (Management and Handling) Rules, 1998 which were amended subsequently. These rules provide for segregation, packaging, transportation, storage, treatment and disposal of wastes generated by hospitals, clinics and laboratories. Bio-medical wastes (BMW) have been classified into various categories (Table-8.11) and the treatment and disposal options for each of the categories are specified (Table-8.12). The treatment and disposal should be in compliance with the standards prescribed in Schedule V, which stipulates standards for incinerators (operating and emission standards), for waste autoclaving, for liquid waste, of microwaving and for deep burial. A schedule for implementation of BMW rules has been laid down in Schedule VI. Imposing segregated practices within hospitals to separate biological and chemical hazardous wastes that will result in a clean solid waste stream, which can be recycled easily. An Advisory Committee is to advise the prescribed authority on the implementation of these Bio-medical wastes (Management and Handling) Rules.

Waste Category	Waste Class	Waste Description
No. I	Hunan Anatomical Wastes, blood and body fluids	Waste consisting of human tissues, organs, body parts, body fluids, blood and blood products and items saturated or dripping with blood, body fluids contaminated with blood and body fluids relieved during/after treatment, surgery or autopsy or other medical procedures.
No. 2	Animal Waste	Waste consisting of animal tissues, organs, body parts, carcasses, bleeding, fluid blood and blood products, items contaminated with blood and fluids, wastes from surgery treatment, and autopsy and wastes of experimental animals used in research, Haste generated by veterinary hospitals, colleges, animal houses and livestock farms.

Table-8.11:	Categories	of Bio-Medical	Wastes
-------------	------------	----------------	--------

- 86 -

# Aizawl Development Authority Master Plan for Aizawl: VISION 2030

No. 3	Microbiology	Wastes from laboratory cultures, stocks or specimens of micro-organisms, live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes and production of biologicals, dishes and devices used to transfer of cultures
No. 4	Waste Sharps	Wastes consisting of sharps such as needles, syringes, scalpels, blades, glosses etc. that are capable of causing puncture and cuts. This includes both used and unused sharps.
No. 5	Highly infectious wastes	Waste containing highly infectious living and nonliving pathogens and exposure to it could cause disease.
No. 6	Isolated waste	Biological wastes from discarded materials contaminated with blood, excretion exudates or secretions from human and animals isolated due to communicable diseases,
No.7	Discarded Medicines	Wastes comprising of outdated, contaminated and discarded medicines,
No.8	Discarded Glass wares	Wastes generated from glass-ware and equipments used.
No.9	Solid Waste	Wastes generated from soiled cotton, dressings, liners, beddings including the packaging materials.
No.10	Disposables	Wastes generated from disposable items other than the waste sharps.
No.11	Liquid wastes	Wastes generated from laboratory and washing, cleaning, house-keeping and disinfecting activities.
No.12	Biotechnology	Wastes generated from activities involving genetically engineered organisms or products and their cultures not declared to be safe.
No.13	Slaughter House	Wastes generated in the form of animal tissues, blood and body fluids.
No.14	Incineration wastes	Ash from incineration of any Bio-medical wastes.

**Source:** Report of the high power committee, Urban Solid waste Management in India, Planning Commission, Government of India, 1995

Table-8.12:	Treatment and	Disposal (	Options of	<b>Bio-Medical</b>	Wastes
	in out in one und	Diopodal		Bio modioa	

Waste Class	Treatment and Disposal Options
Human Anatomical Waste	Disinfection and incineration/Burial
Animal Wastes	Disinfection and burial
Micro-biology	Disposal in special container
Human blood and Body fluids	Dilution with disinfectant Disposal in special drains
Waste sharps	Disposal in special containers and landfill
Highly infectious wastes	Special decontamination, packing in specially designed containers and final disposal on secured landfill.
Isolated wastes	Secured landfill disposal after suitable treatment.
Discarded medicines	Incineration
Discarded glassware	Decontamination, destruction
Soiled-waste	If infectious to be disposed of as infectious waste, if no infectious to be disinfected and disposed.
Disposables	Packaging in appropriate containers and incineration, disposal on secured Landfill.
Liquid Wastes	Disinfection and discharge in special drains.
Bio-technology waste	Packaging in special containers and disposal on land.
Slaughter house waste.	Disinfection and disposal on land for solid and treatment and discharge for liquid.

Source: The Gazette of India (extraordinary) no. 233 dated 25th April, 1995, New Delhi

#### 8.4.8 Processing and Disposal of Solid Waste

The solid waste can be processed by composting, vermi-composting, anaerobic digestion, sanitary land filling, incineration or any other biological processing for stabilization of wastes. Since it contains high amount of biodegradable portion, composting may be a cost-effective option for processing. The process of microbial composting or vermi-composting may be adopted with least mechanization to keep the cost low, and to market the compost as fertilizers to adjoining villages. So the concerned municipalities are duty bound to earmark minimum 20-50 acres of land to meet the requirement of solid waste treatment. The areas of existing dumping yards can also be developed. The rejects from these plants and domestic hazardous wastes may be carefully land-filled. The bio-medical wastes may be disposed off as per the Bio-Medical Waste Management and Handling Rules as described above.

A decentralized treatment system will be more feasible option for solid waste treatment. Recently, there is a trend towards smaller, manually operated composting plants at community level, initiated primarily by citizens' initiatives or nongovernmental organizations (NGOs) supported by many national and International nodal funding agencies. In combination with primary waste collection, composting improves the precarious waste situation in the communities, and residents become less dependent on the poor municipal waste collection service. Decentralized composting can be operated by an appropriate technology and implemented at reduced investment and operating costs. Manual composting in small, decentralized plants is more easily integrated in the prevailing Indian level of development and socio-economic background, as it requires labour-intensive processes. It will create employment opportunities and a source of income to the underprivileged people in the rural areas of Aizawl. Decentralized composting allows reuse of organic waste where it is generated, thereby reducing waste quantities to be transported as well as transport costs. This may drastically reduce the overall cost of municipal solid waste treatment.

#### 8.4.9 **Proposals for solid waste treatment**

Since the solid waste generation expected in Aizawl in 2031is very high, providing compost treatment facilities for this huge quantum of wastes, though essential, may not be practically possible in a single phase. So, it is necessary to propose economically feasible, and technically viable, solutions which can be implemented in a phased manner. The densely populated urban areas of Aizawl are to be given first priority in providing the composting facilities for solid waste treatment. The rural areas, where enough space is available, can practice the traditional disposal practices like vermi-composting or open dumping under controlled conditions. As AUA is in hilly area the transportation of solid waste through long distances in the narrow roads will be very difficult. So the solid waste management system may be decentralised by providing 9 aerobic co-composting plants following windrows method beside the proposed sewage treatment plant (STP) sites. Additional 2 composting plants have been proposed in Lungleng South and Falkawn to cater to the requirements of the South Extension planning zone. Two more disposal sites has been proposed to minimize transport cost, one in Sakawrtuichhun towards north and another in Samtlang towards south shown in **Map-8.4**. The term co-composting means the composting of two or more raw materials together. In the case of organic part of MSW and sewage sludge, this kind of composting is advantageous because the two waste

- 88 -

materials complement each other well **(Fig-8.12)**. The sewage sludge is high in nitrogen content and moisture and the MSW is high in organic (carbon) content and has good bulking quality. Proper mixing of the same ensures and optimum C:N ratio to enhance the biodegradation process. The co-composting plant can utilise the sludge produced from the STPs and convert it to manure which can fetch revenue for AUA.



In pre-processing, materials like glass, plastics, etc. and other pollutants, which can be adversely affect the value of the product of a co-composting operation, are removed from the raw materials, manually, introduced in to the composting process.

Sewage sludge from the sewage treatment plant is thoroughly mixed with food waste according to volume of pile but before mixing of these materials, particles are crushed as well as grinded, manually with the help of cutter and hammer, to get size between 25-75 mm.

Cow-dung is added as source of micro-organism in to waste matrix, initially. The C:N ratio is kept at about 30 and with respect to that the blending ratio of food waste to sewage sludge is kept 3:1 by weight of piles. Saw dust is also added to feed stocks to provide free air space in the waste matrix.

The volumetric ratio of raw materials and saw dust is kept between 1:1 to 1:2.5. It is assumed that saw dust would work as bulking agent and has no effect on one month composting process. Pile is mixed by shovel properly after adding all materials as mentioned earlier. The size and shape of pile is selected in such a way that maximum volume could be covered with available waste and stability of pile could be maintained as well.

At present, dumping of the collected SW are being done in 2 different locations of Aizawl namely, Tuirial (90%), and Durtlang (10%). Tuirial site is located on the western side of Aizawl city at a distance of 27 km from the heart of the city. Durtlang site is 20 Km from city, located by Aizawl to Silchar road towards the north side. The non-biodegradable portion of the MSW amounting to be 171.9 MT/d may be transported to the existing disposal sites and land filled there. Two lined landfills may be developed there.

# 8.4.10 Hazardous/bio-medical waste treatment

(i) The Notification from the Government of India, Ministry of Environment dated 20th July 1998, which deals with the collection of Bio-Medical wastes entrusts the liability of its disposal with the waste producer itself. Thus the management of bio-medical waste is not the responsibility of Municipalities. But, however, they can assist in the management of biomedical wastes on a full cost recovery basis without sharing any legal responsibilities.

(ii) It is advisable to have some hazardous/bio-medical facility for the entire Aizawl planning area. The bio-medical wastes collected from spots can be stored in selective transfer stations and can be transported to this central treatment facility. If so desires, the authorities can formulate action plan for implementing this plant through some competent agencies and can suitably charge for the treatment and disposal of bio medical wastes. The solid waste dumping sites closest to industrial sites will be a more appropriate option.

# 8.4.11Financial management plan

Any proposed solid waste management system will require provision of financial resources for its smooth running. The financial requirements vary substantially from year to year. However, since revenue instrument cannot be made to adjust annual requirements it is proposed to raise the financial sources through;

- 1. Introduction of SWM benefit tax / cess.
- 2. Loans especially for capital investments from appropriate agencies.
- 3. Effort should be made for encouraging private capital through Built-Operate-Own (BOO), Built-Operate-Transfer (BOT), Built-Operate-Lease-Transfer (BOLT) and other arrangements.

- 90 -

# 8.5 POWER

# 8.5.1 The background

In 1961 power supply started in Aizawl with the inauguration of Section Office under the Jorhat Electrical Divisional of the Assam State Electricity Board (ASEB). At that time Mizoram was part of Assam state. First source of power supply in Aizawl was a diesel Power Station with 75 KW capacities in the year 1962. In 1967 ASEB was expanded to Aizawl Electricity Maintenance Sub-Divisional status and later to Divisional Office in 1971. With the attainment of Union Territory in Mizoram, the Aizawl Electrical Maintenance Division was handed over from ASEB to the Mizoram State Public Work Department. In 1979 Power and Electricity Department was formed out of the PWD. The power and Electricity Department started functioning as Department headed by Chief Engineer in 1983 and by Engineer-In-Chief from 08.04.2008.

At present distribution transformers are located just by the side of the road in some places due to non availability of adequate space. Present power supply system is inadequate as compared to demand. Modernizations and augmentation of existing distribution network is required to minimize energy loss, for public safety and uninterrupted power supply. Future Strategy for Generation and Distribution of power has to be formulated in the perspective of expected population growth, future power demand and physical constraints of the region.

Non conventional and renewable energy sources are to be explored to fulfill the future energy demand. Power generation from wind and solar energy sources can reduce the dependence on outside state for power requirement.

# 8.5.2 Availability of power

Like water power is also very essential indicator of development. In Aizawl Urban Area 99% of the households have power connection. In planning zone 1, 2, 3, 4, 6, 7 and 10, 100% households have power connection as shown in **Table-8.13**.

	Planning Zone										
Availability	1	2	3	4	5	6	7	8	9	10	
of Power	Aizawl N-I	Aizawl N-II	Aizawl E-l	Aizawl E-II	Aizawl W-I	Aizawl W-ll	Sairang	Aizawl S-I	Aizawl S-II	South Extn.	AUA
Availability	100	100	100	100	98.40	100	100	93.69	98.92	100	98.93
Not Available	0.00	0.00	0.00	0.00	1.60	0.00	0.00	6.31	1.08	0.00	1.07
Total	100	100	100	100	100	100	100	100	100	100	100

Table-8.13: Percentage distribution of households by availability of power

Source: Socio-Economic Survey Report, 2007

# 8.5.3 Power supply

#### 1. Sources of power supply and distribution

The main sources of power supply in Aizawl are bulk purchase from outside State, viz., Central Sector Power Plant and Rokhia Gas Base Plant. The city does not have any major power station but it has one small Hydel Station i.e. Serlui 'A' SHP (1.0 MW). There are two 132 KV Substations having transformer capacity of 2X12.5 MVA each (Total 50 MVA) and seven nos. 33KV substations having total transformation capacity of 68.0 MVA (Map 8.5). The power is distributed through distribution transformer located at 333 locations having capacity ranging from 25 kVA to 1000 kVA.

		Power availability during 2007-08 (in MU)		Power av during 2008	vailability 8-09 (in MU)	Power availability during 2009-10(in MU)	
SI. No.	Source	Power purchase	Local generation	Power purchase	Local generation	Power purchase	Local generation
1	Tripura State Electricity Corporation Ltd. (TSECL)	24.95	-	23.45	-	26.70	-
2	NEEPCO	182.20	-	192.93	-	157.85	-
3	NHPC (Loktak)	19.01	-	16.13	-	16.68	-
	TOTAL	226.16		232.51		201.23	
4	State Owned Generation	-	2.62	-	2.65	-	4.03
5	Hydel	-	16.30	-	8.28	-	13.45
	Total	226.16	18.92	232.51	10.93	201.23	17.48
GRAND TOTAL		245	5.08	243	3.44	218	3.71

**Table-8.14:** Source of power supply

#### 2. Present pattern of power consumption

The total power supply received from outside the State during 1998-99 was 171.32 MKW. The power supply sources during 1991, 2001 and 2009 are given in **Table-8.15**.

Table-8.15: Pattern of power consumption

SI. No.	Categories	1991	2001	2009
1	Domestic	33.60	56.19	74.27
2	Commercial	2.85	6.73	7.90
3	Public Lighting	3.84	4.80	5.18
4	Public Water Works	5.55	14.79	19.41
5	Bulk Supply	1.60	4.51	6.25
6	Industrial	1.15	1.87	2.38
	Total	48.59	88.89	115.39

# 3. Future Plan for Augmentation

To cater to the ever increasing power demand of the state especially within Aizawl, the following schemes are envisaged:

# i. Hydro Electric Generation:

• Serlui B-12 MW: Serlui B Hydel is situated near Bilkhawthlir. All construction works are completed and the project is on the verge of completion.

- 92 -

- Tuirial-60 MW: Tuirial Hydel Power Project is taken up by NEEPCO and is to be completed by 2015.
- Tuivai-201MW: The project is being taken up in Private Public Partnership (PPP) mode with Central Viability Gap funding expected. Power generated will be transmitted to Sihhmui 400kV substation at Sihhmui (Aizawl). Seven private companies have already been empanelled from which tender has to be invited. The project is to be completed by 2017.
- Tuirini-38 MW: MOU is already signed with SPML (Energy) ltd.
- TuivawI-42 MW: MOU is already signed with SPML (Energy) Itd.
- Lungleng (Tlawng)-55 MW: Letter of Intent (LOI) already issued to Shyam Century Ferrous and Draft MoU is under consideration by Government of Mizoram.

# ii. Thermal Plants:

- Bairabi Thermal Plant-22 MW: This project is Heavy Fuel Based Generation and as there is possibility of gas extraction within the area, the project is proposed to be converted to Gas Based Generation in the near future.
- Gas Based Thermal Plant at Hortoki-150 MW: As there is high possibility of gas extraction at Hortoki area, thermal plant of 150 MW generating capacity is expected to be installed at Hortoki.

# iii. Transmission and Transformation:

- Sihhmui Substation: This will connect Powergrid's 400 kV sub-station at Sakawrtuichhun which is connected with the Transmission Highway of the nation by 400 kV. This will also connect important Generating Station like Tuivai (220kV), Hortoki, Lungleng etc. This will also connect all the important transmission substations of the state directly or indirectly.
- Melriat Substation: This will mainly cater load to Southern part of Aizawl and will have direct connection by 132 kV line with Sihhmui, Luangmual, Bukpui and Lunglei.
- Zuangtui Substation: This is the first substation of the state constructed by the Department of Power and Electricity, Govt. of Mizoram. This substation will feed the Eastern part of Aizawl. The substation will be augmented and renovated to maintain quality power supply. This substation has direct connection with Sihhmui, Serchhip and Saitual.
- Luangmual Substation: This substation is feeding western part of Aizawl and present Aizawl water pumping scheme. In future, this substation will connect SIPMIU 132 kV substation scheme at Dihmunzawl which is being undertaken as deposit work.

# iv. Distribution Scheme:

There are nine 33/11 kV substations in and around Aizawl, catering the distribution transformer through 11 kV line. The Power and Electricity Department is having proposal for setting up of 150 i.e. 50 nos. of 500 kVA and 100 nos. of 250 kVA within the city at different locations. 33 kV substations at Durtlang, 33 kV substations at Lawipu and 33 kV substations at Maumual with associated power networks are in the pipeline.

**RAPDRP:** There is a nationwide system scheme for improvement and reduction of transmission and distribution losses. The scheme includes digitization of the lines, consumers (GIS mapping) within Aizawl and reduction of accumulated losses within 15%.

#### - 93 -

#### 8.5.4 Street lighting

Street lighting not only serves as a lighting system but also prevents social evils. In a congested city like Aizawl, where streets are narrow and dark, proper street lighting is needed. There are numerous places within the city where clearances between distribution lines and buildings as specified in Indian Electricity Rules, 1956 are not maintained. In absence of Building Bylaws, it will be hazardous for vehicles and human life in case of any accidents or breakdown. It is safe to provide underground cable system electrification in busy traffic areas for public safety. The Power and Electricity Department installed street lighting system at suitable locations with fund received from the Local Administration Department for high mast system and other by Power and Electricity Department itself. There is no criterion for locating street light posts at present and are located at suitable locations. There are 15 high mast sodium vapour light locations viz. - Mission Veng, Treasury Square, Vaivakawn, Chanmari, Bawngkawn, New Secretariat Complex, P.C. Hospital, Durtlang, ATC Durtlang, Ramhlun N, Beraw Tlang, TNT, Zuangtui, Civil Hospital, Dawrpui Thlanmual, New market, Central Jail etc.

In the City Development Plan for Aizawl under JNNURM, in their report they have included fixation of High Pressure Sodium Vapour Lamp-250W, 150W, 70W Street Light and installation of High Mast 25 meter high.

Rs.45 crores is planned in JNNURM for investment on Power during their Mission period.

# 8.5.5 Future Demand

The consumption of power in AUA is assumed to be 1.2 Kilo Volt Ampere (KVA) per household at the city level and includes domestic, commercial, industrial and other requirements. **Table 8.16** shows the zone wise electricity demand of AUA for 2011, 2021 and 2031.

	2011			2021			2031		
Planning zones	Popn. 2011	No. of HH 2011	Electricit y in MVA	Popn 2021	No. of HH 2021	Electricit y in MVA	Popn. 2031	No. of HH 2031	Electricit y in MVA
Aizawl N-I	55000	9167	11	74000	12333	15	130000	21667	26
Aizawl N-II	52000	8667	10	64000	10667	13	64000	10667	13
Aizawl E-I	40000	6667	8	40000	6667	8	40000	6667	8
Aizawl E-II	28000	4667	6	28000	4667	6	28000	4667	6
Aizawl W-I	56000	9333	11	100000	16667	20	100000	16667	20
Aizawl W-II	50000	8333	10	88000	14667	18	158000	26333	32
Sairang	6000	1000	1	18000	3000	4	50000	8333	10
Aizawl S-I	46000	7667	9	59000	9833	12	60000	10000	12
Aizawl S-II	42000	7000	8	69000	11500	14	100000	16667	20
South Extension	7000	1167	1	20000	3333	4	90000	15000	18
AUA	382000	63668_	76	560000	93334	112_	820000	136668	164

Table 8.16: Phase wise demand of electricity in the planning zones

**Table 8.17** shows the planning zone wise proposed number of 11 KV substations required for the population of 8.20 lakh in 2031.

- 94 -

#### Master Plan for Aizawl: VISION 2030

Table 8.17: Number of 11 KV substations required for AUA (2031)

Planning zones	Popn. 2031	No. of 11KV substation required
Aizawl N-I	130000	9
Aizawl N-II	64000	4
Aizawl E-I	40000	3
Aizawl E-II	28000	2
Aizawl W-I	100000	7
Aizawl W-II	158000	11
Sairang	50000	3
Aizawl S-I	60000	4
Aizawl S-II	100000	7
South Extension	90000	6
AUA	820000	56

#### 8.5.6 Bottlenecks

Bottlenecks or Impediments in the distribution system

- 1. Loss of power and old network system along with power theft are bottlenecks in efficient distribution.
- 2. Due to haphazard unplanned growth of settlements there is loss of power due to increase in length of supply lines.
- Lack of adequate land available for location of transformers in some places result in locating transformer by the side of the roads and may result in significant loss of life and property in case of accidents.

# 8.5.7 Vision for Development of Electricity generation and distribution

- 1. Access to electricity to 100% in future for all household by 2015
- Establishment of a long-term planning mechanism of power sector operations based on a detailed sector reform roadmap, a long-term power system master plan, and a sector-wise capacity building programme.
- 3. Provision of open space (1/2 acre) for accommodation of future substations should be kept at every 3 km distance in a distributed manner.
- 4. Promotion of private sector participation and public-private partnerships in power generation and distribution
- 5. 100% metering and MIS for reduction of T&D losses
- 6. Cabled LT supply wires help in prevention of hooking and power theft. Control of electric meter in the hand of the distribution authority to prevent illegal tampering.
- 7. Power tariff should be suitably modified for raising the revenue to be used for modern development of power infrastructure.

# 8.5.8 Power Generation Technologies from Renewable Sources

In AUA there is huge potential for power generation from renewable energy sources, such as wind, biomass and solar energy. Special emphasis is to be given for the generation of grid quality power from renewable sources of energy. The renewable energy power sector includes:

- Wind Energy
- Solar Energy
- Biomass Energy
- Biomass Gasifier
- Energy from waste

Aizawl is declared as a Solar City. Under this scheme, solar power plants of capacity 100 KW- 5 nos., 25 KW-10 nos., 10KW-10 nos. totaling to 850 KW at different locations is proposed. DPR for solar water heating system of 20,000 litres per day capacity is already prepared and submitted to MNRE, New Delhi. It is expected to be completed within 2012-2013 financial year and solar water heating system of capacity 30,000 ltrs per day is expected to cover in the next financial year. It is expected to generate 10% of the required power by using solar power plant. Solar Street Light: 6000 solar street lights (74 wp,12 Volt 80 AH) Luminier LED type is expected to be installed at different locations within Aizawl.

# 8.5.9 Renewable Energy at Local Government Level

Various instruments exist with the Indian local Governments that can be used for promoting use of Renewable Energy in local urban developments.

# Legal

Local Authority can use legal instruments for Renewable Energy by amending existing byelaws or by making new laws promoting Renewable Energy. A model regulation / building bye law for making installation of solar assisted water heating system mandatory in various categories of new buildings will go a long way in energy conservation.

# **Fiscal and financial incentives**

To promote Renewable Energy, local Government can also adopt the strategy of providing incentives. These incentives can be financial and fiscal in nature. For Example Municipal Corporation can introduce an incentive of 10% cut in property tax for those who install solar water heating systems.

# Persuasion (organizing awareness programme etc.)

To accelerate development and deployment of Renewable Energy programme at local level, local government can organize awareness and training programmes. It can organize workshops for prospective users such as housing societies, builders, developers and architects. Banks are also coming forward with interest free loans.

# **Demonstration projects**

Some pilot projects can be implemented demonstrating renewable energy and energy efficiency. Large scale use of solar energy for water heating, power traffic lights, and hoardings will result in cost and energy saving. It will also generate confidence among the public for use of Renewable energy and energy efficient technology.

- 96 -















# Chapter- 9

# EDUCATION, RECREATION & COMMUNITY FACILITIES PLAN





# 9.1 Introduction

Equity and Efficiency are two most important aspects while evolving spatial standards for social and cultural facilities. Moreover, planning and development of social infrastructure in Hill Areas need some special considerations:

- 1) Exposure to sunlight, degree of slopes and accessibility in form of distance travelled.
- 2) Flexibility in norms and standards to accommodate conditions guided by difficult hill terrain.
- 3) Work place and residence relationship.
- 4) Energy needs communication network etc.

In the absence of any established norms for planning in Hill Areas, reference has been made to a research paper and norms suggested by Mr. S.K. Kulshrestha, in 'Spatial Standards for Hill Areas' (SDR March – April 94) for proposing social infrastructure in AUA.

This plan recommends:

- > Qualitative improvement and equitable distribution of all types of social infrastructure.
- Emphasis on creation of at least one Vocational training centre in each of the Planning Zones.
- > Setting up of community colleges in all ten Planning Zones.
- > One medical college along with nurses training centre.
- Creation of city level recreational facilities one in the premises of Assam Rifles (proposed to be shifted elsewhere) and another in zone no.6: Aizawl West-II on the road leading to the Airport, to act as gateway to the city.
- > Promotion of vernacular art, architecture and heritage to boost tourism and local economy.

# 9.2 Hierarchy of Social Infrastructure

It is desirable that any planned urban area should have a hierarchical distribution of various social facilities, so as to ensure equitable distribution of essential facilities and services at different levels. For AUA, a residential area with an approximate population of 10,000- 15,000 is conceived as a basic nucleus - a neighbourhood, with secondary school and shopping facilities for day to day needs. Distribution of higher level of additional facilities for health, education, recreation and safety, is organized at community, district, zone and city level and this framework provides a basic structure for facility planning. However, such a structure can be taken only as a broad guideline. In hilly areas, distance factor is also important and need to be taken into consideration for facility distribution. Moreover planning zones also vary in population size requiring some adjustment in final planning.

A basic standard is shown in the **Table-9.1**. Final requirement for each aspect and zone wise distribution of various types of social facilities is based on the existing situation and are dealt separately in the following sections. Zone wise distribution of existing facilities has been covered in detail in the respective sections of the status report.

- 97 -

#### Table-9.1: Hierarchy of Social Infrastructure

SI No.	Level	Population	Facilities	No.	Area in Hectares Per Unit
			Convenience Shopping	1	
			Playground	1	0.50 - 1.00
1	Housing Area	5000	Community Hall	1	
	U U	5000	Primary School	1	0.2 – 0.3
			Health Sub Centre	1-2	0.025-0.067
Ì			Veterinary Centre	4-5	0.05 – 1.0
			Local Shopping	1	
			Neighbourhood Park	1	1.20 – 2.00
2	Naighbourbood	10000 15000	Secondary School	1	0.3 - 0.6
2	Neighbournood	10000-15000	Indoor Stadium	1	
			Community Hall & Library	1	0.10 – 0.15
			Religious Building	1	
			Shopping complex/informal bazar	1	
2	Community	20000 25000	Community Welfare Centre	1	
3	Community	20000-25000	Higher Secondary School	1	0.3-0.6
			Main Health Centre	1	0.105-0.210
		50000	District Shopping Centre	1	
			College	1	2.0-3.0
			Industrial training Centre/ Polvtechnic	1	0.3-0.6
4	District		Hospital	1	0.840 -2.1
	District	00000	Multipurpose Park /ground	1	
			Sub Post Office	1	0.10 -0.15
			Police Post	1	
			Fire service	1	0.30 – 0.80
			Sub City Centre	1	
			Recreational Club/Cultural Centre	1	
			Medical College	1	15
4	Zone/Sub City	100000	General Hospital	1	
			Engineering College	1	60
			Telephone Exchange	1	
			Police station	1	
			City Centre	1	
			University	1	
			Sports Complex	1	
5	Urban Area /City	800000- 1000000	Exhibition-cum-Fair ground	1	10 - 20
			Botanical gardens/Eco parks/zoo	1	10-20
			Amusement Park	1	10-20
			Head Post office	1	0.2-0.4

# 9.3 Educational facilities

One of the prime components of social infrastructure is education. As such education and healthcare have a direct bearing on the 'quality of life' and form the basis of resident satisfaction of the people. Recommendation for educational facilities is based on the analysis of the current situation.

- 98 -

As per people's rankings on priority for development in the opinion survey, school has been ranked fourth. The existing situation of educational facilities and information on related aspects like student enrolment and student-teacher ratio at primary, secondary and graduate level for Aizawl Urban Area (AUA) have been discussed in detail in the status report. Distribution of colleges and technical Institutes in various planning zones, show that Planning zones 4, 7 and 10 are deprived of colleges and training institutes. This is also corroborated by the report from socio economic survey, which shows that in Planning Zone 7 (Sairang), travel distance to college is more than 5 Km. There is no engineering college in AUA. As per standards, at least 2 such colleges are to be provided in urban area and its extension. Also absent is any medical college. Engineering and Medical colleges need to be established to cater to not only the urban area but also to the entire State. Considering the high literacy rate, spirit of community service, artistic skill and creative aptitude of Mizo people, there is need to establish more number of Technical Institutes, Polytechnics and Vocational institutes evenly distributed and easily accessible.

# 9.3.1 Proposed Educational Facilities in Aizawl

Existing facilities show that except in planning zones of Sairang, West II and South Extension, there is not much shortage in number of schools at any level. On an average the shortage is not a quantitative one. However, there is need for qualitative improvement of existing educational facilities especially at school level. For determining the future requirement for schools at higher levels, the existing numbers of higher secondary schools have only been considered and requirement calculated as one school per 16,000 population.

It is desirable that instead of creating new facilities, the focus should be on qualitative improvement by raising the standards of the existing facilities, capacity building and upgrading teaching standard. In Planning Zones with adequate existing facilities, it is recommended that existing Secondary Schools/ Middle Schools be upgraded to High Secondary Schools if the situations permit so. There is lack of higher level educational facilities in Aizawl East II, Sairang, Aizawl South-II and South Extension. This has been taken care of in the proposal by providing adequate number of colleges in these areas **(Table-9.3)**.

Level of Education	Population per facility	Distance In Km	Recommended area ( In hectares)			
			Minimum	Maximum		
Primary	4,000	1-2	0.2	0.3		
High + Higher Secondary	16,000	5-7	0.3	0.6		
College	30,000	8-12	2.0	3.0		
Industrial training Centre/ Polytechnic	50, 000 /at least one in each Planning zone	8-12	0.3	0.6		
Engineering College			60			
Medical College			15			

Table-9.2: Recommended Guidelines for educational facilities

- 99 -

#### Master Plan for Aizawl: VISION 2030

ones	Prir	nary Sch	ool	Mid Secor Highe	dle Schoo Idary Sch r Second	ol ool ary		College		Tecl	nnical Co	llege
Planning	No. of existing facilities (2011)	No. of additional facilities Required (2030)	Additional Area Requirement (in ha.)	No. of existing Facilities (2011)	No. of additional facilities HS Required (2030)	Additional Area Requirement (in ha.)	No. of existing Facilities (2011)	No. of additional facilities Required (2030)	Additional Area Requirement (in ha.)	No. of existing Facilities (2011)	No. of additional facilities Required (2030)	Additional Area Requirement (in ha.)
Aizawl N-I	37	-		32+19+4	4	2.4	3	1	3	3	1	0.6
Aizawl N-II	35	-		30+23+4	-		2	-		3	-	
Aizawl E-I	19	-		13+16+9	-		3	-		1	-	
Aizawl E-II	21	-		19+5+1	1	0.6	-	1	3	-	1	0.6
Aizawl W-I	15	10	3.0	11+19+5	1	0.6	2	1	3	2	-	
Aizawl W-II	21	19	5.7	14+18+2	8	4.8	2	3	9	-	3	1.8
Sairang	5	8	2.4	3+1+0	3	1.8	-	2	6	-	1	0.6
Aizawl S-I	19	-		17+8+3	1	0.6	2	-		2	-	
Aizawl S-II	16	9	2.7	13+14+4	2	1.2	1	2	6	1	1	0.6
South Extension	9	14	4.2	6+5+0	6	3.6	-	3	9	-	2	1.2
Total	197	60	18.0	158+128 +32	26	15.6	15	13	39	12	9	5.4

Table-9.3: Zone wise existing and future (2030) no. of educational facilities and their area requirement

There is a need to give priority on skill based training institutes. Technical Institutes, Polytechnics and Vocational Institutes should be evenly distributed and easily accessible. It is being proposed to have at least one technical college or polytechnic at each planning zone. Indian government is encouraging establishment of Community Colleges for capacity building and vocational training. This programme can be integrated in AUA and necessary facilities be created and land allotted for the



same.

One Medical College has been proposed in Aizawl South Extension to cater to the entire state. Nurses Training Institute and Paramedical colleges as well as one Veterinary College have been proposed in addition to existing Veterinary College (Map-9.1).

# 9.4 Health care facilities

#### 9.4.1 Existing Health care facilities

Health Department is one of the oldest functioning departments of Mizoram. Health service is quite well organized with proper hierarchical distribution of State and District Hospitals, Community Health Centres, Primary Health Centres and Sub Centres. ANM training courses for training nurses, Multipurpose Workers Scheme (MPW) and Multipurpose Health Worker School (MHWS) ensure that remote areas can also avail of health services by trained personnel.

- 100 -

Due to presence of missionary hospitals as well as State initiatives, number of hospitals in AUA is reasonably satisfactory. However, as per standard, to meet the present requirement, the capacity of Civic hospital needs to be upgraded to 500 beds and at least one more intermediate hospital of 200 beds capacity is required. Existing distribution of health facilities has been discussed in the Status Report.

Health care facilities are generally well distributed in a hierarchical manner and have a proper network. However, Planning Zone 7 (Sairang) is deficient in health care facilities. From socioeconomic survey showing 'patterns of distance to medical in AUA', highest concentration is found to be in the range of <1KM which is guite satisfactory. However a greater travel distance to medical facilities for Planning Zones 1, 6, 7, 10 (according to the Socio Economic survey) is to be noted and taken care of in the Master Plan. It is important is to have more number of primary health centres and dispensaries in AUA within easy reach of people.

A Referral Hospital has been established at Falkawn in Planning Zone 10. The Hospital at present has 50 beds. It is understood that the number of beds is proposed to be increased in the near future.

Special attention need to be given to the problem of HIV and related issues especially that of drug addiction. As per socio-economic survey, on an average drug addiction is reported to be 14.04 % and HIV to be 2.05 %. Stratum 2 and 5 are most affected by HIV and drug addiction is reported to be high in Strata 5 & 9, moderately high in Strata 4, 6 & 8. However, some recent findings from Statistical handbooks of Mizoram-2003, 2004, 2006 show that recorded cases of drug abuse are reducing over last few years. As HIV and drug abuses are somewhat related issues and a social as well as health care problem, they are to be addressed in conjunction with each other in a holistic manner.



9.4.2

A Medical Hub is proposed at Falkawn (Planning Zone 10) where a Referral Hospital is already in existence. Considering the future population growth as proposed, it is important to have more number of primary health centres and dispensaries in AUA within easy reach of people. Zone wise required number of various health facilities and land requirement is shown in the proposal. As per population threshold, number of general hospitals is guite satisfactory for most of the zones. In AUA, four more hospitals are proposed (Table-9.5).

**Proposed Health care facilities** 

- 101 -

`Type of Facility	Population served	Distance In Km	Number of Beds per facility	Area requirement(in hectares)
Health Sub Centre	3,000	2-4		0.025-0.067
Main Health Centre	20,000	16-20	25-50	0.105-0.210
General Hospital	80,000	16-20	200- 250	0.840 -2.1
Veterinary Centre	1,000	16-20		0.05 – 1.0

 Table-9.4:
 Recommended
 Guidelines
 for
 Healthcare
 Facilities
 for
 Hilly
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas
 Areas

**Table-9.5:** No. of existing Healthcare Facilities (2011) and additional requirement of facilities and recommended areas for 2030

	Sub	Health Ce	ntre	Mair	Health Co	entre	Gei	neral Hospita	al
Zone name	No. of existing facilities (2011)	No. of additional facilities Required (2030)	Additional Area Requirement (in Ha.)	No. of existing facilities (2011)	No. of additional facilities Required (2030)	Additional Area Requirement (in Ha.)	No. of existing facilities (2011)	No. of additional facilities Required (2030)	Additional Area Requirement (in Ha.)
Aizawl N-I	3	40	2.68		7	1.47	2	0	
Aizawl N-II	3	18	1.21	1	2	0.42	3	0	
Aizawl E-I	2	11	0.74	1	1	0.21	2	0	
Aizawl E-II	2	7	0.47		1	0.21	3	0	
Aizawl W-I	4	29	1.94	1	4	0.84		1	2.1
Aizawl W-II	4	49	3.28		8	1.68	1	1	2.1
Sairang	1	16	1.07	1	2	0.42		1	2.1
Aizawl S-I	4	16	1.07		3	0.63		1	2.1
Aizawl S-II	6	27	1.81	1	4	0.84	3	0	
South Extn.	4	26	1.74		5	1.05	1	0	
Total	33	239	16.01	5	37	7.77	15	4	8.4

# 9.5 Recreation & Open Space

There is striking deficit of Parks and Playgrounds in the urban area. The number of parks, open spaces, playgrounds, community welfare centers in AUA is quite insufficient to cater to recreational needs of the people.

Socio economic survey shows that people in AUA generally have to travel few KMs on an average to reach outdoor recreational facilities. Indoor stadiums are relatively more in number and well distributed but many are in need of qualitative improvement. Moreover, there is a dearth of city level cultural complexes which can act as nucleus of social, recreational and commercial activities appropriate to any modern urban area. Recreational areas of different types and hierarchy must be made more easily accessible to people by better connectivity and equitable distribution. Existing facilities are to be upgraded wherever necessary.

- 102 -

# 9.5.1 Proposed Open Space, Playgrounds, Indoor Stadiums and Community Centers

Slope and topography pose constraint to location of playgrounds, parks and playfields. Lands with higher gradient can be developed as Eco Parks to serve the recreational needs. In view of the high rainfall, indoor stadiums are more appropriate to serve the needs of the community. Thus a requirement of at least one indoor stadium for every 10.000 people has been taken as a guideline for future proposal. Present premises of Assam Rifles, proposed to be shifted elsewhere has been proposed as one of the locations for city level recreational facilities and open space. Larger play grounds are required in North Aizawl, East Aizawl and West Aizawl and the same has been incorporated in the proposal (Table-9.7, 9.8).

16.71% (2553 Ha) of the AUA has earmarked as Sloped land/Undevelopable land. All such undevelopable areas should be investigated for potential utilization as recreational purposes such as mountaineering, hiking, trekking, etc. or afforestation programmes ensuring land stability and protection. Locations between Mizoram University to Sihhmui, South Hlimen, Tlangnuam, Neihbawih Tlang and other such suitable hillocks including the Hangi Lunglen tlang, Tlangnuam, Hillock at Lawipu, and Beraw Tlang are some of the potential sites which can be used for recreational purposes.

Table-9.6: Recommended Guidelines for Open Space and Cultural Facilities in Hill Areas

Level of open space	Population per facility as per Standard	Area range in hectares	Area per 1000 population ( hectares)
Playgrounds	5,000	0.50 - 1.00	0.12 - 0.20
Parks	10,000	1.20 – 2.00	0.12 - 0.20
Indoor Stadium	10,000		
City Parks/Playgrounds/exhibition grounds/cultural gathering grounds	City level		0.12 - 0.20
Botanical gardens/Eco parks	One for every town	10 – 20	
Recreational Complex /zoo	One for every settlement	10 – 20	
Community Welfare Centre	16,000	0.10 – 0.15	

Table-9.7: No. of existing Open Space (2011) and additional requirement of facilities and recommended areas for 2030

		Play	grounds			F	Parks	
Planning Zone	No. of existing playgrounds (2011)	No. of additional playgrounds Required (2030)	Additional Area Requirement (in Ha.)	No of playgrounds in 2030	No. of existing parks (2011)	No. of additional parks Required (2030)	Additional Area Requirement (in Ha.)	No. of parks in 2030
Aizawl N-I	3	23	23	26	3	10	20	13
Aizawl N-II	2	11	11	13	1	5	10	6
Aizawl E-I	2	6	6	8	0	4	8	4
Aizawl E-II	2	4	4	6	0	3	6	3
Aizawl W-I	2	18	18	20	1	9	18	10
Aizawl W-II	4	28	28	32	0	16	32	16
Sairang	2	8	8	10	0	5	10	5
Aizawl S-I	4	8	8	12	1	5	10	6
Aizawl S-II	4	16	16	20	0	10	20	10
South Extension	4	14	14	18	2	7	14	9
Total	29	136	136	165	8	74	148	82

- 103 -

# Master Plan for Aizawl: VISION 2030

		Community V	Velfare Centre			Indoor Sta	adiums	
Planning Zone	No. of existing Community Welfare Centre (2011)	No. of additional Community Welfare Centre Required (2030)	Additional Area Requirement (in Ha.)	No. of Community Welfare Centre in 2030	Existing Indoor Stadium (2011)	Total No. of Indoor Stadium Required	Additional Indoor Stadium 2031	Facilities in 2030
Aizawl N-I	7	1	0.15	8	6	13	7	13
Aizawl N-II	6	-		6	3	6	3	6
Aizawl E-I	3	-		3	6	4	0	6
Aizawl E-II	4	-		4	6	3	0	6
Aizawl W-I	7	-		7	6	10	4	10
Aizawl W-II	8	2	0.3	10	0	16	16	16
Sairang	4	-		4	2	5	3	5
Aizawl S-I	7	-		7	5	6	1	6
Aizawl S-II	14	-		14	11	10	0	11
South Extension	8	_		8	6	9	3	9
Total	68	3	0.45	71	51	82	37	88

Table-9.8: No. of existing Indoor Stadiums and cultural facilities (2011) and additional requirement of facilities for 2030





**Fig-9.3:** Planning zone wise existing and proposed playgrounds







indoor stadiums

- 104 -

# 9.6 Community facilities 9.6.1 Community halls

As per UDPFI guidelines, one community hall/room of 660 Sq mt is suggested for every 5000 persons. There are 48 Community Halls in AUA. However most of the existing community halls are below the suggested norm in terms of area /capacity. There is need for more community halls with higher capacity and augmented facilities. Establishment of community hall with modern library in each locality (housing area) is likely to ensure better community ties.

Planning Zone No.	Planning zone Name	Number of Community Halls in a planning zone in 2011	Suggested number as per UDEFI guidelines in 2030	Additional number of Community Hall in 2030	Additional Area required (0.66 Ha per Hall)
1	Aizawl N-I	5	25	20	13.86
2	Aizawl N-II	2	13	11	7.26
3	Aizawl E-I	4	8	4	2.64
4	Aizawl E-II	6	6	0	0.00
5	Aizawl W-I	5	20	15	9.90
6	Aizawl W-II	5	32	27	17.82
7	Sairang	2	20	18	5.28
8	Aizawl S-I	5	11	6	4.62
9	Aizawl S-II	9	17	8	7.26
10	South Exten	5	13	8	8.58
Total	AUA	48	165	117	77.22

Table-9.9: No. of existing Community Halls and additional requirement for 2030

# 9.6.2 Community Libraries

High literacy level in AUA is reflected in a strong network of library facilities and reading rooms spread over various parts of AUA. 80 community libraries are located in AUA and most of the community libraries belong to the Young Mizo Association (YMA), a strong and well-knitted NGO. In addition, there are 4 libraries attached to higher level educational Institutions. Planning –zone wise distributions of libraries is shown in **Table-9.10**.

On an average at present there is one community library per 3500 persons. This has been shown in the status report. UDPFI guidelines suggest a norm of one library of 2000 Sq. M for every 15, 000 population. Except Aizawl N-I and Sairang, all planning zones have requisite number of libraries even to cater to future population. However, many of the libraries are not well equipper and they need to be improved.

Libraries play crucial role in inculcating a sense of belongingness in a community and need constant upgrading. In view of the emerging concept of e-library and immense possibilities it offers, some of the community libraries can be augmented with Tele Networking and video facilities to promote mass awareness and for organizing local level training programmes and capacity building workshops.

- 105 -

Planning zone No.	Planning zone Name	Number of Community Libraries (2011)	Additional number of Community Libraries (2030)
1	Aizawl N-I	6	3
2	Aizawl N-II	7	-
3	Aizawl E-I	6	-
4	Aizawl E-II	6	-
5	Aizawl W-I	13	-
6	Aizawl W-II	11	-
7	Sairang	2	1
8	Aizawl S-I	10	-
9	Aizawl S-II	13	-
10	South Exten.	6	-
Total	AUA	80	4

**Table-9.10:** No. of existing community libraries and additional requirement for 2030

# 9.7 Other social infrastructural facilities

# 9.7.1 Religious

Christianity has a strong influence on Mizo society. There are a number of local churches which play active role in education, health care and voluntary services. There are people from other religion too who have their own places of worship and gathering.

In Mizoram and especially in Aizawl, churches have traditionally played a very important role as community centres. There are numerous churches spread in different parts of AUA.

Due to high percentage of people of Christian background, there is considerable demand for space for graveyard. Even the old graveyards within the urban limit need attention. As per UDPFI standards, sites for burial grounds and specially cremation grounds are to be identified in locations which are not in close proximity to residential areas.

# 9.7.2 Non Governmental Organisations and Associations

A number of voluntary organisations are active in various awareness campaign, community services, etc. The more notable NGOs are Young Mizo Association (YMA), Mizo Hmeichhe Insuihkawm Pawl (MHIP) or Mizo Women Association Mizoram Upa Pawl (MUP) or Mizoram Elders Association and Mizo Zirlai Pawl (MZP) or Mizo Students Association. These organisations have various branches and dedicated members. These organisations are important part of any social development programme.

# 9.7.3 Proposed Other Social Infrastructural facilities

Table-9.11:	Recommended of	uidelines for	Telecommunications.	Postal Services	and Fire Service	for Hill Areas
	r to common aca y	1000101	1 eleccinina lication log	1 00101 001 11000		101 1 1111 / 11 0 0 0 0

Type of Facility	Walking Distance	Area Range in Hectares	Population threshold
Telecommunication	-		10 lines per 100 population
Telephone Exchange	10 – 15 km		
General Post Office	10 – 15 km	0.20 - 0.40	50, 000
Postal Services	5 - 7 km	0.10 – 0.15	10000
Fire Service	<3 km	0.30 - 0.80	50, 000
Commercial/Cooperative Bank	1.6 – 3 km	0.10 - 0.15	10000
Recreational Hall (cinema/auditorium)	.5 – 1.6 km		20000
Stadium/ Sports Complex	-		2 lakhs

- 106 -

# 9.7.3.1 Postal services

The General Post office is located in Aizawl S-I Planning zone at Treasury Square, one Head Post Office in Aizawl N-1 and 8 Sub Post Offices and 35 Branch Post Offices are distributed in various parts of AUA. Proposal for various categories of post offices is shown in the **Table-9.12** 

**Table-9.12:** No. of existing Postal Facilities (2011) and additional requirement of facilities and recommended areas for 2030

Planning Zone	No. of existing Head Post Office (2011)	No. of Head Post Office in 2030 (@250000 pop.)	No. of existing Sub Post Office in 2011	No. of additional Sub Post Office in 2030	Additional Area Requirement (in Ha.)*
Aizawl N-I	1	1	3	10	1.50
Aizawl N-II	0	0	2	4	0.60
Aizawl E-I	0	0	0	4	0.60
Aizawl E-II	0	0	0	3	0.45
Aizawl W-I	0	0	0	10	1.50
Aizawl W-II	0	1	1	15	2.25
Sairang	0	0	1	4	0.60
Aizawl S-I	1	1	0	6	0.90
Aizawl S-II	0	0	1	9	1.35
South Extension	0	1	0	9	1.35
Total	2	4	8	74	11.10

# 9.7.3.2 Fire services

As per available data, there is only one Fire Station in Aizawl located in Hunthar Veng in Planning zone No. 6. There is need for more fire stations, stringent regulation for fire fighting and proper distribution of fire services within AUA. Proposal for additional fire services is shown in the **Table-9.13**.

# 9.7.3.3 Police, safety and security

There are 4 police stations and two police out posts in Aizawl (**Table-9.13**). As per the available information, total recorded cases of crimes are on increase over years. Of the recorded cases of crime- rapes and drug offence indicate that issues relating to drug addiction need to be addressed. At present there are 10 numbers of drug de- addiction centres under the jurisdiction of Mizoram Social Defense and Rehabilitation Board. Even various church organisations are working towards this effort through seminars and counseling. The traditional spirit of 'Zawlbuk' or community associations of the youth can be revived to engage young Mizos in constructive community efforts to address this problem. Proposal for additional police station is shown in the **Table-9.13**.

- 107 -

	Recr (audite	eational H orium/cine	all ma)		Fire Service	S	Police station /post			
Planning Zone	No. of existing Recreational hall (2011)	No. of additional Recreational hall Required (2030)	Additional Area Requirement	No. of existing Fire station (2011)	No. of additional Fire station Required (2030)	Additional Area Requirement	No. of existing Police station (2011)	No. of additional Police station Required (2030 @ 90000 popn. per facility)	No. of police post Required (2030 @ 50000 popn. per facility)	
Aizawl N-I	2	5			3	2.4		1	3	
Aizawl N-II		3			1	0.8	1		1	
Aizawl E-I		2			1	0.8			1	
Aizawl E-II		1			1	0.8	1		1	
Aizawl W-I	2	3			2	1.6		1	2	
Aizawl W-II		8		1	2	1.6		2	3	
Sairang		3			1	0.8	1		1	
Aizawl S-I		3			1	0.8		1	1	
Aizawl S-II		5			2	1.6	1		2	
South Extension		5			2	1.6		1	2	
Total	4	38		1	16	12.8	4	6	17	

#### **Table-9.13:** Future requirement of Auditorium/Cinema Hall, Fire Service and Police Station/Post

# 9.8 Vernacular Art and Cultural Heritage

The traditional fairs and festivals, music and dance, living style, vernacular architecture and décor of these tribal people – need to be preserved, promoted and highlighted as unique features of this region.

In spite of excellent quality, various forms of indigenous arts such as weaving, basket making, pottery, metal working, lacquering and smithying, are in real danger of extinction due to fall in demand. There is a necessity to have:-

- Training centres to propagate the skill to young generation of Mizos.
- Design centres and workshops to introduce innovation.
- Marketing and promotion policy for export.

# 9.8.1 Policies on Cultural Development

The following measures are suggested in regard to cultural development:

- 1. Promotion of Traditional Fairs and Festivals through government and NGOs so as to generate awareness among the new generation towards cultural heritage and inviting cultural tourism.
- 2. Setting up of a centre of traditional art and culture, craft, cuisine and living style, fair and festivals of Mizoram.
- 3. Development of Traditional Art Villages in the lines of 'Arts Acre' in the peri-urban areas like South Extension of Aizawl.
- 4. Cultural complex/ Heritage Interpretation Centres near places of scenic beauty, lakes and places of cultural interest with Day Service facilities.

- 108 -

- 5. Identifying suitable permanent locations for observation and celebration of cultural activities and formulation of development guidelines of these locations.
- 6. Documentation, Training, Research and Development Centre for Traditional Folk and Performing Arts Centre at Aizawl West-II for regional and international tourists .
- 7. Floricultural and Agro processing Parks with nurseries, packaging, processing and training facilities integrated with Eco Tourism Resorts at South Extension.
- 8. Textile parks with cottage, small and medium scale industries for local specialized Weaving Art at South Extension.
- 9. Promotion of Rural Tourism.

# 9.8.2 Policies on Development of Recreation

Aizawl has the potential to offer varied forms of indoor and outdoor recreational facilities. The region, having large river fronts, hills, reserve forest, heritage and cultural resources and a planned capital city offers great potential for development of recreational facilities and services.

Proposals for Augmentation and Development of Recreational Facilities are:

- Development of commercial zones for multiplex, retail malls and theme parks for outdoor recreation. The vast area with the stadium, presently used by Assam Rifles is proposed to be developed for such City Level Recreational Facility.
- 2. Eco-sensitive Development of low-lying and steep areas can be used for the development of eco-sensitive activities such as Heritage Parks, Theme Parks, Orchards, Herbal Gardens, low density tourist resorts etc.
- 3. Urban Parkway System: connecting various parks with landscaped structures along major circulation corridors.
- 4. Theme Park on Mizo culture at Aizawl East-II.
- 5. Conservation and Development of caves , and lakes for Historical or Heritage Interpretation Activities like landscaped sculpture gardens, light and sound programme, which would generate an awareness towards cultural and historical importance of the place among the local mass and tourists along with providing outdoor recreation.
- 6. Development of Nature Corridors to provide a feel of flora and fauna in the urban setup.
- 7. Adaptive reuse of old colonial bungalows for conversion to community centres, clubs houses, heritage hotels and community centres.
- 8. Picturesque, picnic/ outdoor recreational area with mountaineering, sky diving facilities, camping sites, etc. can be developed.
- 9. Riverside, lakes and water reservoirs like may be developed with landscaping and environmental lighting with tourist day service facilities.
- 10. Development of recreational facilities by private enterprises may be encouraged.

- 109 -

#### 9.8.3 Proposed Cultural Hub - Gateway to Aizawl

Vision for development of Aizawl Planning Area as identified through various discussions with different stakeholder is as follows:

- 1. A modern capital town of the North-Eastern region with the latest state of the art infrastructure.
- 2. Self-sufficient in terms of all kinds of economic infrastructure.

A progressive and developing society needs a contemporary Icon to which the young generation can identify with. In Aizawl, there is a dearth of a city level recreational place of international standard. It is recommended to establish a city Icon - an international standard Trade, Recreation & Tourist Hub to create a cultural hub with following amenities:

- □ Integrated Resort-Convention-Exhibition Centre
- Art & Science Museum
- □ Specialty Restaurants, Theatres, Shopping Mall, Golf course
- □ A Visitor Centre, to depict Mizo lifestyle, culture and heritage
- □ A Tourist Park to regularly host dances and showcase Mizo craft and handloom.

However, slope and topography pose constraint for locating such a large scale community and social infrastructure within the reach of the people. Moreover it needs proximity to the existing settlement /city core, must have high visibility as one approaches the urban area and at the same time must not cause any environmental disturbance. Thus the criteria are conflicting and varied in nature and pose a problem for suitable site selection.

Most of the decision making procedures for such site selection problems require simultaneous evaluation of multiple criteria which are used to assess the suitability degree of each alternative location. A decision support system (DSS) can assist authorities and decision makers to identify priority sites. As a demonstrative example, a multi criteria decision model (MCDM) combined with a GIS-based methodology has been applied to evaluate alternative locations for the proposed cultural hub /Gateway to AUA. Selection of the site for the new development area is based on optimization of following criteria.

- □ Slope
- Accessibility
- Environmental Concerns
- Visibility

From five best options, a site has been selected in zone no.6: Aizawl West-II as the best location. The selected site is a vacant site and more than 10 hectares in area, is most accessible from the proposed network of highways, is visible as one approaches the city from the Airport, relatively far away from natural reserves, located on a relatively gentle slope and is in close proximity to the city core.

- 110 -

Table 0 1/1 Eive best options of Site for Cotowov to Aizowi	
Table-9.14. Five best oblights of Sile for Galeway to Alzawi	

Site	Slope Deg.	Dist_NH Km	Dist_NR Km	View
1	10.0	0.5	0.75	yes
2	11.5	0.25	0.6	yes
3	11.5	0.25	1.0	yes
4	9.0	0.5	0.5	yes
5	11.5	0.25	1.2	yes

# Education, Recreation and Community Facilities Plan



Fig-9.7: Trade Fair Complex site selection

# 9.8.4 Policies on Development of Tourism

Of the infrastructure needed for promoting tourism, development of convenient and comfortable but reasonably cheap accommodation in and around the AUA stands out as very important. Natural and Cultural Heritage of Aizawl can be also be presented into a marvelous tourist package. Tourist participation may boost up the local economy, create a better market for their traditional art and craft, at the same time generating a sense of pride among the local mass toward their society, culture and bring positive technological and hygienic awareness for those hither to neglected the State's heritage . AUA presents immense possibilities for Village and Cultural Tourism.

According to the existing scenario analysis of Aizawl, it has been observed that the following categories of tourism have immense potentialities for this region:

- 1. Cultural and Heritage Tourism with annual / seasonal traditional village fairs and festivals, folk or tribal socio-cultural events with arts, crafts, music, dance etc.
- Nature based outdoor recreation and Eco-tourism for hills, forest, riverfront and vast agricultural area/ village settlements with undulating landforms hilly sites including picnic spots, sightseeing, camping sites etc. Presence of all these tourism products calls for the growth of Adventure Tourism.
- 3. Educational Tourism with reserve forest and Zoological Park/ Aviary / bird watching centres and Botanical Garden with a focus on study or excursion activities for school/ college/ university students and researchers.

Tourism and recreational activities can become one of the important economic sources of Aizawl urban area. Though there exist a number of areas with good potentials and resources such as places of natural scenic beauty, places of historical interests and antiquities, tourism and recreational facilities are still not enough. There is need for better promotion and awareness as well as infrastructural facilities to attract both national as well as foreign tourists.



# 9.8.5 Developing Tourism Travel Circuits for integrating tourist destinations having a common theme

Tourism travel circuits help in equitable tourism development. Some of the themes for tourism travel circuits are:

- a. Religious Tourism integrating religious structures as well as places of local spiritual values
- b. Monument and Culture based
- c. Art and Craft
- d. Tribal or village tourism based
- e. Wildlife, Ecotourism and Adventure
- f. Weekend and scenic area based

# 9.9 Heritage and Conservation

Aizawl has a rich tradition of cultural heritage both colonial and vernacular. Traditional crafts and art form have much more potential. With well structured rejuvenation policy and management guidelines, these crafts, festivals, performing arts can be projected at national and international forums.

Only a very few monuments and heritage structures within AUA are enlisted and protected. Rests are unlisted. It is necessary to have a systematic inventory and formal/legal tools to preserve built and living heritage by a centralised body.

It is recommended to form a Heritage Cell as an integral part of the Planning Department. Heritage Cell will be responsible for documentation, enlisting and preparing special byelaws for the enlisted structures and precincts. Rejuvenation and development of natural, cultural and built heritage of AUA

need to address the conflicts between preservation of heritage, economic development and social equity. Sustainable solutions must evolve from a systematic understanding of the present status within the proposed vision of the AUA and an assessment of opportunities, potentials and threats.

# 9.9.1 Existing Heritage & Conservation

Heritage of Aizawl has to be viewed from the perspective of Mizo society, where intangible aspects of heritage are an integral part of Mizo tradition and culture. Hills and plateaus, caves, monoliths and relics, rivers and lakes gain importance due to associated legends, myths and fables. Traditions continue through festivals, dance forms, handicraft, beliefs and practices. Tangible aspects of



Fig-9.8: Mc. Donald Hills, Zarkawt, Aizawl

- 112 -

heritage in the form of monuments and buildings are rare. Any permanent edifice of heritage is of relatively recent in origin.

#### 9.9.1.1 Historical monuments and important heritage sites of Aizawl City

History of Aizawl dates back to 1890, when a small fort was set up by Mr. Daly of Silchar Military Police. The fort was built on a site of a deserted village built in 1881 by the son of a local chief and subsequently vacated. The place is situated at Zawlbuk. Since then Aizawl was occupied by British Military personnel as well as Missionaries. Many sites, buildings and churches, graves and tombstones bear testimony to this period of Aizawl's historical past. Unfortunately, many relics and monuments have been destroyed. Few still exist and are in need to be promoted as an integral part of heritage of this place. Some of these sites are;

**Mc. Donald Hills Zarkawt, Aizawl**: The first school was installed at this site by the two missionaries, J.H. Lorrain & F.W. Savidge in the year 1894 with 3 students (**Fig-9.8**).

**Govt. Mizo Higher Secondary School, Chanmari**: The first school was established at this site by the two missionaries J.H. Lorrain & F.W. Savidge, in the year 1894 with 3 students (Fig-9.9).

The British had built numerous governmental buildings and bungalows (**Fig-9.10**). Some of them are still in use. The Welsh Missionaries also set up some buildings, hospitals and mission schools and these are being taken care of by the Mizoram Synod. However, all these buildings need to be listed and graded with guidelines for repair and restoration measures.



**Fig-9.9:** Memorial stone, Govt. Mizo Higher Secondary School, Chanmari



Fig-9.10: Governmental buildings and bungalows by British

# 9.9.2 Preservation initiatives by Cultural Departments & Organisations

The Department of Art and Culture, Govt. of Mizoram is working on preserving these important sites **(Table-9.15)** in collaboration with NGO's viz. – INTACH (Mizoram Chapter), YMA/MUP branches and others. The Legislative Assembly of the State has enacted the 'Mizoram Ancient Monuments and Archeological Sites and Remains Acts & Rules' which are in force.

- 113 -

Aizawl Development Authority/AMC has also taken action under their respective Building Regulations, listing out "important Buildings and Areas/Sites of Historical Importance" **(Table-9.15)**. The ADA/AMC is restricting/controlling building construction within the periphery of 20 meters from the identified areas/sites. Protection and preservation of these areas and sites is being done by the Art and Culture Department.

**Table-9.15:** Historical sites and structures (enlisted through local initiatives for inclusion in the list of protected monuments)

SI. No.	Name of the Monument /Historical Site	Details of Location	Details of area/periphery for Architectural Control
1	Durtlang Lal In	Durtlang, Aizawl	
2	Pi Puii In ( House of Dr. G.P. Roberts)	Presbyterian Hospital, Durtlang Aizawl	Areas/plots within a
3	Bethel Lungphun	Chaltlang, Aizawl	from the identified
4	Missionary Hriatrengna Lungdawh	Mc. Donald Hill, Zarkawt, Aizawl	areas/sites
5	Dawrpui Presbyterian Church	Dawrpui, Aizawl	
6	Quarter Guard/A.R. Commandant Quarters ( DIG quarter & A.R. Barracks)	Assam Rifles Complex, Aizawl	
7	Deputy Commissioner Office	Treasury Square , Aizawl	
8	Old Aizawl Treasury	Treasury Square , Aizawl	
9	War Memorial, Treasury Square	Treasury Square , Aizawl	
10	Laldenga Thlan, Treasury Square	Treasury Square , Aizawl	
11	Sabinga Lung	Khatla Kawn, Aizawl	
12	Superintendent Bungalow now Raj Bhavan	Aizawl	
13	Sikul Sen ( Primary School) & Sikulpui (Govt. Boy's English School)	Sikulpuikawn, Aizawl	
14	Mission Bangla Pui	Mission Veng, Aizawl	
15	Mission Veng Thlanmual	Mission Veng, Aizawl	
16	Suakpuilala Thlan	Tanhril, Aizawl	
17	Khamliana Sailo In	Lungleng	
18	Sairang Police Station	Sairang	

# 9.9.3 Goals and policies

Preservation of built, natural and cultural heritage and environments as an integral to the overall process of development must be able to:

- i. Preserve cultural and ecological diversity as far as possible.
- **ii.** Give priority to local value system.

- 114 -
- iii. Explore the new opportunities arising out of heritage resources.
- iv. Consider archeological and environmental conservation as tools to stimulate economic development.
- v. Promote economic development by promotion of traditional art/craft and uplift of the workers community in a healthy and sustainable manner by appropriately using and preserving the heritage resources.
- vi. Enforce a proper scrutiny so that short term benefits should not take precedence over long term costs.
- **vii.** To use zoning and special area rules and regulations as tools to establish an enabling environment and ensure resource compatibility.

With appropriate policy guidelines and heritage management, the cultural resources of AUA can boost local economy, highlight the past heritage, promote tourism and also be able to play crucial and meaningful role in projecting Aizawl's cultural identity. This will contribute a great sense of pride amongst the residents of AUA become a touchstone for future development.

It is recommended that:

- i. Heritage Zones and Special areas are to be declared as important cultural sites of AUA and protected and preserved as Special Areas.
- **ii.** In addition to enforcement of relevant acts whichever is applicable to the monuments/precincts/sites, Special Area Rules and Bye-laws are to be prescribed for the identified special areas.
- iii. A detail inventory of all the resources, built, natural and cultural for the Heritage sites, as well as, other heritage resources for the entire AUA has to be prepared by the proposed Heritage Cell. Enlisting and grading of all heritage resources are to be taken up on a priority basis for any further detail recommendation.
- iv. Heritage Trails need to planned and executed to ensure proper accessibility and connectivity to the heritage areas.

**Table-9.16 and Map-9.2** shows some examples of significant heritage structures, precincts and areas in AUA and broad recommendations.

- 115 -

(Page left blank intentionally)

- 116 -

#### Table-9.16: Signifiant Heritage Structures and Precincts

Zone name	Area name	Main Elements	Quality	Recommendations		Typical Features
	Assam Rifles' Area	Historical , Architectural , Natural	Highest	To be developed as City level Cultural & Recreational Complex		
			l		Assam Rifles' Ground	Deputy Commissioner's Office
	Raj Bhavan Complex & Surroundings	Townscape, Architectural & Historical	Highest	Delineated as declare as Heritage Aare		
					Raj Bhavan	City Park
	Other Areas	Historical , Architectural	High	Enlisted structures and precincts to be declared as protected and adopted to suitable reuse wherever necessary		
					Old School Building	Old School Building
	Other Areas	Socio-cultural , Historical, Architectural	High	Enlisted structures and precincts to be declared as protected and adopted to suitable reuse wherever necessary	<text></text>	
						Sikilpuri Sikilsen Govt. Boys' Middle
	Other Areas	Socio-cultural , Historical,,	High	Enlisted structures and precincts to be declared as protected and adopted to suitable reuse wherever necessary		
					Memorial of distinguished personality	Pionners' memorial









## Chapter-10

# **ADMINISTRATIVE PLAN**





#### **10.1** Introduction

An efficient organizational structure and governance strategy holds the key to effective implementation of the Master Plan. In this chapter, the options for essential administration and management required to implement the identified projects and for its successful completion are described. Though the executing and implementing agencies are the ones responsible for the right pace of development, they have to be aided by various administrative options including mobilization of human resources, financial resources and natural resources.

#### **10.2 Strategy for Plan Implementation**

There are three essential elements in any successful plan implementation strategies, i.e.

- a) Clearly identified set of projects
- b) Adequate sources of finances for the required investment
- c) A flexible, pragmatic and responsive approach to management of development process.

#### **10.2.1 Projectisation and Packaging the Projects**

The plan proposals are statements of intention, or at best, a guiding framework which need to be translated into a set of implementable projects. Then the projects shall need to be prioritised, suitably packaged and the phasing of implementation determined.

#### **10.3 Organisational and Institutional Profile**

The establishment of appropriate organisational/institutional set up along with procedural layout is as important as finances. The set of organisation/institution would need to work in a coordinated manner so that the proposed initiatives from project conception, formulation, financing, execution and operation and maintenance through the project lives can happen as conceived or visualized.

The concerned agencies in the Aizawl Development Plan Area (ADPA) will be Government of Mizoram and the Aizawl Municipal Council.

Coordination among various agencies for providing infrastructure and services in the urban areas requires consideration on priority. Execution has to be done in a planned and coordinated manner. There is an evident need to re-strategise and streamline the responsibility of the functions of the participating agencies. Many programmes have suffered serious setback due to lack of adequate communication, commitment, co-operation and co-ordination between different agencies and department within. Greater participation of the citizen and other stakeholders must generate better partnership. Partnership should go beyond mere participation in emphasising collaborative activities among interested groups, based on mutual recognition of respective strength and weaknesses.



The Master Plan will be followed with more detailed Zonal Development Plans. To integrate various urban planning functions of the city, a High Powered Committee may be created under the chairmanship of the Minister of Urban Development & Poverty Alleviation (UD&PA). The Secretary of UD&PA will be the Convener and members will be drawn consisting of experts in the disciplines of town planning, architecture, engineering, etc. with a clear mandate to effectively coordinate implementation of the Master Plan.

#### **10.4 Urban Governance**

Both in India and in Mizoram, the Panchayati Raj Institutions [PRIs] and Urban Local Bodies [ULBs] are institutional forms representing decentralised planning, accompanied by the devolution of power and people's participation. In order to strengthen and augment the planning and development functions, Aizawl Development Authority has been created in 2006. In the year 2007, the Government decided to revitalise the Local Self Government based on the feedbacks from different sources and as per the 73rd and 74th Constitutional Amendments. This is a noble attempt to overhaul the Local Self Government and introduce drastic systematic changes in it. The tenure of these bodies are fixed for five years.

The Proposed Master Plan should look into:

- The Village Councils must augment their status of Governance and strengthen capacity building.
- It is expected that some of the non-municipal areas will attain municipal status.

The National Action Plan for Good Urban Governance (Government of India & UNCHS) with specific focus on Participatory Planning Process along with strengthening the local bodies have been accepted and adopted by the State Governments. This has been also reflected in their various Legislative efforts.

Salient points have been towards:

- I. Active decentralisation of power.
- II. Facilitating with more planning and development functions as well as taxing powers.
- III. Improve Capacity Building of local bodies by introduction of community participation and delivery of public services. Interactive participation of Village Committees is made responsible for infrastructural development at the community level.
- IV. Augment resource base for revenue generation including rationalised fiscal transfer.
- V. Adopting modern financial tools for development functions.
- VI. Change of mindset and public awareness is essential for implementation of Cost Recovery.
- VII. Enhancement of Tax base and improvement of collection of Property Tax and other taxes.
- VIII. Thrust and focus on adopting Transformation in Civic engagement.
- IX. Expanded role in capital budgeting and selecting their priority schemes.

- 118 -

- X. The integration of urban local bodies with its own decentralised management through ward committees as well as with the high level District Planning Committees is essential.
- XI. The participation through micro planning process, prioritisation of needs, organising community structure as well as hygiene education program are the essential framework.
- XII. Training of officials as well as non-officials connected with all agencies and institutions need to be given appropriate training so as to enable them perform the new set of tasks.
- XIII. Augmenting capacity building in collecting base line information, data up dating and compilation in GIS format.
- XIV. Municipalisation of urban centers at appropriate time must be organised.
- XV. Involvement and induction of professionally trained urban planners, engineers and architects must be considered for various institutions as a part of capacity building.
- XVI. All institutions must also be supported by modern communication and information technology.
- XVII. Strong capacity to ensure the delivery of services through a variety of mechanism.
- XVIII. Adopt appropriate regulatory system.
  - XIX. Generate strong public trust and public access to information.

#### **Good Governance:**

The principals of high impact governance have been distilled to identify the major issues for Aizawl Urban Area.

- i. Create the right structure
- ii. Make the concerned agencies accountable by instituting target setting, MoUs and monitoring processes
- iii. Streamline key processes
  - Redesigning the Development Control and Building approval process
  - Strengthening internal systems through accounting reforms
- iv. Increasing dialogue with citizens
  - E governance
  - Citizen involvement in Prioritization of projects at grass root level
  - Strengthening of Grievance Redressal System
- v. Generate momentum through quick wins
- vi. Institute a report card system for all agencies

#### Single Window clearance body:

In case of high risk areas, disaster prone areas and multi storied buildings, a "Single Window Clearance Body' needs to be constituted.

- 119 -

## 10.5 Legislation

Participatory planning process has been strengthened in the recent past and urban institution, urban and rural local bodies and others have been statutorily entrusted with some planning and development function.

The following legislations are in operation for various relevant purposes:-

- a. The Lushai Hills District (Village Council) Act, 1953 and substituted by Mizoram (Village Council)(Amendment) Act, 1996 (Act no.10 of 1996)
- b. Mizoram Urban & Regional Development [Amendment Act 1996 (No. 12 of 1990 & 1996)].
- c. Mizoram Urban & Regional Development rules 1998;
- d. The Aizawl Development Authority Act 2005 (Act 9 of 2005) Aizawl Development (Master Plan & Zonal Development rules 2005)
- e. Aizawl Development Authority (Master Plan & Zonal Development Plan) (first amendment) Rules 2006;
- f. Mizoram Municipalities Act 2007
- g. Relevant Land Revenue Acts :
  - i. The Mizoram (Taxes on Land, Building and Assessment of Revenue) Act, 2004 (Act No. 13 of 2004)
  - ii. The Mizoram (Land Survey and Settlement Operation) Act, 2003 (Act No. 4 of 2003)
  - iii. The Mizoram (Restriction on use of transferred Land) Act, 2002 (Act No. 15 of 2002)
  - iv. The Mizoram (Prevention of Government Land Encroachment) Act, 2001 (Act No. 7 of 2001)
  - v. The Mizoram Public Demand Recovery Act, 2001 (Act No. 11 of 2001)
  - vi. The Mizoram Land Holding and Settlement Act, 2000 (Act No. 1 of 2001)
  - vii. The Mizoram Roadside Land Control Act, 1976 (Vide Notification No. A. 46011/ 1/ 94 GAD/ Loose dt. 14.6.1995)
  - viii. The Mizoram Roadside Land Control Rules, 1979.

#### **10.6** Towards formulation of policy options for development

- To establish simplified framework for planning and management of the Aizawl Urban Area.
- To explore the possibilities of developing a **State Capital Region** to boost the economy of the entire State.
- To **adopt the planning process** consisting of Development Authorities, Urban Local Government and Village Councils.

- 120 -

- To increase Efficiency of Management and Quality of Governance (Transparency, Efficiency and Accountability) by conducting performance audit and publishing annual reports.
- To make the concerned agencies accountable by setting time specific targets based on which all key departments and agencies should sign annual MOU.
- To enhance decentralization of responsibility and power by facilitating the **local institutions** with skilled manpower and improved technology (**Capacity building and empowerment**).
- To enhance supportive legislation and legal system and facilitate interagency coordination
- To arrange for **Public Education & Awareness** generating programmes incorporating greater role of NGO's & CBO's.
- Introduction of a system of e-governance using IT applications, such as GIS and MIS for various services provided by ULBs and parastatal agencies.
- Provision of **basic services to the urban poor** including security of tenure at affordable prices, improved housing, water supply and sanitation. Delivery of other existing universal services of the government for education, health and social security is ensured.
- Implementation of decentralisation measures as envisaged in 74th Constitutional Amendment Act. The State should ensure meaningful association and engagement of ULBs in planning the function of parastatal agencies as well as the delivery of services to the citizens.
- **Reform of Rent Control Laws** balancing the interests of landlords and tenants.
- Earmarking at least **20-25 percent** of developed land in all housing projects (both public and private agencies) for EWS and LIG category with a system of cross subsidisation.
- To make a concerted effort in making the city enterprising by creation of business friendly environment. An effective special planning framework should be immediately initiated in order to achieve some of the following objectives:
  - Integrating issues like protection of environment, conservation of heritage, economic development, expansion of infrastructure & disaster mitigation in the planning process to keep pace with actual growth
  - Facilitating optimum use of land through tools like TDR, Development Fees and allowable FSI.
  - Developing planned communities or New Towns to offer high quality residential and business environment
  - Preparing Zonal Plans and Town Planning Schemes (TPS)

- 121 -

- Formulating adequate policy for redevelopment of degraded wasteland and densification.
- Encouraging public private partnership for development and management of new area with good connectivity and infrastructure.
- To **augment Institution, encourage stakeholders' participation** including private sector, so as to facilitate realisation of the Vision through proper Implementation and Management.

### 10.7 Conclusion

The problem with cities today is the lack of co-ordination between the various implementing and regulating agencies. The AMC in its nascent state of existence is not equipped with the required technical know-how to handle this onerous task of coordination and efficient implementation and therefore capacity building for this purpose and strengthening of the AMC accordingly remains imperative.

- 122 -



## Chapter-11

# **FINANCIAL PLAN**



#### 11.1 Introduction

In this Master Plan, it is not attempted to indicate the total financial involvement required for implementation of the Plan. Detailed schemes will have to be prepared and estimates for such schemes worked out. All that can be said at this stage is that the financial investment will be huge and the bulk of the required fiancé will have to come from the public sector, i.e. grants and loans from the Central Government under regular budgets as also from various schemes like JNNURM etc. and the resources of the State government. It will be imperative that the State Government and statutory and local bodies gear themselves up to mobilize resources for financing various projects under the Master Plan. In addition, private sector will have to be involved in a big way. It is now accepted worldwide that the active participation of the private sector in *sine qua non* for speedy economic development.

### 11.2 Financing Urban Development

The question more often asked by the Development Authorities is not what needs to be done for a planning area but how the huge investment will be funded. Financing urban development in a sustained manner requires looking at two major aspects of financing, viz. capital finances and revenue finances. Capital financing that usually figures in the current account of development budget pertains to development of urban infrastructure comprising civic services (utility) infrastructure, social infrastructure and economic or commercial infrastructure. For achieving this, it would be imperative to mobilise adequate resources.

Traditionally they have been funded through budgetary support of Central, State Government, N-E Village Council and local bodies through five-year plans and the annual plans. These resources have in some cases been supplemented by assistance from sources such as World Bank, multilateral agencies such as ADB, JBIC, CFIC, USAID, DFID and UNICEF etc as partly grants and partly as loans. The domestic financial institutions like HUDCO, HDFC and NHB have also provided financial assistance for urban infrastructure development projects. ICICI, IDBI, UTI and commercial banks have also made forays into the sector with their urban infrastructure portfolios. However, with the process of economic liberalisation being in practice throughout the country, the public sector resources are becoming increasingly scarce.

On the other hand, domestic financial institutions lay emphasis on financial viability of projects, which is hardly possible for most of the basic services infrastructure projects to match. Assistance from international donor agencies is also appearing hard to come by. In this context, exploring alternative sources of financing capital investment is the major option left.

## 11.3 Innovative Options for Resource Mobilisation

Infrastructure financing requires long-term lending, whereas the normal borrowing in the Indian capital and debt market is short-term only. Financial Institution would need a mix of resources and balanced combination of lending portfolio constituting both long and short-term fund. Some such suggested mechanisms are listed below.

- 123 -

## Chapter 11

- a) Consortium finances
- b) Development Authority Bond or Municipal Bond
- c) Project Initialisation fund / Project Development Fund
- d) Foreign Direct Investment
- e) Leveraging Insurance Sector Funds
- f) Special Economic Zone
- g) Public Private Partnership (PPP)

There are alternative models of PPP as noted below:

- a) Build Operate Transfer (BOT)
- b) Build Own Operate Transfer (BOOT)
- c) Build Own Operate (BOO)
- d) Fully Private (Divestiture)
- e) Joint Sector Projects
- h) Effective utilization of JNNURM fund for development of Planned Infrastructure
- j) Introduction for Freight Charge or Toll Tax
- k) Introduction of Land Development and or Development Charge
- I) Rationalisation of Excise and Sales Tax
- m) Enhancement of Vehicle Tax
- n) Parking Fees
- o) Land use conversion Charges etc.
- p) Grants from Central and State Government
- q) Pooling of resources available in different departments and agencies of the State Government
- r) External Aid
- s) Tax, Fees etc.
- t) Institutional Finances

The state government has recently brought out a Policy on Public Private Partnership (PPP) that provides a guideline to agencies for operationalising PPP in infrastructure development initiatives.

## 11.4 Options for Land Resource Mobilisation

Since land has been established as the most important resource for the development of any city, it is important that all the parcels of land within the jurisdiction of the Development Plan Area be recorded and accounted for. In order to speed up the Development Plan implementation and mobilize land resources some of the techniques given below may be followed.

- 124 -

- a) Assembly of land through land pooling
- b) Transfer of Development Rights (TDR)

## 11.5 Revenue Financing Options

Capital investments on infrastructure entail expenditure on recurrent basis for proper operation and maintenance, without which delivery of services would not happen as expected and the same would frustrate the very objectives of capital investment programs carried out. Any capital investment expenditure calls for meeting, on recurrent basis, the requirement of funds for debt servicing, operation and maintenance and capital replacement reserve. Some of the innovative instruments are:

a) Water Supply

- Advance registration fees.
- Enhancement of water tariff and metering
- Connection charges
- Water tax
- Development Charges
- Other sources such as property tax,
- Sale of plots etc.

#### b) Sewerage

- Connection charges
- Sewerage Tax
- Conservancy tax
- Sale of sludge
- Sale of renewable waste
- Fines for untreated effluent disposal
- c) Solid Waste Management
  - Collection charge
  - Cess
  - Sale of renewable waste
  - Fines on Dumping waste

#### d) Roads

- Toll tax
- Advertising rights
- Cess on diesel and petrol

#### - 125 -

- Land as a resource
- e) Airport/ Railway Station / Bus Terminus
  - Toll tax
  - User charges for transport terminals
  - Advertising rights
  - Land as resources
  - Surcharge on tickets
- g) Property tax reforms

Property tax/house tax/holding tax is the single largest source of revenue and is an indirect user charge for municipal services whose benefits are collective and are not confined to any identified individual. Reform in property tax is necessary to for promoting efficiency through linking of provision of municipal services closely to their financing. Some recommended Property tax reforms are (i) simplification of tax laws (ii) coverage of tax net (iii) valuation accuracy (iv) collection efficiency (v) rate setting (vi) administrative incentives and (vi) policy and institutional reforms. Steps should be taken for transparent assessment of properties (unit area method), increased coverage by property mapping using GIS applications and rationalisation of self-assessment system. Every property in the city must be given a Property Tax Index Number (PTIN) whereby the payment, the changes and nature of use of the property can be done through computer and e – seva centre.

#### 11.5.1 Non-Tax Revenue Generation through Commercial Development of Properties

- Build and lease
- Sell land for private development
- Public-private joint development

## 11.5.2 Non Tax Revenue Generation through Innovative Land Planning and Development Control Regulation

- Creation of Special Development Districts (SDD) to make major investment in infrastructure and services and formulate different Development Control Regulations.
- Imposition of Development Impact Fees in the SDD, the designation of district zones with differing built form parameter is assumed.
- Utilisation of Transfer of Development Right (TDR) enabling flexible development control and permitting trade for their lost FSI.
- Imposition of User Charges i.e., cost recovery through direct charges to beneficiaries.

- 126 -

## 11.6 Establishment of a Special Purpose Company (SPC) to Implement the Plan

The task being implementation of a dynamic plan, demands a wide range of technical, financial and management skills to be successful, it may be preferable that to establish a Special Purpose Company (SPC) to implement the plan or to contract out services needed rather than to hire in-house staff.

It could be setting up of a joint venture company between the Government and the Private Entrepreneurs, financial institutions like HUDCO etc, on the basis of equity distribution as may be mutually agreed upon. This could also be a company on the CIDCO model.

In order to expedite development and attract developers, following may be provided:

- I. A bankable risk sharing mechanism
- II. Mortgage leasehold rights
- III. Exempt first sale on transfer from payment of Stamp Duty or Registration fees
- IV. Exempt all inputs from sales tax during construction

#### **11.7** Involvement of Private Sectors

In addition to all the government agencies, the State's corporate and the private sector will need to play an active role in taking ADPA forward.

Following areas need immediate private sector involvement for achieving the required momentum:

- Advocacy: Seminars and reports on local issues and press conferences to spread awareness.
- Funding: Advertisements (bus shelters, public toilets, roads, street lights and donations or sponsorship for key projects
- Infrastructure creation: Visible business models for roads, parks and gardens, public toilets and slum rehabilitation. .
- Management resources: High caliber management talent on secondment of Government and other non profiting agencies and task forces for specific business related initiatives (eg. Land issues).
- Independent project: Venture capital funding and image marketing.

### **11.8** Towards formulation of policy options for development

- To **introduce innovative techniques** of financing.
- Adoption of modern accrual-based **double entry system of accounting in ULBs** and parastatal agencies.



- **Reform of property tax with GIS** so that this augments the major source of revenue for the ULBs. This will improve the effective implementation so that collection efficiency reaches at least 85 percent within the next seven years.
- Levy of reasonable user charges by ULBs and Parastatals with the objective that the full cost of O&M or recurring cost is collected within the next seven years. However, cities and towns in the North East and other special category States may recover only 50 percent of O&M charges initially. These cities and towns should graduate to full O&M cost recovery in a phased manner.
- Internal earmarking, within local bodies, budgets for basic services to the urban poor.
- Rationalisation of Stamp Duty to bring it down to no more than 5 percent within next seven years.
- To create of Urban Regional Planning and Development fund

#### 11.9 Conclusion

To carry out the major urban development projects, it will be necessary for the Government, Aizawl development Authority, Municipality and other functionaries to explore implementation of all the options suggested above. Though final estimation for the various projects has not been made yet, it can be expected to reach Rs. 10 crore for the next 10 years. The co-coordinating body must work out the revenue mobilization including Public Private Partnership models relevant for the city and state.



## Chapter- 12

# **DEVELOPMENT CONTROL**





### 12.1 Introduction

The Master Plan provides strategic framework for land use planning in the Aizawl Development Plan Area (ADPA), for shaping its future towards vision 2030. It sets out the spatial strategy for 10 planning zones as identified in the Master Plan to address the different needs of each area. The priority set out for each planning zone based and supported by the policies in this plan. The common aim is to actively manage changes within ADPA limit to deliver a better quality of life and environment.

## 12.2 The Proposed Plan

During the allocation of land uses and formulation of zones various hubs and residential corridors have been proposed. **Residential hubs** in areas at Durtlang and Lungleng and **residential corridors** along the by-pass roads have been identified. Apart from these, hubs like the **Administrative hubs**, **Educational hubs**, **Commercial Hubs**, **Transportation hubs**, **Recreational hubs** have been identified at strategic locations. **A Industrial estate**, **Industrial growth center**, new **Industrial hubs** are proposed in the Master Plan.

The proposed land use plan is required to be implemented and enforced. The zoning regulations here are framed to translate the provision of the future Master Plan.

## 12.3 Regulations for land use zoning for natural hazard prone areas

#### 12.3.1 Introduction

The regulations for Land Use Zoning for Natural Hazard Prone Areas are to be notified under section

1) u/s 73(f) of Model Town & Country Planning Act, 1960; OR

2) u/s 143(f) of Model Regional and Town Planning and Development Law; OR

3) u/s 181(f) of Model Urban & Regional Planning and Development Law

(Revised) of UDPFI Guidelines as may be applicable in the respective States under the existing provisions of Town & Country Planning Legislation as and when Master Plan/ Development Plan of different cities/ town/ areas are formulated. However, these zoning regulations are to be implemented through the provisions of Development Control Regulations/ Building Bye-Laws, wherever the Master Plan are not in existence or not formulated.

Detailed regulations for land use zoning in natural hazard prone areas shown as "no development zone" should be taken up while doing the Zonal Development Plan, i.e., next step after the Master Plan.

#### 12.3.2 Land use zoning

The main purpose of the land use zoning is to provide regulations for development of a particular area to serve the desired purpose efficiently and to preserve its character. It also provides for the kind of buildings to be constructed. Zoning regulations are legal tools for guiding the use of land and protection of public health, welfare and safety. Such regulations also include

- 129 -

Provisions for the use of premises/property and limitations upon shape, size and type of buildings that are constructed or occupy the land. Further, these provide both horizontal as well as vertical use of land. These regulations also improve the quality of life in urban centres. Similarly, along the drains green belts can be planned which may facilitate improvements of these drains in future. Life line structures should also be protected likewise while either proposing land uses or otherwise.

#### 12.3.3 Use zones

In order to promote a healthy and balanced development, it is necessary to apply reasonable limitations on use of lands and buildings. For desirable development, the city is divided into a number of 'use zones' such as residential, commercial, industrial recreational, etc. For each zone, specific regulations are provided for. A single set of regulations cannot be applied for the whole city.

#### 12.3.4 Non-conforming use

Zoning protects residential areas from harmful invasions of other uses like industrial use and commercial use. However, it does not prohibit use of lands and buildings that are lawfully established prior to coming into effect of such zoning regulations. If such uses are contrary to regulations in a particular 'use zone' and are not to be allowed, such uses are designated as 'non-conforming uses'. These are to be gradually eliminated without inflicting unreasonable hardship on the property owners/users. For implementation and enforcement of proposals under each land use category, contained in a development plan, there is a need to list out various uses and activities that are permitted, permissible on an application to the Competent Authority and prohibited. Land use zoning regulations precisely provide this list for various use zones.

The suggested list of uses/activities for various use zones should be comprehensive, keeping in mind the local and special characteristics of various sizes of settlements (large, medium and small). Depending upon the specific situation this list could be further enhanced or reduced, as the case may be.

#### **12.4 Regulations for Identification of Natural Hazard Prone Areas**

#### 12.4.1 Earthquake Prone Areas

a. Intensities of VII or more on Modified Mercalli or MSK intensity scale are considered moderate to high. Areas under seismic zones III, IV and V as specified in IS 1893. Therefore, all areas in these three zones will be considered prone to earthquake hazards.

b. In these zones the areas which have soil conditions and the level of water table favourable for liquefaction or settlements under earthquake vibrations will have greater risk to buildings and structures which will be of special consideration under Land Use Zoning.

c. Under these zones, those hilly areas which are identified to have poor slope stability conditions and where landslides could be triggered by earthquake or where due to prior saturated conditions, mud

- 130 -

flow could be initiated by earthquakes and where avalanches could be triggered by earthquake will be specially risk prone.

d. Whereas, earthquake hazard prone areas defined in 'a' above are identified on the map given in IS 1893 to small scale and more easily identified in the larger scale state wise maps given in the Vulnerability Atlas of India, the special risky areas as defined in 'b' and 'c' above, have to be determined specifically for the planning area under consideration through special studies to be carried out by geologists and geo-technical engineers.

e. If an active fault trace is identified by GSI (Geological Survey of India), a structure for human occupancy should not be placed over the fault trace and must be set back by a minimum of 15 m on either side of fault trace.

#### 12.4.2 Land Slide Prone Areas

(a) While it is known that most hilly areas are prone to landslides/landslips, the susceptibility of the various areas to landslide varies from very low to very high. Landslide zoning naturally requires mapping on large scale.

In preparation of the landslide zone map, two types of factors are considered important as listed here below:

#### 1. Geological/Topographic Factors/Parameters

- Lithology
- Geological Structures/Lineaments
- Slope-dip (bedding, joint) relation
- Geomorphology
- Drainage
- Slope angle, slope aspect and slope morphology
- Land use
- Soil texture and depth
- Rock weathering

#### 2. Triggering Factors

- Rainfall
- Earthquake
- Anthropogeny

(b) Whereas the factors listed under geological/topographic parameters have been considered as basic inputs for the landslide potential model, the three triggering factors namely, rainfall, earthquake and anthropogeny were considered external factors which trigger the occurrence of a landslide.

#### - 131 -

(c) Whereas, the landslide prone areas under 'a' are available for some parts of the country on the maps given in Landslide Hazard Zonation Mapping in the Himalayas of Uttranchal and Himachal Pradesh States using Remote Sensing and GIS Techniques, pub. By National Remote Sensing Agency, Department of Space, Government of India, Hyderabad and Landslide Hazard Zonation Atlas of India – Landslide Hazard Maps and Cases Studies prepared by Building Materials & Technology Promotion Council, Ministry of Urban Development & Poverty Alleviation, Govt. of India, the risky areas in other parts of the country have to be determined specially for the planning areas under consideration through special studies to be carried out by the State/UT governments and the concerned Competent Authorities.

## 12.5 Zoning Regulations

#### 12.5.1 Introduction

In order to promote public health, safety and the general social welfare of the community, it is necessary to apply reasonable limitation on the use of land and buildings. This is to ensure that the most appropriate economical and healthy development of the city takes place in accordance with the land use plan. For this purpose, the City is divided into a number of use zones, such as residential, commercial, industrial, public and semi-public, etc.

Zoning protects residential area from the harmful invasions of commercial and industrial uses and at the same time promotes the orderly development of industrial and commercial areas. By regulation the spacing of buildings, adequate light, air, protection from fire etc. can be provided. It prevents overcrowding in buildings and land thus ensures adequate facilities and services.

Zoning is not retrospective. It does not prohibit the uses of land and buildings that are lawfully established prior to the coming into effect of the zoning regulations. If these uses are contrary to the newly proposed uses, they are termed as non-conforming uses and are gradually eliminated over years without inflicting unreasonable hardship upon the property owners.

The zoning regulations and their enforcement are a major tool in keeping the land uses pattern of the Comprehensive Development Plan.

It has been stated that the consultants have adopted the UDPFI guidelines with minor modifications as follows.

- Public Semi-public has been divided into Public Semi-Public Use Zone and Utilities and Services Use Zone.
- Agriculture and Water Bodies has been divided into Agricultural/Forest Use Zone and Rivers/Streams/Water bodies Use Zone.
- Three new use zones have been added namely Defense Land, Slopped Land/Undevelopable Use Zone and Restricted Use Zone.

- 132 -

#### 12.5.2 Simplified Urban Land Use Zoning Regulations

A broad description of the proposed land uses according to 'Activities/Uses Permitted', 'Permissible on application to Competent Authority (with conditions)' and 'Activities/Uses Prohibited' is given below.

#### 1) Residential Use Zone

In Residential Use Zone, **'R'** (Primary Residential, Mixed Residential Unplanned/ Informal Residential) has been marked for general guidance.

#### a) Uses/Activities Permitted

Residence plotted (detached, semi-detached and row housing), group housing, work-cum-residential, hostels, boarding and lodging houses, night shelters, guest houses, educational buildings (nursery, primary, high school), \*religious places, neighborhood level social, cultural and recreational facilities with adequate parking provisions, community halls, convenience shopping, local(retail) shopping, community centers, clubs, auditoriums, exhibition and art galleries, libraries and gymnasiums, health clinics, yoga centers, dispensaries, nursing homes and health centers (20 beds), public utilities and buildings except service and storage yards, electrical distribution depots and water pumping stations, nursery and green houses, services for households (salon, parlours, bakeries, sweet shops, dry cleaning, internet kiosks etc.), banks and professional offices not exceeding one floor, bus stops, taxi stands, police posts and post offices, parks and tot–lots.

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

Shopping centres, village council, local council, state and central government offices, colleges and research institutions, petrol filling stations, Places of entertainment, cinema halls, restaurants and hotels, markets for retail goods, IT and IT enabled services, tourism related services, motor vehicle repairing workshop, garages, storage of LPG cylinders, burial grounds, printing presses employing not more than 10 persons, godowns /warehousing of non perishables, bus depots without workshop, household industries if the area for such use does not exceed one floor and there shall be no public display of the goods, consulates.

#### c) Prohibited Uses/Activities

Heavy, large and extensive industries, noxious, obnoxious and hazardous industries, warehousing, storage godowns of perishables, hazardous, inflammable goods, wholesale mandis, junk yards, workshops for buses, slaughter houses, hospitals treating contagious diseases, sewage treatment plants and disposal sites, water treatment plants, solid waste dumping grounds, outdoor and indoor games stadiums, shooting range, zoological garden, botanical garden, bird sanctuary, international conference centers, district battalion offices, forensic science laboratory, all uses not specifically permitted.

#### Guidelines for \*religious places:

All religious places should follow The Noise Pollution (Regulation and Control) Rules, 2000

- 133 -

#### 2) Commercial Use Zone

In Commercial Use Zone, "**C**" (Retail Shopping Zone, General Business and Commercial District, Wholesale business) has been marked for general guidance.

#### a) Uses/Activities Permitted

Retail and wholesale business, mercantile, commercial centers, wholesale storage yards, godowns, covered storage and warehousing, banks, financial services and stock exchanges, perishable goods markets, business and professional offices, private institutional offices and semi government offices, shops and shopping malls, commercial services, restaurants and hotels, hostels, boarding houses, social and welfare institutions, guest houses, convenience and neighborhood shopping centers, local shopping centers, weekly and formal markets, bakeries and confectionaries, cinema halls, theaters, banquet halls, auditoriums, community halls, night shelters, clinics and nursing homes, petrol pumps, IT and IT enabled services, commercial institutes, research and training institutes, parking lots, taxi stands, 2 wheeler stands.

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

Associated residential uses, wholesale storage godowns of perishable, inflammable goods, coal, wood, timber yards, non-polluting, non-obnoxious light industries, junk yards, service centers, garages, workshops, printing presses employing not more than 10 persons, 20 bedded hospitals not treating contagious diseases and mental patients, weigh bridges, gas installation and gas works, colleges, polytechnics and higher technical institutes, sports complex and stadiums, transient visitor's homes, places of entertainment, recreational uses and museums, convention centers, religious places, public utilities, telephone exchanges, police posts and post offices, picnic hut, truck terminal, bus depots and parking.

#### c) Prohibited Uses/Activities

Polluting industries, heavy, extensive, noxious, obnoxious, hazardous and extractive industrial units, hospitals, research laboratories treating contagious diseases, poultry farms, dairy farms, slaughter houses, sewage treatment plants and disposal sites, solid waste treatment plants and dumping grounds, agricultural uses, storage of perishable and inflammable commodities, quarrying of gravel, sand, clay and stone, zoological gardens, botanical gardens and bird sanctuary, sports training centers, district battalion offices, forensic science laboratory and all other related activities which may cause nuisance, court, all uses not specifically permitted.

#### 3) Public and Semi – Public Use Zone

In Public and Semi–Public use zone, "**PS**" (Govt./Semi-Govt./Public Offices Zone/Institutions) has been marked for general guidance.

#### a) Uses/Activities Permitted

Government offices, central , state, local and semi-government, public undertaking offices, universities and specialized educational institutions, colleges, schools, research and development

- 134 -

centers, social and welfare centers, libraries, hospitals, health centers, dispensaries and clinics, social and cultural institutes, religious buildings, marriage halls, community halls, conference halls, museums, art galleries, exhibition halls, auditoriums, police stations, police lines, jails, local state and central govt. offices uses for defence purpose, educational and research institutions, social and cultural and religious institutions, local village council facilities, uses incidental to govt. offices and for their use, monuments.

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

Residential flats, residential plots for group housing and staff housing, IT services, hostels, transit accommodation, entertainment and recreational complexes, nursery and kindergarten, welfare center, open air theater, playground, residential club, guest house, truck terminals, helipads, parking areas, taxi stands, 2 wheeler stands.

#### c) Prohibited Uses/Activities

Heavy, extensive and other obnoxious, hazardous industries, slaughterhouses, junkyard, wholesale mandies, dairy and poultry farms, farmhouses, workshops for servicing and repairs, processing and sale of farm products and uses not specifically permitted herein.

#### 4) Utilities and Services Use Zone

In Utilities and Services use zone "**US**" (Water Supply/Sewerage/Drainage/Solid Waste, Power, Transmission and Communication, and Burial and Cremation Ground) has been marked for general guidance.

#### a) Uses/Activities Permitted

Post offices, telegraph offices, public – utilities and buildings, water treatment plant, sewage treatment plant, solid waste treatment plant solid waste dumping grounds, radio transmitter and wireless stations, telecommunication centers, telephone exchange, water supply installations, sewage disposal works, service stations, cemeteries/burial grounds and cremation grounds, power plants/ electrical substation, radio and television station, fire stations.

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

Service industry, warehouse/storage godowns, health center for public and staff or any other use incidental to public utilities and services, information/payment kiosks, incidental/ancillary residential use, truck terminals, helipads, commercial uses center.

#### c) Prohibited Uses/Activities

Any building or structure which is not required for uses related to public utilities and activities is not permitted therein, heavy, extensive and other obnoxious, hazardous industries, all uses not specifically permitted.

- 135 -

#### 5) Industrial Use Zone

In Industrial use zone, "I" (All kind of non polluting industries, Service and Light Industry and Special Industrial Zone) has been marked for general guidance.

#### a) Uses/Activities Permitted

All kind of non polluting industries, IT & ITES, SEZs notified by government of India, loading, unloading spaces, warehousing, storage and depots of non perishable and non- inflammable commodities, cold storage and ice factory, gas godowns, wholesale business establishments, petrol filling station with garages and service stations, bus terminals and bus depots and workshops, parking, taxi stands, residential buildings for essential staff and for watch and ward, public utilities.

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

Heavy, extensive and other obnoxious, hazardous industries subject to the approval of the Mizoram Pollution Control Board, industrial research institute, technical educational institutions, junkyards, sports/ stadiums/ playgrounds, sewage disposal works, electric power plants, service stations, cemeteries, govt. semi-govt., private business offices, banks, financial institutions and other commercial offices, agro-based industries, dairy and farming, gas installations and gas works, workshops garages, hotels and guest houses, hospitals and medical centers.

#### c) Prohibited Uses/Activities

General business unless incidental to and on the same site with industry, schools and colleges, hotels, motels and caravan parks, recreational spots or centers, other non-industrial related activities, religious buildings, Irrigated and sewage farms, major oil depot and LPG refilling plants, social buildings, all uses not specifically permitted.

#### 6) Recreational Use Zone

In Recreational Use Zone, "**P**" (Playgrounds/Stadium/Sports Complex, Parks and Gardens, Special Recreational Zone and Multipurpose Open Space Zone) has been marked for general guidance.

#### a) Uses/Activities Permitted

Specialized parks/ maidans for multipurpose use, regional parks, district parks, playgrounds, children traffic parks, clubs, stadiums, picnic huts, holiday resorts, shooting range, sports training center, swimming pools, botanical/ zoological garden, bird sanctuary, green belts, public utilities and facilities such as police post, fire post, post and telegraph office, health center for players and staff, animal racing or riding stables, open air theater, theme parks, amphitheaters, camping sites.

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

Building and structure ancillary to use permitted in open spaces and parks such as stands for vehicles on hire, taxis and scooters, commercial use of transit nature like cinemas, circus and other shows, public assembly halls, restaurants, parking areas, caravan parks, entertainment and recreational

- 136 -

complexes, community halls, libraries, residential club, guest house, fire post, police station, post and telegraph office, commercial uses centre, special education areas, incidental/ancillary residential use.

#### c) Prohibited Uses/Activities

Any building or structure, which is not required for open air recreation, dwelling unit except for watch and ward, and uses not specifically permitted therein, all uses not specifically permitted.

#### 7) Transportation Use Zone

In Transportation Use Zone, "**T**" (Roads, Airport and Bus Depots/Truck Terminal) has been marked for general guidance.

#### a) Uses/Activities Permitted

All types of roads, airport, air strip, helipad, rail terminal, goods terminal, circulations, bus stops and bus and truck terminals, taxi stands, parking areas, multi level car parking, filling stations, transport offices, booking offices, night shelter, boarding houses, banks, restaurants, workshops and garages, automobile spares and services, godowns, loading and unloading platforms (with/without cold storage facility), weigh bridges, ware houses, storage depots, utility networks (drainage, sewage, power, tele-communications).

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

Way side shops and restaurants, authorised/planned vending areas, incidental/ancillary residential use, emergency health care centre, tourism related projects, all ancillary (complimentary) uses for above categories (subject to decision of the Authority).

#### c) Prohibited Uses/Activities

Use/activity not specifically related to transport and communication permitted herein, all uses not specifically permitted.

#### 8) Defense Land

In Defence Land, "DL" (Defence related activities) has been marked for general guidance.

#### a) Uses/Activities Permitted

All activities related with Defence purpose.

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

City level recreational facilities and open space in the premises of Assam rifles after clearance from the authority.

#### c) Prohibited Uses/Activities

Use/activity not specifically related to Defence permitted herein.

- 137 -

#### 9) Restricted Use Zone

In Restricted Use Zone, "**RA**" (existing development within the High Risk Zone, existing development on areas with slope higher than 36°, areas within 20 m radius around identifies important buildings and areas/sites of historical importance) has been marked for general guidance.

#### a) Uses/Activities Permitted

As directed by the Art and Culture Department, Aizawl and the Window Clearance Body.

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

As directed by the Art and Culture Department, Aizawl and the Window Clearance Body.

#### c) Prohibited Uses/Activities

Any development violating the decisions and directions of the Art and Culture Department, Aizawl and the Window Clearance Body.

#### 10) Agricultural/Forest Use Zone

In Agriculture Use Zone, "A-1" (Agriculture and Horticulture, Farm) has been marked for general guidance.

#### a) Uses/Activities Permitted

Agriculture and horticulture, dairy, poultry and pig farming, milk chilling center, storage, processing and sale of farm produce, dwelling for the people engaged in the farm (rural settlement), farm houses and accessory buildings, Afforestation, eco-tourism, camping sites, eco-parks, eco lodges, Special outdoor recreations, 800 m green belt on either side from the centre of the river, existing settlements within river buffer, water treatment plants, sewage treatment plants, power sub-stations.

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

Houses incidental to this use, agro serving, agro processing, agro business, ice factory, cold storage. Parks and other recreational uses, activities related to tourism, burial and cremation grounds, Normal expansion of land uses only in the existing homestead land, Soil testing lab, Cottage industries, Quarrying of gravel, sand, clay or stone, Building construction over plots covered under town planning scheme and conforming uses, Brick kilns and extractive areas.

#### c) Prohibited Uses/Activities

Residential use except those ancillary uses permitted in agricultural use zone, Heavy, extensive, obnoxious, noxious and hazardous industries, Any activity which is creating nuisance and is obnoxious in nature, All uses not specifically permitted. Residential use except those ancillary uses permitted in agricultural use zone, Heavy, extensive, obnoxious, noxious and hazardous industries, All uses not specifically permitted.

- 138 -

#### 11) Slopped Land/Undevelopable Use Zone

In Slopped Land/Undevelopable Use Zone, "**SL**" (Earthquake/landslide prone, cliffs and environmentally hazardous area, High Risk zones as shown in the map, areas adjacent to fault lines, areas with slope higher than  $36^{\circ}$ , areas adjacent to major drainage lines) has been marked for general guidance.

#### a) Uses/Activities Permitted

Afforestation.

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

Quarrying of gravel, sand, clay or stone, Check dam to store water after clearance from the authority, Special outdoor recreations.

#### c) Prohibited Uses/Activities

All uses not specifically permitted.

#### 12) Rivers/Streams/Water bodies Use Zone

In Water bodies Use Zone, "W" (River/Canal/Streams/Water Spring, Ponds/Lakes/Wetland/Aqua culture pond and Water catchment area) has been marked for general guidance.

#### a) Uses/Activities Permitted

Rivers, canals, streams, water spring, ponds, lakes, wetland, aqua culture pond, reservoir, water logged/marshy area.

#### b) Uses/Activities Permissible on Application to Competent Authority (with conditions)

Fisheries, boating, water theme parks, water sports, lagoons, and any other use/activity incidental to Water bodies Use Zone is permitted.

#### c) Prohibited Uses/Activities

Use/activity not specifically related to Water bodies Use not permitted herein, all uses not specifically permitted.

SI. No.	Use Zone	Uses/Activities Permitted	Uses/Activities Permissible on application to the Competent Authority	Uses/Activities Prohibited
		(a)	(b)	(c)
1	Residential Use Zone ( R )	1. Residence plotted (detached, semi-detached and row housing), group housing, work-cum- residential	1. Shopping centres	1. Heavy, large and extensive industries, noxious, obnoxious and hazardous industries
		2. Hostels, boarding and lodging houses	2. Village council, local council, state and central government offices	2. Warehousing, storage godowns of perishables, hazardous, inflammable goods, wholesale mandis,

Table-12 2. Land L	leas Parmittad	Permitted Under S	necial Consideration	& Prohibited In	Different Lise Zones
Table IZ.Z. Lanu (	JSES Fernilleu,	remilled Under S		a FIUIIDILEU III	

- 139 -

## Chapter 12

## **Aizawl Development Authority**

#### Master Plan for Aizawl: VISION 2030

				iunk vards
		3. Night shelters, guest houses	3. Colleges and research institutions	3. Workshops for buses
		4. Educational buildings (nursery, primary, high school)	4. Petrol filling stations	4. Slaughter houses
		5. Religious places	5. Places of entertainment, cinema halls, restaurants and hotels	5. Hospitals treating contagious diseases
		6. Neighborhood level social, cultural and recreational facilities with adequate parking provisions	6. Markets for retail goods	6. Sewage treatment plants and disposal sites
		7. Community halls	7. IT and IT enabled services	7. Water treatment plants, solid waste dumping grounds
		8. Convenience shopping, local (retail) shopping	8. Tourism related services	8. Outdoor and indoor games stadiums, shooting range
		9. Community centers, clubs, auditoriums	<ol> <li>Motor vehicle repairing workshop, garages, storage of LPG cylinders</li> </ol>	9. Zoological garden, botanical garden, bird sanctuary
		10. Exhibition and art galleries	10. Burial grounds	10. International conference centers
		11. Libraries and gymnasiums	11. Printing presses employing not more than 10 persons	11. District battalion offices, forensic science laboratory
		12. Health clinics, yoga centers, dispensaries, nursing homes and health centers (20 beds)	12. Godowns /warehousing of non perishables	12. All uses not specifically permitted in column (a) and (b)
		13. Public utilities and buildings except service and storage yards, electrical distribution depots and water pumping stations	13. Bus depots without workshop	
		14. Nursery and green houses	14. Household industries if the area for such use does not exceed one floor and there shall be no public display of the goods	
		15. Services for households (salon, parlours, bakeries, sweet shops, dry cleaning, internet kiosks etc.)	15. Consulates	
		16. Banks and professional offices not exceeding one floor		
		17. Bus stops, taxi stands		
		19. Parks and tot-lots		
		1. Retail and wholesale business,	1 Approximated residential upon	1 Dolluting industrias
	_	mercantile		
2	Commercial Use Zone (C)	2. Commercial centers	2. Warehousing, storage godowns of perishable, inflammable goods, coal, wood, timber yards	2. Heavy, extensive, noxious, obnoxious, hazardous and extractive industrial units
		3. Wholesale storage yards	3. Non- polluting, non- obnoxious light industries	3. Hospitals, research laboratories treating contagious diseases
		4. Godowns, covered storage and warehousing	4. Junk-yards	4. Poultry farms, dairy farms, slaughter houses
		5. Banks, financial services and stock exchanges	5. Service centers, garages, workshops	5. Sewage treatment plants and disposal sites, solid waste treatment plants and dumping grounds
		6. Perishable goods markets	6. Printing presses employing not more than 10 persons	6. Agricultural uses, storage of perishable and inflammable commodities
		7. Business and professional offices	7. 20 bedded hospitals not treating contagious diseases and mental patients	7.Quarrying of gravel, sand, clay and stone
		8. Private institutional offices and semi government offices	8. Weigh bridges	8. Zoological gardens, botanical gardens and bird sanctuary

- 140 -

#### **Aizawl Development Authority**

#### Master Plan for Aizawl: VISION 2030

## **Development Control**

		9. Shops and shopping malls	9. Gas installation and gas works	9. Sports training centers
		10. Commercial services	10. Colleges, polytechnics and higher technical institutes	10. District battalion offices
		11. Restaurants and hotels	11. Sports complex and stadiums	11. Forensic science laboratory and all other related activities which may cause nuisance
		12. Hostels, boarding houses, social and welfare institutions, guest houses	12. Transient visitor's homes	12. Court
		13. Convenience and neighborhood shopping centers, local shopping centers, weekly and formal markets, bakeries and confectionaries	13. Places of entertainment, recreational uses and museums	13. All uses not specifically permitted in the column (a) and (b)
		14. Cinema halls, theaters, banquet halls, auditoriums	14. Convention centers	
		15. Community halls, night shelters	15. Religious places	
		16. Clinics and nursing homes	16. Public utilities, telephone exchanges	
		17. Petrol Pumps	17. Police posts and post offices	
		18. IT and IT enabled services	18. Picnic Hut	
		<ol> <li>Commercial institutes, research and training institutes</li> <li>Parking lots</li> </ol>	19. Truck terminal, bus depots and parking	
		21. Taxi stands, 2 wheeler stands		
		1. Government offices, central, state, local and semi- government, public undertaking offices	1. Residential flats, residential plots for group housing and staff housing	1. Heavy, extensive and other obnoxious, hazardous industries
		2. Universities and specialized educational institutions, colleges, schools, research and development centers	2. IT services	2. Slaughterhouses
	Public &	3. Social and welfare centers	3. Hostels, transit accommodation	3. Junkyard
3	Semi-public Use Zone	4. Libraries	<ol> <li>Entertainment and recreational complexes</li> </ol>	4. Wholesale mandies
	(PS)	5. Hospitals, health centers, dispensaries and clinics	5. Nursery and kindergarten, welfare center	5. Dairy and poultry farms, farmhouses
		6. Social and cultural institutes	6. Open air theater, playground	6. Workshops for servicing and repairs
		7. Religious buildings	7. Residential club, guest house	7. Processing and sale of farm products
		8. Marriage halls, community halls	8. Truck terminals, helipads	<ol> <li>All uses not specifically permitted in columns (a) and (b)</li> </ol>
		9. Conference halls	<ol> <li>Parking areas, taxi stands, 2 wheeler stands</li> </ol>	
		10. Museums, art galleries, exhibition halls, auditoriums		
		<ol> <li>Police stations, police lines, jails</li> </ol>		
		<ol> <li>Local state and central govt.</li> <li>offices uses for defence purpose</li> <li>Educational and research</li> </ol>		
		Institutions 14. Social and cultural and religious institutions		
		15. Local village council facilities		
		16. Uses incidental to govt. offices and for their use		
		17. Monuments		

- 141 -

## Chapter 12

## **Aizawl Development Authority**

#### Master Plan for Aizawl: VISION 2030

	Litility and	<ol> <li>Post offices, Telegraph offices, public – utilities and buildings</li> </ol>	1. Service industry	1. Any building or structure which is not required for uses related to public utilities and activities is not permitted therein.
4	Services Use Zone (US)	2. Water Treatment Plant, Sewage Treatment Plant, Solid waste Treatment Plant solid waste dumping grounds	2. Warehouse/storage godowns	2. Heavy, extensive and other obnoxious, hazardous industries
		3. Radio transmitter and wireless stations, telecommunication centers, telephone exchange	3. Health center for public and staff or any other use incidental to public utilities and services	3. All uses not specifically permitted in column (a) and (b)
		4. Water supply installations	4. Information/Payment kiosk	
		5. Sewage disposal works	5. Incidental/ancillary residential use	
		6. Service stations	6. Truck terminals, helipads	
		Cemeteries/burial grounds and cremation grounds     B. Power plants/ electrical	7. Commercial uses center	
		substation		
		<ol> <li>9. Radio and television station</li> <li>10. Fire stations</li> </ol>		
		1. All kind of non polluting industries	1. Heavy, extensive and other obnoxious, hazardous industries subject to the approval of the Mizoram Pollution Control Board	1. General business unless incidental to and on the same site with industry
		2. IT & ITES	2. Industrial Research Institute	2. Schools and colleges
		3. SEZs notified by government of India	3. Technical Educational	3. Hotels, motels and caravan parks
		4. Loading, unloading spaces	4. Junkyards, sports/ stadiums/	4. Recreational spots or
	Industrial Use Zone (I)	5. Warehousing, storage and depots of non perishable and non- inflammable commodities	5. Sewage disposal works, electric power plants, service stations, cemeteries	5. Other non-industrial related activities
5		6. Cold storage and ice factory	6. Govt. semi-govt., private	6. Religious buildings
		7. Gas godowns	7. Banks, financial institutions and other commercial offices	7. Irrigated and sewage farms
		8. Wholesale business	8. Agro-based industries, dairy	8. Major oil depot and LPG
		9. Petrol filling station with	9. Gas installations and gas	
		garages and service stations	works	
		10. Bus terminals and bus depots and workshops	10. Workshops garages	permitted in columns (a) and (b)
		11. Parking, taxi stands	11. Hotels and guest houses	
		essential staff and for watch and ward	12. Hospitals and medical centers	
		13. Public utilities		1 Any building or structure
6	Recreationa	<ol> <li>Specialized parks/ maidans for multipurpose use</li> </ol>	1. Building and structure ancillary to use permitted in open spaces and parks such as stands for vehicles on hire, taxis and scooters	which is not required for open air recreation, dwelling unit except for watch and ward, and uses not specifically permitted therein.
		2. Regional parks, district parks, playgrounds, children traffic parks	2. Commercial use of transit nature like cinemas, circus and other shows	2. All uses not specifically permitted in column (a) and (b)
	I Use Zone	3. Clubs	3. Public assembly halls	
	(P)	4. Stadiums, picnic huts, holiday resorts	4. Restaurants	
		5. Shooting range, sports training center	5. Parking areas, Caravan parks	
		6. Swimming pools 7. Botanical/zoological garden	6. Open air cinemas/ theatre	
		bird sanctuary	recreational complexes	
		8. Green belts 9. Public utilities and facilities	8. Community hall, library	
		such as police post, fire post,	9. Residential club, guest house	

Department of Architecture & Regional Planning, Indian Institute of Technology Kharagpur - 721302

- 142 -

#### **Aizawl Development Authority**

#### Master Plan for Aizawl: VISION 2030

## **Development Control**

		post and telegraph office, health		
		center for players and staff		
		stables	10. Yoga and meditation centres	
		11. Open air theater, theme	11. Fire post, police station, post	
		parks, amphitheaters	and telegraph office	
		12. Camping sites	12. Commercial uses centre	
			13. Special education areas	
			residential use	
				1. Use/activity not
		<ol> <li>All types of roads</li> </ol>	1. Way side shops and restaurants	specifically related to
				transport permitted herein.
		2 Airport air strip bolipad	2. Authorised/Planned Vending	2. All uses not specifically
			areas	(b)
		3. Rail terminal, goods terminal,	3. Incidental/ancillary residential	
		circulations	use	
		4. Bus stops and Bus and Truck	4. Emergency health care	
		5 Taxi stands	5 Tourism related projects	
			6. All ancillary (complimentary)	
		6 Darking groop	uses for above categories	
		0. Faiking aleas	(subject to decision of the	
	Transportati		Authority)	
7	on Use	8 Filling stations		
'	Zone	9. Transport offices, booking		
	(T)	offices		
		10. Night shelter, boarding		
		houses		
		12 Restaurants		
		13. Workshops and garages		
		14. Automobile spares and		
		services, Godowns		
		15. Loading and unloading		
		storage facility), weigh bridges		
		16. Ware houses. Storage depots		
		17. Utility networks (drainage,		
		sewage, power, tele-		
		communications)		
	Defense	1 All activities related with	1. City level recreational facilities and open space in the	1. Use/activity not
8	Land	Defense purpose	premises of Assam rifles after	specifically related to
	(DL)	• •	clearance from the authority	Defence permitted herein.
				1. Any development
	Restricted	1.As directed by the Window	1.As directed by the Window	violating the decisions of
9	Use Zone		Cicarance Duy	Window Clearance Body.
	(RA)	2.As directed by the Art and	2.As directed by the Art and	
		Culture Department, Aizawl	Culture Department, Aizawl	
				1. Residential use except
		1. Agriculture and Horticulture	1. Houses incidental to this use	permitted in agricultural use
				zone
		2. Dairy, poultry and pig farming	2. Agro serving, agro	2. Heavy, extensive,
		milk chilling center	processing, agro business	obnoxious, noxious and
	Agricultural/		-	3. Any activity which is
	Forest Use	3. Storage, processing and sale	3. Ice factory, cold storage	creating nuisance and is
10	∠one			obnoxious in nature
	(A)	4. Dwelling for the people	4. Parks and other recreational	4. All uses not specifically
		engaged in the farm (rural settlement)	uses	permitted in column (a) and
		5. Farm houses and accessory		(~)
		buildings	5. Activities related to tourism	
		6. Afforestation	6. Burial and cremation	
			grounds	
		7. Eco-tourism, camping sites,	uses only in the existing	
		eco-parks, eco lodges	homestead land	

- 143 -

#### Master Plan for Aizawl: VISION 2030

		8. Special outdoor recreations	8. Soil testing lab	
		9. 800 m green belt on either side from the centre of the river	9. Cottage industries	
		10. Existing settlements within river buffer	10. Quarrying of gravel, sand, clay or stone	
		11. Water treatment plants, sewage treatment plants, power sub-stations	11. Building construction over plots covered under town planning scheme and conforming uses	
			12. Brick kilns and extractive areas	
11	Slopped Land/Undev elopable Use Zone (SL)	1. Afforestation	1. Quarrying of gravel, sand, clay or stone	1. All uses not specifically permitted in column (a) and (b)
			2. Check dam to store water after clearance from the authority	
			3. Special outdoor recreations	
12	Water Bodies Use Zone	1. Rivers, canals	1. Fisheries	1. Use/activity not specifically related to Water bodies Use not permitted herein.
		2. Streams, water spring	2. Boating, water theme parks, water sports, lagoons	2. All uses not specifically permitted in column (a) and (b)
	(VV)	3. Ponds, lakes	3. Any other use/activity incidental to Water bodies Use Zone is permitted.	
		4. Wetland, aqua culture pond		
		5. Reservoir		
		6. Water catchment area		

## 12.6 Suggestions for development control in Planning Zone No -3 Aizawl: East I and Planning Zone No -4: Aizawl East II

#### Four pronged approach:

- 1) Zoning guidelines in the form of fixed ground coverage, FAR and height control on plot for all new development.
- Create a mechanism for differential Property Tax while imposing responsibility to an incumbent in bearing the maintenance cost of nearby vicinity for better quality of environment.
- 3) Setting up administrative mechanism (a court or a reviewing body) which would be empowered to identify all non-compatible development such as derelict market, unused cemetery, unwanted parking lot etc. within these zones and replace the same plot with suitable activities of higher productive (non residential) functions.
- 4) A special Building Committee within the Aizawl Municipal Council to review or scrutinize any further development or re-densification within this area. Primarily integration of above three points may be converged to allow any development in this area (Similar to Heritage Committee etc. adopted in other cities).

- 144 -
# 12.7 Suggestions for development control along the Chanmari to Chaltlang and Bawngkawn to Durtlang roads

Control/restriction of construction of buildings along the Chanmari to Chaltlang and Bawngkawn to Durtlang roads as approved by the Development Authority are:

- No construction within 50 feet on both sides of the road be allowed and, in addition, for structures below the road, the roof top should not be higher than 20 feet below the road level
- Beyond 50 feet of the main road, permission may be considered:
  - a) If structural engineer certifies that the proposed structure is safe, and
  - b) Only if a structural engineer or a geologist certify that the proposed structure will not endanger the natural soil and rock formation on the western slopes of Laipuitlang

## 12.8 Other Development Control Guidelines

All guidelines implemented are as per norms specified in the following:

- The National Building code
- UDPFI Guidelines
- TCPO Guidelines
- The Indian Standard Code
- Urban Development Plans Formulation and Implementation Guides
- Mizoram Urban and Regional Development Rules
- Aizawl Plan Status Report

Further all structural guidelines are to be in reference with standard building bye laws of the area and National Building Code structural details. The National Building Codes should also be followed for

- General Structural Safety (IS 456:2000, IS 800-1984, IS 801-1975, IS 875 (Part 2), IS 875 (Part 3), IS 875 (Part 4), IS 875 (Part 5), IS 883:1966, IS 1904:1987, IS 1905:1987, IS 2911 (Part 1)
- For cyclone/Wind Storm Protection (IS 875 (3)-1987)
- Earthquake Protection (IS 1893-2002, IS 13920-1993, IS 4326-1993, IS 13828-1993, IS 13827-1993, IS 13935-1993)
- Protection of land slide hazard (IS 14458 (Part 1) 1998, IS 14458 (Part 2) 1997, IS 14458 (Part 3) 1998, IS 14458 (Part 2) 1998)
- Fire safety
- Services
- Signs and outdoor displays

Provision for infrastructure and services to be in accordance with guidelines by TCPO, UDPFI and National Building Code.

Standard protocol regarding responsibility of Architect and Engineer in reference to standard TCPO guidelines.

In addition to standard guidelines for building safety and disaster preparedness, measures for barrier free environment must also be made.

- 145 -

## 12.8.1 Building Regulations

Development must adopt or follow the salient guidelines of the Aizawl Municipal Council Building Regulations, 2011 and the Aizawl Development Authority Building Regulations, 2008

- i. Building Requirements
- ii. Structural Safety and services
- iii. Maximum Permissible Floor Area Ratio (F.A.R.), Height Limitation, Maximum Permissible Coverage and Types of Occupancy

#### A. Maximum Permissible Floor Area Ratio (F.A.R.)

Table-12.2: Maximum Permissible Floor Area Ratio (F.A.R.)

Sr. No.	Type of Occupancy	Maximum Permissible F.A.R.
1	Residential - A	3.0
2	Residential - B	2.5
3	Special Residential	2.0
4	Educational	2.0
5	Mercantile (Commercial)	2.5
6	Institutional (Medical)	2.0
7	Government or Semi-Government	2.5
8	Assembly	1.5
9	Industrial	1.5
10	Storage	2.0
11	Hazardous	1.2

Source: The Aizawl Municipal Council Building Regulations, 2011

Provided that any floor space used for parking or plant room shall not be taken into account in calculating F.A.R.

Provided further that in the case of vertical extension/addition, F.A.R. may be relaxed on the merit of each case.

#### B. Height Limitation

The height of building shall be restricted to 19m (64'4"). Provided that if an entire floor is used as a parking space, that floor shall not be taken into account while calculating height subject to the condition that the total height of the building shall not exceed 22m. In case of plots smaller than 93 sq.m. the height of a building shall not exceed 12.85m (42'2") and in case of plots of size 93 to 130 sq.m. the height of building shall not exceed 16m (52'6").

Provided further that staircase cover or mumty and safety installations shall not be taken into account while calculating height.

- 146 -

#### Master Plan for Aizawl: VISION 2030

#### C. Maximum Permissible Coverage

Table-12.3: Maximum Permissible Ground coverage

Sr. No.	Size of Plots (in sq.m.)	Maximum Permissible Ground coverage (%)
1	Less than 93	71
2	93 to 250	68
3	251 to 400	67
4	401 to 600	66
5	601 to 800	65
6	801 to 1000	60
7	Above 1000	50

Source: The Aizawl Municipal Council Building Regulations, 2011

#### D. Types of Occupancy

The occupancy of any building or part thereof shall be governed by the following provisions:

The usage of plots proposed for development/ re-development shall be governed by the provisions contained in the Master Plan/Zonal Plan/Layout Plan prepared for the locality, provided where no such Plan exists; the usage of plots shall be as approved by the Aizawl Municipal Council.

## **12.9** Towards formulation of policy options for development

- Repeal of ULCRA.
- Reform of Rent Control Laws balancing the interests of landlords and tenants.
- Enactment of the Public Disclosure Law to ensure preparation of medium-term fiscal plan of ULBs and parastatal agencies and release of quarterly performance information to all stakeholders.
- Revision of bye-laws to streamline the approval process for construction of buildings, development of site etc.
- **Simplification** of legal and procedural frameworks for conversion of land from agricultural to non-agricultural purposes.
- Introduction of Property Title Certification System in ULBs.
- Introduction of computerised process of registration of land and property.
- Revision of byelaws to **make rain-water harvesting mandatory** in all buildings and adoption of water conservation measures.
- Byelaws for reuse of **recycled water**.
- Obtaining No Objection certificate (NOC)/ Clearance from Geology and Mineral Resources Department, Mizoram Remote Sensing Application Centre or the concerned Department.

- 147 -

It is suggested that, simultaneously with the preparation of Master Plan or as soon as may be thereafter, the Authority shall proceed with the preparation of Zonal Development Plan - detailed plan must be prepared within the framework of the Master Plan containing proposals for various land uses, roads and streets, parks and open spaces, community facilities, services and public utilities, etc. for each of zones of the area covered by the Master Plan.

## 12.10 Conclusion

It is very essential that the development control regulations are strictly followed to enjoy a regulated development and growth of the city. Any violation these regulations must be strictly dealt with and should be punishable. At the same time efforts should be made by the authorities to make the general public aware of these regulations and inspire them to be alert to report any deviations from these regulations in their surroundings.

- 148 -

#### Master Plan for Aizawl: VISION 2030

- 1 Aizawl City Master Plan, June, 2002, Town & Country Planning Wing, Local Administration Department, Aizawl, Mizoram
- 2 City Development Plan for Aizawl (under JNNURM), Water and Power Consultancy Services (India) Limited
- 3 Environmental Studies of Aizawl City Using Remote Sensing and G.I.S., Mizoram State Remote Sensing Centre Science, Technology and Environment Planning Department Aizawl, Mizoram
- <sup>4</sup> The Mizoram Municipalities Bill 2007, Urban Development & Poverty Alleviation Department
- <sup>5</sup> Village Level Statistics of Mizoram, Economics & Statistics Department Govt. of Mizoram
- 6 Economic Survey, Economic Survey Cell: Planning & Programme Implementation Department
- 7 Socio-Economic Review, Mizoram, Issued by Directorate of Economics & Statistics, Govt. of India
- 8 Building Statistic, Aizawl Building Division
- 9 Primary Census Abstract (2001): Mizoram, Census of India
- 10 Village Directory (2001), Census of India
- 11 The Aizawl Development Authority Building Regulations
- 12 Approved Annual Plan, Local Administration Department, Govt. of Mizoram
- <sup>13</sup> Revised Approved Annual Plan, Local Administration Department, Govt. of Mizoram
- 14 Approved Annual Plan, Local Administration Department, Govt. of Mizoram
- <sup>15</sup> Revised Draft Annual Plan, Urban Development & Poverty Alleviation Department
- 16 Rainfall data
- 17 The Mizoram Gazette, Aizawl Development Authority
- 18 District Disaster Management Plan Aizawl District by Deputy Commissioner, Aizawl District, Government of Mizoram, March 2003.
- <sup>19</sup> Environmental Studies of Aizawl City Using Remote Sensing and GIS (A Project Report) by Mizoram State Remote Sensing Centre, Aizawl, March 2005.
- 20 Extraction of Topographic and Morphometric Features for Landslide Zonation: A Case Study for Ooty Mettupalayam Highway by S.Vasantha Kumar, N. Raja, and G. Prasad Babu in Map world forum, 2007.
- 21 Landslide Disaster Management and Planning: .A GIS based Approach by S.S. Ramakrishnan, V. Sanjeevi Kumar, M.G.S.M. Zaffar Sadiq, M. Arulraj and K. Venugopal in Indian Cartographer, 2002.
- 22 Landslide Inventory of Aizawl City During May-June 2006 by Directorate of Industries, Geology & Mining Wing, Aizawl, 2006.
- 23 Landslide Susceptibility Map of Utah by Richard E. Giraud and Lucas M. Shaw, Utah Geological Survey, 2007.
- <sup>24</sup> Report on Slope Stability and Risk Classification of Aizawl City by H. Lallenmawia, 2006.
- <sup>25</sup> Socio-Economic Survey Report, 2007, Architecture & Regional Department, IIT Kharagpur
- Landuse Survey Report, 2007, Architecture & Regional Department, IIT Kharagpur

- 149 -

- 27 Transit & Transportation Survey Report, 2007, Architecture & Regional Department, IIT Kharagpur
- 28 Central Statistical Organisation, 2006
- <sup>29</sup> Urban Development Plan Formulation and Implementation (UDPFI) Guidelines, 1996
- 30 K.V. Sundaram, "Urban and Regional Planning in India", Delhi Vikas, 1977
- 31 Government of Mizoram School Education Department, 2004
- 32 Statistical handbooks of Mizoram 2003, 2004, 2006
- 33 Annual Report 2005-2006, Directorate of health Services, Aizawl, Mizoram
- 34 Block Statistics of Directorate of Economic & Statistic 1.4. 1999
- 35 CPHEEO "Manual on Water Supply and Treatment"
- 36 Mizoram District Gazetteers, Director of Art and Culture, Govt. of Mizoram 1989
- 37 Report on Monuments and Important Heritage Sites of Aizawl city, Dept. of Art and Culture, Govt. of Mizoram
- <sup>38</sup> Mizoram- Past and Present by H.G. Joshi, Mittal Publications, New Delhi, India, 2005
- 39 Newslink, Vol-IX, No.229; Aizawl, October 16, 2007
- 40 Mizoram Gazette Issue No. 46, Dated 07.08.1978
- 41 Mizoram Gazette Issue No. 126, Dated 06.06.1995
- 42 Mizoram Gazette Issue No. 124(A), Dated 08.11.1988
- 43 Notification No. C18012/a/88-REV/Pt-1, Dated 15.07.1998
- 44 Govt. Notification No. K. 15013/69/99- REV: (Taxes on Land; Building and Assessment of Revenue) Act, 4<sup>th</sup> January, 2007
- 45 www.mizoram.nic.in