MHVRA

INFORMED DISASTER MANAGEMENT PLAN 2023-2032

DISTRICT MALIR

DEVELOPED BY
PDMA SINDH

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PREFACE

Multi-Hazard Vulnerability Risk Assessment (MHVRA) and resultant database are the foundation for evidence-based disaster management plan. Such databases are also an integral part of the implementation of disaster risk reduction and disaster risk management strategies. The MHVRA study of the Malir district has been conducted successfully using high-resolution satellite imagery and its products like digital elevation models, historical disaster datasets, hydro-meteorological data, pertinent socio-economic data, and various other essential datasets. The hazard, vulnerability, and risk maps at Union Council (UC) level have been prepared and compiled as atlases. Using disaster risk information obtained through MHVRA, the disaster management plan of district Malir is prepared and being presented to disaster management practitioners, executors, and prominent stakeholders. Before the MHVRA study, the district-level disaster and contingency plans were prepared using conventional methods and human knowledge. In contrast, the MHVRA based disaster management plans are realistic, based on modern techniques and multiple data sources, therefore, are more authentic and reliable for planning and management of disasters in the district.

The disaster management plans are based on MHVRA study carried out to understand the hazard vulnerability and risk at UC levels. The multi-criteria approach used in this disaster management plan offers comprehensive understanding of vulnerable communities at UC levels, while offering concerned authorities with viable and best practices to minimize the hazard impacts to the communities. Also, cost-benefit analysis for recommended mitigation efforts provides clear actionable insights for relevant authorities to take necessary measures.

District-wise disaster management plans will be revised after 10 years on updation of the MHVRA study. The disaster management plan of Malir is comprehensive and covers guidelines on the complete spectrum of disaster management and standard operating procedures to efficiently cope with disasters and emergencies in the district.

The disaster management plan is duly approved by Provincial Disaster Management Board and demands its proactive implementation in true letter and spirit. The proactive implementation of the plan will ensure reduced disaster losses and damages in the district.

ACKNOWLEDGEMENTS

Multi-Hazard Vulnerability Risk Assessment (MHVRA) based Informed Disaster Management Plan (IDMP) for Sindh Province will help to strengthen the institutional and community level capacity to plan and implement natural hazard risk preparedness, recovery, and reduction in the province through capacity building, public education, and awareness by undertaking steps to reinforce physical, environmental and economic elements, as well as psychosocial wellbeing of communities.

SUPARCO appreciates and acknowledges the efforts of the project officials and professionals' team in preparing this comprehensive IDMP. We would also like to extend special thanks to the Project Director and Project Coordinator, Sindh Resilience Project (SRP), for their valuable inputs and necessary support required during the execution of different project activities.

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The Informed Disaster Management Plan (IDMP), the product of "Multi-Hazard Vulnerability Risk Assessment (MHVRA) Study" developed for Provincial Disaster Management Authority (PDMA) Sindh under Sindh Resilience Project (PDMA Component) by Pakistan Space and Upper Atmosphere Research Commission (SUPARCO) is based on results of MHVRA 2022 study, satellite imagery, data and information obtained from concerned departments and verifiable online sources. Every effort has been made to make this plan practical and free of errors, however, PDMA Sindh or SUPARCO are not liable for any discrepancy in data obtained from various departments. The Informed Disaster Management Plan or any part of it is not to be used for legal or litigation matters and commercial use. However, the information contained in the IDMP or any part of the IDMP can be used without prior permission of PDMA Sindh with proper citation and acknowledgements.

INTRODUCTION TO DISASTER MANAGEMENT PLAN OF DISTRICT MALIR

INTRODUCTION

As per the declaration of National Disaster Management Act 2010, the districts are required to develop disaster management plans to effectively cope with disasters and emergencies at district level. The objective of district wise disaster management plan is to adopt a proactive approach in managing disaster risk by building capacity and strengthening institutional mechanisms. The plan is aimed to provide direction and guidelines to district governments and other stakeholders, in a paradigm shift from reactive to a proactive approach, and to layout the standard operating procedures to be followed in the complete cycle of disaster management.

Multi-Hazard Vulnerability and Risk Assessment (MHVRA) is integral for proactive risk management, hence under Sindh Resilience Project (PDMA Component), MHVRA has been conducted at the Provincial level. MHVRA is a multi-disciplinary process involving the quantification of the frequency and intensity of possible hazard(s), the assessment of the elements that can be destroyed or damaged from possible disasters, and the degree of the damage each element can sustain when affected by certain disasters of various intensities. The assessment of hazard, exposure, vulnerability and capacity leads to the risk assessment, which indicates the anticipated damages in case of a possible disaster. Disaster risk assessment is normally the first step in planning for disaster management activities. It provides an evidence-based estimation of the risk so that effective risk reduction measures can be employed appropriately and cost-effectively.

The development of MHVRA informed disaster management plan is based on diversified information sources including satellite remote sensing, Digital Elevation Model (DEM), and pertinent information collected from concerned departments. The outcomes for MHVRA study are depicted in atlas including; landuse / landcover, critical infrastructure, hazard, exposure, vulnerability, and risk maps of cyclone and storm surge, drought, earthquake, flood, heatwave, and tsunami at UC level.

The MHVRA Informed Disaster Management Plan is a significant step towards disaster resilient Sindh because the foundation of disaster management plan is laid on realistic disaster risk identification and efficient need-based disaster preparedness and response measures. UC-level multi-disaster risk identification will not only enable active and effective disaster preparedness but also help in disaster risk reduction at the grass-root level. In addition, the plan is intended to strengthen the district disaster management system and provide guidance on pre-disaster preparedness, coordinated response and recovery through implementable agenda.

VISION

Vision of MHVRA Informed Disaster Management Plan is;

- To identify underlying UC level multi-disaster risks in administrative districts of Sindh province.
- To develop realistic Disaster Management Plan for proactive disaster management.
- To ensure prioritization of disaster risk reduction measures at UC level.
- To enforce better coordination for disaster response.
- To improve rehabilitation plans for restoration of livelihood, and organizational capacities of affected communities.

OBJECTIVES

The plan is intended to meet following objectives in 10 years;

1. Building disaster resilience capacity at UC level to minimize the loss of lives, livelihood, assets and environment.

2. Improved understanding of disaster risk, hazard and vulnerabilities to strengthen disaster governance from local level to provincial level.

3. Enhanced preparedness to improve disaster response at grass-root level.

4. Promote and facilitate Disaster Risk Reduction (DRR) in planning and implementation of development projects to increase resilience.

5. Provide clarity on roles and responsibilities of various departments and stakeholders involved in different aspects of disaster management.

6. Promote "Build Back Better" principle in recovery, rehabilitation and reconstruction.

7. Promote social inclusion and communities as partners to reduce and manage disaster risk.

8. Promote disaster prevention and mitigation culture at local level.

REVIEW OF MHVRA INFORMED DISASTER MANAGEMENT PLAN

The MHVRA Informed Disaster Management Plan is planned to be effective for 10 years starting from January 2023 to December 2032 and requires review before completion of 10 years. Periodic review is essential because of following reasons;

1. During 10 years, there will be likely chances of new development in the district hence, vulnerability, exposure, and risk assessment will require updation.

1. Planning is a dynamic process, therefore, disaster management plan must be reviewed periodically to incorporate changes according to the emergence of new eminent disasters and situations.

2. Climate is a dynamic driver of changing hazard risks, therefore, it is important to review disaster management plan in changing disaster scenarios.

Additionally, it is also recommended to review the plan after the occurrence of each disaster event to measure its effectiveness. Necessary adjustment may be carried out in the plan accordingly.

Foregoing in view, it is recommended to formulate a committee to review the disaster management plan. A review of the plan shall be carried out by the concerned DDMA under the supervisory role of PDMA Sindh. Recommended composition of the plan review committee is as follows;

Table 1: Recommended Committee for Reviewing Disaster Management Plan

Committee Representative	Role
DG, PDMA Sindh / Dir Ops PDMA	Chairman
Concerned DC or representative officer	Member
Concerned officer from local government	Member
Elected representative of the concerned district	Member
Representatives from disaster affected communities	Member (s)
Representative from SUPARCO	Member
Representative from research / academia experienced in disaster management field	Member (s)
Representative from UN Organization on disaster related domains in Pakistan, especially in Sindh	Member
Representative from reputed NGO working on disaster related domains especially in Sindh	Member
Representatives from Business Committee	Member
Representatives from Chamber of Agriculture	Member
Any other member as deemed appropriate (need basis)	Member

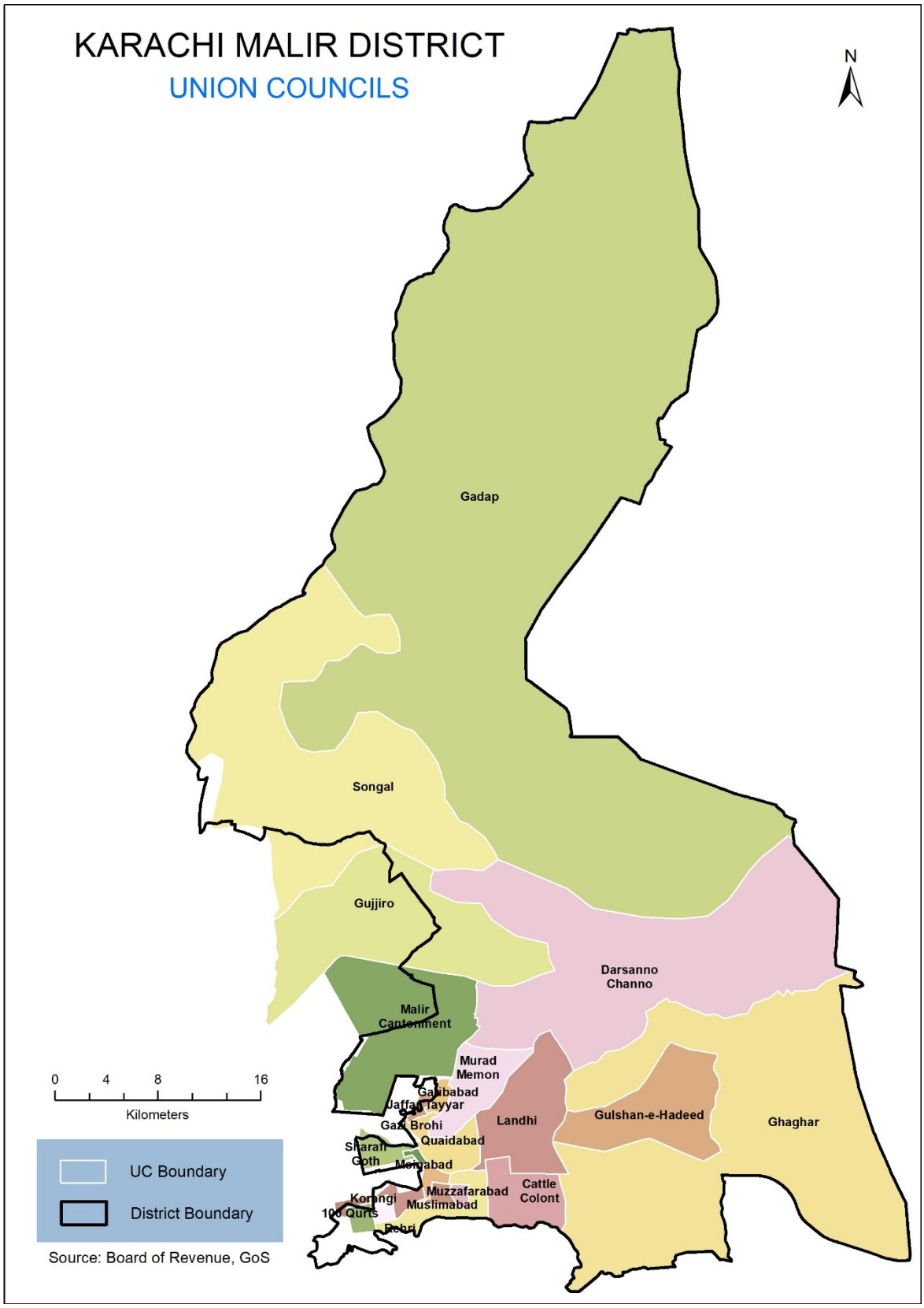
MODES OF REVIEW

Preferred modes of review of plan are;

a. For a post-disaster review of the plan, PDMA shall conduct a questionnaire-based survey covering pertinent questions to identify gaps or issues in the plan. A questionnaire-based survey can be conducted through online survey services or organizing online meetings. Once issues have been identified by the committee, necessary changes be incorporated in the plan and the revised plan be approved by review committee.
b. For review before the expiry of the validity of the plan, necessary updation in baseline mapping i.e., hazard, exposure, vulnerability, and risk assessment be carried out to incorporate new developments and disaster situations. Once, baseline mapping is updated, plan is to be updated accordingly. The review committee shall vet the updation of the plan in the light of experience and recommendations. Upon approval from the review committee, the plan shall be effective for next 10-years.

DISASTER RISK PROFILE OF DISTRICT MALIR

DISTRICT MALIR AT A GLANCE



GEOGRAPHY

District area in Sq. Km	2,487	
Coordinates	Longitude 67° 1' 38" to 67° 34' 37" East Latitude 24° 45' 29" to 25° 38' 36"North	
Surrounding Districts	Jamshoro and Thatta in East East and Korangi in West Balochistan Province in North Arabian Sea in South	
Climate Conditions	Warm and Semi-Arid	
Coldest Month Hottest Month	January May	
Seasonal Temperatures	Max Mean (◦C)	Min Mean (◦C)
Spring (March and April)	33.51	21.13
Dry Summer (May and June)	36.50	26.80
Wet Summer (July to September)	33.75	26.17
Autumn (October to November)	32.74	21.20
Winter (December to February)	26.29	14.83
Average Rainfall	173.75 mm/year	
Physiographic Features	-	

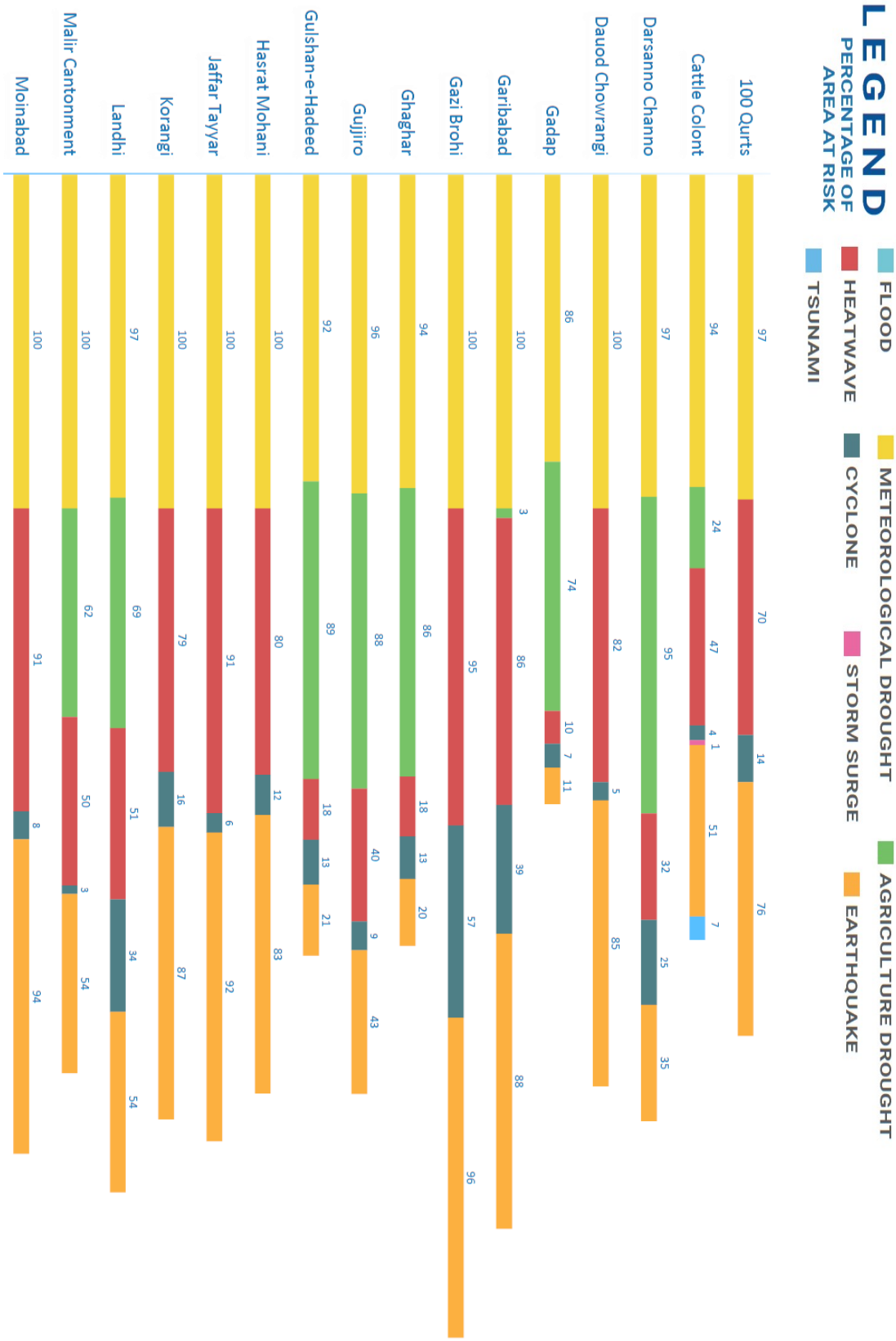
DEMOGRAPHY

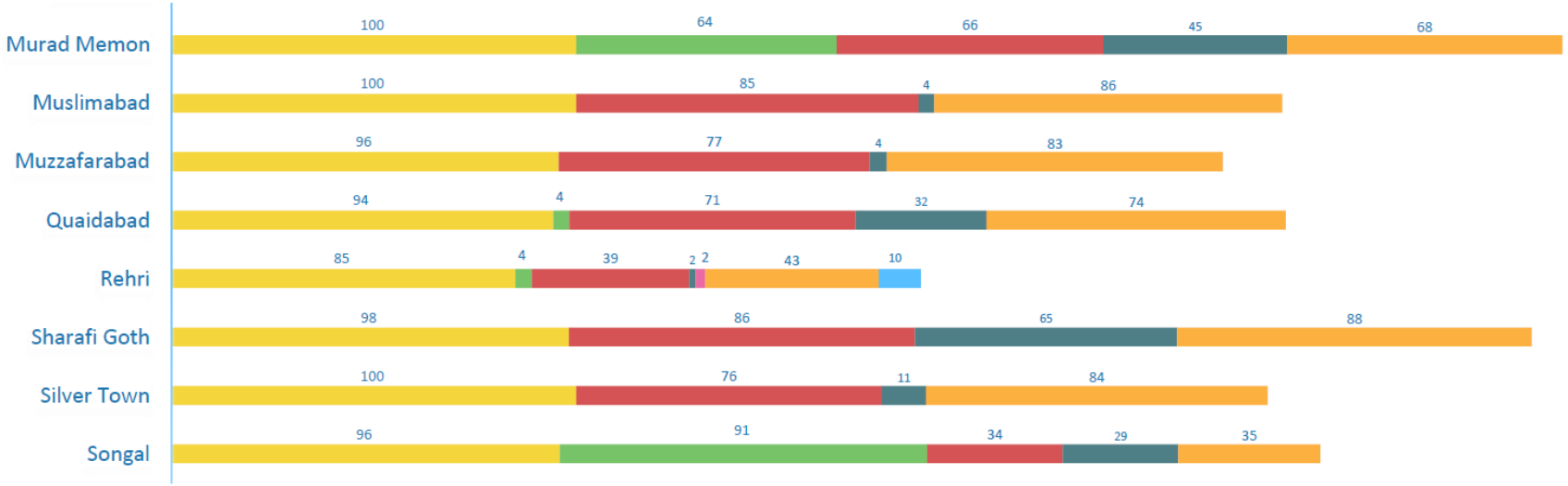
	Year-1998	**Year-2017**
Population	914,765	1,924,346
Urban	580,564	1,066,712
Rural	334,201	857,634
No. of Household	-	338,257
Average Annual Growth Rate 1998-2017	3.99 %	

ECONOMY

Industries	Food Products and Beverages and other non-metallic mineral products

TALUKA NAMES	UC NAMES
1. Airport 2. Bin Qasim Sub-Division 3. Gadap Sub-Division 4. Ibrahim Hydri 5. Korangi Creek Cantonment 6. Malir Cantonment 7. Murad Memon 8. Shah Mureed	1. 100 Quarters 2. Cattle Colony 3. Darsanno Channo 4. Dauod Chowrangi 5. Gadap 6. Garibabad 7. Gazi Brohi 8. Ghaghar 9. Gujjiro 10. Gulshan-E-Hadeed 11. Hasrat Mohani 12. Jaffar Tayyar 13. Korangi 14. Landhi 15. Malir Cantonment 16. Moinabad 17. Murad Memon 18. Muslimabad 19. Muzzafarabad 20. Quaidabad 21. Rehri 22. Sharafi Goth 23. Silver Town 24. Songal


LEGEND
PERCENTAGE OF AREA AT RISK
FLOOD
HEATWAVE
CYCLONE
TSUNAMI
METEOROLOGICAL DROUGHT
STORM SURGE
AGRICULTURE DROUGHT
EARTHQUAKE
100 Qurts
97 70 14 76
Cattle Colont
94 24 47 4 1 51 7
Darsanno Channo
97 95 32 25 35
Dauod Chowrangi
100 82 5 85
Gadap
86 74 10 7 11
Garibabad
100 3 86 39 88
Gazi Brohi
100 95 57 96
Ghaghar
94 86 18 13 20
Gujjiro
96 88 40 9 43
Gulshan-e-Hadeed
92 89 18 13 21
Hasrat Mohani
100 80 12 83
Jaffar Tayyar
100 91 6 92
Korangi
100 79 16 87
Landhi
97 69 51 34 54
Malir Cantonment
100 62 50 3 54
Moinabad
100 91 8 94


Murad Memon
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Muslimabad
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Quaidabad
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Rehri
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Sharafi Goth
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Silver Town
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Songal
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35

UC WISE RISK PROFILE

100 Quarters			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	2.641 sq km
		Pakka Unplanned Area	0.081 sq km
		Education Facilities	18
		Health Facilities	1
		Road Network	14.219 km
		Population	103147
		Household	16833
Meteorological Drought	Low - Medium	Population	103840
		Household	16946
Heatwave	Low - Extreme	Population	102373
		Household	16705
		Pakka Planned Area	2.62 sq km
		Pakka Unplanned Area	0.08 sq km
Cyclone	Low	Pakka Planned Area	0.508 sq km
		Pakka Unplanned Area	0.009 sq km
		Education Facilities	3
		Road Network	0.523 km
		Population	24950
		Household	4090
Tsunami	Low - Extreme	Pakka Planned Area	0.008 sq km
		Education Facilities	1
		Road Network	1.121 km
		Population	330
		Household	52
Storm Surge	Low - Extreme	Pakka Planned Area	0.005 sq km
		Road Network	0.435 km
		Population	218
		Household	34
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture Drought	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Cattle Colony

Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	1.002 sq km
		Forest Area	0.001 sq km
		Pakka Planned Area	10.218 sq km
		Pakka Unplanned Area	0.788 sq km
		Range Land	0.464 sq km
		Bus Stops	3
		Education Facilities	22
		Grain Mandi	1
		Grid Stations	1
		Industries	58
		Mobile Towers	10
		Petrol Pumps	2
		Police Stations	2
		Post Offices	1
		Power Plants	17
		Railway Line	7.512 km
		Road Network	69.487 km
		Population	102783
		Household	16220
Meteorological Drought	Low - Extreme	Agriculture Area	1.016 sq km
		Forest Area	0.237 sq km
		Range Land	2.845 sq km
		Population	104253
		Household	16450
Agricultural Drought	Low - Medium	Agriculture Area	0.003 sq km
		Forest Area	0.039 sq km
		Range Land	3.355 sq km
		Population	39130
		Household	6174
Heatwave	Low - Extreme	Population	102327
		Household	16148
		Agriculture Area	0.996 sq km
		Pakka Planned Area	10.158 sq km
		Pakka Unplanned Area	0.786 sq km
Cyclone	Low	Agriculture Area	0.995 sq km
		Pakka Planned Area	0.23 sq km
		Pakka Unplanned Area	0.034 sq km
		Range Land	0.005 sq km
		Road Network	0.447 km

		Population	4408
		Household	697
Tsunami	Low - Extreme	Agriculture Area	0.155 sq km
		Forest Area	0.035 sq km
		Pakka Planned Area	0.511 sq km
		Pakka Unplanned Area	0.143 sq km
		Range Land	1.12 sq km
		Education Facilities	2
		Mobile Towers	1
		Road Network	1.847 km
		Population	5855
		Household	924
Storm Surge	Low - High	Forest Area	0.034 sq km
		Pakka Planned Area	0.218 sq km
		Pakka Unplanned Area	0.019 sq km
		Range Land	0.089 sq km
		Road Network	0.416 km
		Population	761
		Household	119
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Darsanno Channo			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	70.095 sq km
		Forest Area	0.132 sq km
		Pakka Planned Area	15.639 sq km
		Pakka Unplanned Area	5.12 sq km
		Range Land	6.691 sq km
		Bridges	9
		Bus Stops	1
		Education Facilities	81
		Industries	3
		Mobile Towers	13
		Petrol Pumps	10
		Power Plants	1
		Tourist Places	1
		Welfare Trust	1
		Irrigation and Drainage Network	59.888 km
		Road Network	449.526 km
		Population	89926

		Household	17975
Meteorological Drought	Low - Extreme	Agriculture Area	70.743 sq km
		Bare Area with sparse Natural Vegetation	56.497 sq km
		Forest Area	1.74 sq km
		Range Land	107.786 sq km
		Population	90804
		Household	18147
Agricultural Drought	Low - Extreme	Agriculture Area	81.149 sq km
		Bare Area with sparse Natural Vegetation	68.708 sq km
		Forest Area	2.116 sq km
		Range Land	131.077 sq km
		Population	102628
		Household	20479
Heatwave	Low - Extreme	Population	89735
		Household	17936
		Agriculture Area	69.855 sq km
		Pakka Planned Area	15.59 sq km
		Pakka Unplanned Area	5.112 sq km
Cyclone	Low	Agriculture Area	69.991 sq km
		Forest Area	0.019 sq km
		Pakka Planned Area	2.242 sq km
		Pakka Unplanned Area	0.972 sq km
		Range Land	0.722 sq km
		Education Facilities	24
		Mobile Towers	2
		Petrol Pumps	5
		Tourist Places	1
		Welfare Trust	1
		Irrigation and Drainage Network	3.115 km
		Road Network	92.32 km
		Population	21834
		Household	4332
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC is not prone to flood hazard due to Indus River. However, Malir River passes through the UC and has	

		potential to produce flooding during monsoon / heavy rains. In case of excessive water in Malir river, overtopping / breaching and consequent residual risk of flooding cannot be ruled out for UC.	
Dawood Chowrangi			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	1.814 sq km
		Pakka Unplanned Area	0.716 sq km
		Ambulance Services	2
		Bus Stops	2
		Education Facilities	12
		Grid Stations	1
		Industries	14
		Mobile Towers	4
		Petrol Pumps	2
		Police Stations	1
		Power Plants	1
		Road Network	9.075 km
		Population	47442
		Household	7485
Meteorological Drought	Medium	Population	47704
		Household	7526
Heatwave	Low - Extreme	Population	47173
		Household	7439
		Pakka Planned Area	1.808 sq km
		Pakka Unplanned Area	0.711 sq km
Cyclone	Low	Pakka Planned Area	0.095 sq km
		Pakka Unplanned Area	0.062 sq km
		Education Facilities	1
		Mobile Towers	1
		Road Network	0.561 km
		Population	5930
		Household	934
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Gadap			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	108.729 sq km
		Forest Area	0.298 sq km
		Natural Vegetation in Wet Areas	0.027 sq km
		Pakka Planned Area	4.739 sq km
		Pakka Unplanned Area	5.408 sq km
		Range Land	7.83 sq km
		Bridges	4
		Education Facilities	126
		Fire Stations	1
		Grid Stations	1
		Industries	1
		Mobile Towers	6
		Petrol Pumps	3
		Tourist Places	1
		Irrigation and Drainage Network	151.785 km
		Road Network	568.899 km
		Population	39736
		Household	8429
Meteorological Drought	Low - Extreme	Agriculture Area	110.007 sq km
		Bare Area with sparse Natural Vegetation	549.583 sq km
		Forest Area	5.042 sq km
		Natural Vegetation in Wet Areas	3.346 sq km
		Range Land	342.29 sq km
		Water Body	19.981 sq km
		Wet Area	0.328 sq km
		Population	40075
		Household	8496
Agricultural Drought	Low - Extreme	Agriculture Area	127.984 sq km
		Bare Area with sparse Natural Vegetation	525.289 sq km
		Forest Area	6.142 sq km
		Natural Vegetation in Wet Areas	4.103 sq km
		Range Land	414.013 sq km
		Water Body	8.55 sq km
		Wet Area	0.384 sq km
		Population	48821
		Household	10347

Heatwave	Low - Extreme	Population	39716
		Household	8424
		Agriculture Area	108.36 sq km
		Pakka Planned Area	4.704 sq km
		Pakka Unplanned Area	5.406 sq km
Cyclone	Low	Agriculture Area	85.364 sq km
		Forest Area	0.017 sq km
		Pakka Planned Area	0.824 sq km
		Pakka Unplanned Area	0.754 sq km
		Range Land	0.802 sq km
		Education Facilities	21
		Industries	1
		Mobile Towers	1
		Petrol Pumps	1
		Tourist Places	1
		Irrigation and Drainage Network	6.02 km
		Road Network	97.204 km
		Population	8514
		Household	1807
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Gharibabad			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	1.119 sq km
		Pakka Planned Area	1.84 sq km
		Pakka Unplanned Area	0.068 sq km
		Range Land	0.041 sq km
		Ambulance Services	1
		Bridges	2
		Bus Stops	1
		Education Facilities	24
		Mobile Towers	1
		Irrigation and Drainage Network	3.262 km
		Road Network	11.594 km
		Population	44528
		Household	8509

Meteorological Drought	Low - Extreme	Agriculture Area	1.128 sq km
		Range Land	0.096 sq km
		Population	44606
		Household	8523
Agricultural Drought	Low	Range Land	0.114 sq km
		Population	486
		Household	95
Heatwave	Low - Extreme	Population	44393
		Household	8481
		Agriculture Area	1.112 sq km
		Pakka Planned Area	1.835 sq km
		Pakka Unplanned Area	0.068 sq km
Cyclone	Low	Agriculture Area	1.109 sq km
		Pakka Planned Area	0.313 sq km
		Pakka Unplanned Area	0.019 sq km
		Range Land	0.004 sq km
		Ambulance Services	1
		Irrigation and Drainage Network	1.817 km
		Road Network	3.514 km
		Population	6640
		Household	1282
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Ghazi Dawood Brohi Goth			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	1.767 sq km
		Pakka Planned Area	1.023 sq km
		Pakka Unplanned Area	0.49 sq km
		Ambulance Services	1
		Bridges	1
		Bus Stops	1
		Education Facilities	21
		Mobile Towers	10
		Petrol Pumps	5
		Post Offices	1

		Irrigation and Drainage Network	3.239 km
		Road Network	5.22 km
		Population	30721
		Household	5912
Meteorological Drought	Medium	Agriculture Area	1.773 sq km
		Population	30770
		Household	5922
Heatwave	Low - Extreme	Population	30671
		Household	5904
		Agriculture Area	1.764 sq km
		Pakka Planned Area	1.021 sq km
		Pakka Unplanned Area	0.489 sq km
Cyclone	Low	Agriculture Area	1.758 sq km
		Pakka Planned Area	0.171 sq km
		Pakka Unplanned Area	0.131 sq km
		Ambulance Services	1
		Bridges	1
		Education Facilities	2
		Mobile Towers	1
		Irrigation and Drainage Network	2.898 km
		Road Network	1.715 km
		Population	5683
		Household	1101
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC is not prone to flood hazard due to Indus River. However, Malir River passes through the UC and has potential to produce flooding during monsoon / heavy rains. In case of excessive water in Malir river, overtopping / breaching and consequent residual risk of flooding cannot be ruled out for UC.	
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	

Ghaghar			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	44.52 sq km
		Forest Area	0.021 sq km

		Pakka Planned Area	15.701 sq km
		Pakka Unplanned Area	3.263 sq km
		Range Land	4.561 sq km
		Ambulance Services	1
		Bridges	2
		Bus Stops	2
		Education Facilities	48
		Grid Stations	1
		Health Facilities	2
		Industries	48
		Mobile Towers	10
		Petrol Pumps	15
		Police Stations	1
		Post Offices	1
		Power Plants	4
		Tourist Places	1
		Irrigation and Drainage Network	2.442 km
		Railway Line	54.425 km
		Road Network	343.341 km
		Population	149176
		Household	25203
Meteorological Drought	Low - Extreme	Agriculture Area	45.022 sq km
		Bare Area with sparse Natural Vegetation	113.615 sq km
		Forest Area	1.092 sq km
		Range Land	108.005 sq km
		Water Body	0.044 sq km
		Wet Area	2.408 sq km
		Population	150266
		Household	25392
Agricultural Drought	Low - Extreme	Agriculture Area	54.23 sq km
		Bare Area with sparse Natural Vegetation	137.96 sq km
		Forest Area	0.883 sq km
		Range Land	128.688 sq km
		Water Body	0.054 sq km
		Wet Area	0.348 sq km
		Population	141814
		Household	23960
Heatwave	Low - Extreme	Population	148600
		Household	25107
		Agriculture Area	44.386 sq km

		Pakka Planned Area	15.664 sq km
		Pakka Unplanned Area	3.25 sq km
Cyclone	Low	Agriculture Area	44.486 sq km
		Forest Area	0.009 sq km
		Pakka Planned Area	0.294 sq km
		Pakka Unplanned Area	0.397 sq km
		Range Land	0.486 sq km
		Education Facilities	7
		Tourist Places	1
		Irrigation and Drainage Network	0.914 km
		Railway Line	0.277 km
		Road Network	30.408 km
		Population	12892
		Household	2179
Tsunami	Low - High	Forest Area	0.095 sq km
		Pakka Planned Area	1.567 sq km
		Range Land	1.641 sq km
		Railway Line	1.426 km
		Road Network	8.066 km
Storm Surge	Low - High	Forest Area	0.096 sq km
		Pakka Planned Area	1.028 sq km
		Range Land	0.065 sq km
		Railway Line	0.399 km
		Road Network	0.741 km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Gujjirio			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	10.67 sq km
		Forest Area	0.001 sq km
		Kachcha Area	0.174 sq km
		Pakka Planned Area	32.4 sq km
		Pakka Unplanned Area	12.218 sq km
		Range Land	1.265 sq km
		Bridges	8
		Bus Stops	5
		Education Facilities	46
		Fire Stations	2
		Grain Mandi	2
		Grid Stations	1

		Health Facilities	3
		Industries	54
		Mobile Towers	70
		Petrol Pumps	32
		Police Stations	4
		Post Offices	4
		Power Plants	1
		Welfare Trust	4
		Irrigation and Drainage Network	41.567 km
		Road Network	295.089 km
		Population	667316
		Household	103998
Meteorological Drought	Low - Extreme	Agriculture Area	10.785 sq km
		Forest Area	0.353 sq km
		Range Land	18.705 sq km
		Population	670339
		Household	104490
Agricultural Drought	Low - Extreme	Agriculture Area	13.119 sq km
		Forest Area	0.43 sq km
		Range Land	22.748 sq km
		Population	600791
		Household	94518
Heatwave	Low - Extreme	Population	666324
		Household	103845
		Agriculture Area	10.627 sq km
		Kachcha Area	0.173 sq km
		Pakka Planned Area	32.338 sq km
		Pakka Unplanned Area	12.202 sq km
Cyclone	Low	Agriculture Area	10.647 sq km
		Kachcha Area	0.173 sq km
		Pakka Planned Area	1.129 sq km
		Pakka Unplanned Area	0.468 sq km
		Range Land	0.172 sq km
		Bus Stops	1
		Education Facilities	4
		Mobile Towers	2
		Petrol Pumps	1
		Irrigation and Drainage Network	1.433 km
		Road Network	15.541 km
		Population	28842

		Household	4746
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC is not prone to flood hazard due to Indus River. However, Liyari River passes through the UC and has potential to produce flooding during monsoon / heavy rains. In case of excessive water in Liyari river, overtopping / breaching and consequent residual risk of flooding cannot be ruled out for UC.	

Gulshan-e-Hadeed			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	7.768 sq km
		Pakka Planned Area	3.315 sq km
		Pakka Unplanned Area	0.158 sq km
		Range Land	0.799 sq km
		Bus Stops	6
		Education Facilities	9
		Health Facilities	4
		Mobile Towers	3
		Police Stations	2
		Post Offices	2
		Road Network	99.626 km
		Population	74572
		Household	12604
Meteorological Drought	Low - Extreme	Agriculture Area	7.889 sq km
		Bare Area with sparse Natural Vegetation	4.028 sq km
		Range Land	29.41 sq km
		Population	67737
		Household	11445
Agricultural Drought	Low - Extreme	Agriculture Area	9.579 sq km
		Bare Area with sparse Natural Vegetation	4.893 sq km
		Range Land	35.706 sq km
		Population	57949
		Household	9795
Heatwave	Low - Extreme	Population	73827
		Household	12473
		Agriculture Area	7.728 sq km

		Pakka Planned Area	3.283 sq km
		Pakka Unplanned Area	0.157 sq km
Cyclone	Low	Agriculture Area	7.764 sq km
		Pakka Planned Area	0.505 sq km
		Pakka Unplanned Area	0.037 sq km
		Range Land	0.113 sq km
		Education Facilities	3
		Health Facilities	1
		Road Network	7.364 km
		Population	12104
		Household	2041
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Hasrat Mohani			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	1.834 sq km
		Pakka Unplanned Area	0.232 sq km
		Education Facilities	18
		Grid Stations	1
		Road Network	8.401 km
		Population	97561
		Household	15937
Meteorological Drought	Medium	Range Land	0.002 sq km
		Population	98304
		Household	16055
Heatwave	Low - Extreme	Population	96854
		Household	15819
		Pakka Planned Area	1.821 sq km
		Pakka Unplanned Area	0.23 sq km
Cyclone	Low	Pakka Planned Area	0.278 sq km
		Pakka Unplanned Area	0.024 sq km
		Education Facilities	3
		Road Network	0.771 km
		Population	14781
		Household	2420

Tsunami	Low - Medium	Pakka Planned Area	0.013 sq km
		Population	580
		Household	92
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	

Jaffar Tayyar			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	0.003 sq km
		Pakka Planned Area	1.659 sq km
		Pakka Unplanned Area	0.403 sq km
		Bus Stops	1
		Education Facilities	27
		Health Facilities	1
		Mobile Towers	8
		Road Network	8.256 km
		Population	66184
		Household	12420
Meteorological Drought	Medium	Agriculture Area	0.004 sq km
		Population	66295
		Household	12442
Heatwave	Low - Extreme	Population	66112
		Household	12408
		Agriculture Area	0.003 sq km
		Pakka Planned Area	1.656 sq km
		Pakka Unplanned Area	0.403 sq km
Cyclone	Low	Agriculture Area	0.002 sq km
		Pakka Planned Area	0.09 sq km
		Pakka Unplanned Area	0.038 sq km
		Education Facilities	3
		Road Network	0.464 km
		Population	5455
		Household	1013
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	

Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood

Korangi			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.394 sq km
		Range Land	0.001 sq km
		Education Facilities	7
		Road Network	3.381 km
		Population	13950
		Household	2295
Meteorological Drought	Medium	Range Land	0.001 sq km
		Population	14082
		Household	2316
Heatwave	Low - Medium	Population	13798
		Household	2268
		Pakka Planned Area	0.39 sq km
Cyclone	Low	Pakka Planned Area	0.077 sq km
		Road Network	0.433 km
		Population	2291
		Household	375
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	

Landhi			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	18.218 sq km
		Pakka Planned Area	8.216 sq km
		Pakka Unplanned Area	2.706 sq km
		Range Land	0.858 sq km
		Bus Stops	5

		Education Facilities	61
		Fire Stations	1
		Grid Stations	1
		Health Facilities	1
		Industries	11
		Mobile Towers	16
		Petrol Pumps	7
		Police Stations	3
		Power Plants	4
		Tourist Places	1
		Welfare Trust	1
		Irrigation and Drainage Network	11.926 km
		Road Network	102.461 km
		Population	312845
		Household	50494
Meteorological Drought	Low - Extreme	Agriculture Area	18.326 sq km
		Range Land	13.918 sq km
		Population	315749
		Household	50959
Agricultural Drought	Low - High	Agriculture Area	15.617 sq km
		Range Land	14.038 sq km
		Population	217158
		Household	34935
Heatwave	Low - Extreme	Population	311612
		Household	50294
		Agriculture Area	18.17 sq km
		Pakka Planned Area	8.181 sq km
		Pakka Unplanned Area	2.7 sq km
Cyclone	Low	Agriculture Area	18.189 sq km
		Pakka Planned Area	0.876 sq km
		Pakka Unplanned Area	0.292 sq km
		Range Land	0.125 sq km
		Education Facilities	15
		Grid Stations	1
		Mobile Towers	1
		Petrol Pumps	1
		Tourist Places	1
		Irrigation and Drainage Network	2.276 km
		Road Network	24.477 km
		Population	41362

		Household	6859
Tsunami	Low - Medium	Pakka Planned Area	0.009 sq km
		Population	351
		Household	56
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC is not prone to flood hazard due to Indus River. However, Malir River passes through the UC and has potential to produce flooding during monsoon / heavy rains. In case of excessive water in Malir river, overtopping / breaching and consequent residual risk of flooding cannot be ruled out for UC.	

Malir Cantonment			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	1.457 sq km
		Forest Area	0.007 sq km
		Kachcha Area	0.157 sq km
		Pakka Planned Area	42.688 sq km
		Pakka Unplanned Area	2.262 sq km
		Range Land	0.438 sq km
		Ambulance Services	1
		Bridges	10
		Bus Stops	19
		Education Facilities	40
		Fire Stations	2
		Grid Stations	3
		Health Facilities	2
		Mobile Towers	53
		Petrol Pumps	25
		Police Stations	3
		Post Offices	6
		Welfare Trust	7
		Irrigation and Drainage Network	25.027 km
		Railway Line	6.084 km
		Road Network	206.121 km
		Population	325301
		Household	53084
Meteorological Drought	Low - Extreme	Agriculture Area	1.476 sq km
		Forest Area	0.117 sq km
		Range Land	2.477 sq km

		Population	327411
		Household	53423
Agricultural Drought	Low - High	Agriculture Area	1.771 sq km
		Forest Area	0.143 sq km
		Range Land	2.989 sq km
		Population	290431
		Household	46916
Heatwave	Low - Extreme	Population	324822
		Household	53002
		Agriculture Area	1.449 sq km
		Kachcha Area	0.159 sq km
		Pakka Planned Area	42.634 sq km
		Pakka Unplanned Area	2.257 sq km
Cyclone	Low	Agriculture Area	1.45 sq km
		Forest Area	0.003 sq km
		Kachcha Area	0.156 sq km
		Pakka Planned Area	0.534 sq km
		Pakka Unplanned Area	0.102 sq km
		Range Land	0.02 sq km
		Bus Stops	1
		Education Facilities	2
		Mobile Towers	5
		Petrol Pumps	3
		Irrigation and Drainage Network	0.316 km
		Road Network	4.719 km
		Population	17085
		Household	2731
Tsunami	Low - Medium	Pakka Planned Area	0.027 sq km
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Moinabad			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	0.015 sq km
		Pakka Planned Area	0.686 sq km
		Pakka Unplanned Area	0.306 sq km
		Bus Stops	3
		Education Facilities	10

		Industries	2
		Mobile Towers	3
		Post Offices	1
		Railway Line	0.396 km
		Road Network	1.493 km
		Population	39313
		Household	6203
Meteorological Drought	Medium	Agriculture Area	0.016 sq km
		Population	39397
		Household	6217
Heatwave	Low - Extreme	Population	39190
		Household	6184
		Agriculture Area	0.015 sq km
		Pakka Planned Area	0.685 sq km
		Pakka Unplanned Area	0.304 sq km
Cyclone	Low	Agriculture Area	0.014 sq km
		Pakka Planned Area	0.057 sq km
		Pakka Unplanned Area	0.024 sq km
		Road Network	0.093 km
		Population	2998
		Household	473
Tsunami	Low - Medium	Pakka Planned Area	0.027 sq km
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	

Murad Memon			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	12.078 sq km
		Forest Area	0.027 sq km
		Pakka Planned Area	5.903 sq km
		Pakka Unplanned Area	0.472 sq km
		Range Land	0.559 sq km
		Ambulance Services	4
		Bridges	3
		Bus Stops	2
		Education Facilities	53

		Grid Stations	1
		Industries	5
		Mobile Towers	12
		Petrol Pumps	3
		Power Plants	1
		Irrigation and Drainage Network	11.977 km
		Road Network	47.369 km
		Population	77391
		Household	15019
Meteorological Drought	Medium - Extreme	Agriculture Area	12.146 sq km
		Forest Area	0.555 sq km
		Range Land	5.946 sq km
		Population	77661
		Household	15070
Agricultural Drought	Low - Medium	Agriculture Area	7.783 sq km
		Forest Area	0.671 sq km
		Range Land	7.065 sq km
		Population	52289
		Household	10145
Heatwave	Low - Extreme	Population	77375
		Household	15014
		Agriculture Area	12.045 sq km
		Pakka Planned Area	5.902 sq km
		Pakka Unplanned Area	0.472 sq km
Cyclone	Low	Agriculture Area	12.035 sq km
		Forest Area	0.004 sq km
		Pakka Planned Area	0.615 sq km
		Pakka Unplanned Area	0.128 sq km
		Range Land	0.058 sq km
		Ambulance Services	1
		Bus Stops	1
		Education Facilities	13
		Mobile Towers	1
		Petrol Pumps	1
		Irrigation and Drainage Network	0.571 km
		Road Network	16.689 km
		Population	10196
		Household	1977
Tsunami	Low - Medium	Pakka Planned Area	0.027 sq km

Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge
Riverine Flood	Nil	The UC is not prone to flood hazard due to Indus River. However, Malir River passes through the UC and has potential to produce flooding during monsoon / heavy rains. In case of excessive water in Malir river, overtopping / breaching and consequent residual risk of flooding cannot be ruled out for UC.

Muslimabad			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	1.153 sq km
		Pakka Unplanned Area	1.445 sq km
		Range Land	0.032 sq km
		Education Facilities	10
		Health Facilities	1
		Mobile Towers	4
		Police Stations	1
		Irrigation and Drainage Network	1.274 km
		Road Network	4.423 km
		Population	105707
		Household	16681
Meteorological Drought	Medium - Extreme	Range Land	0.14 sq km
		Population	106011
		Household	16727
Agricultural Drought	Low-Medium	Agriculture Area	7.783 sq km
		Forest Area	0.671 sq km
		Range Land	7.065 sq km
		Population	52289
		Household	10145
Heatwave	Low - Extreme	Population	105518
		Household	16649
		Pakka Planned Area	1.152 sq km
		Pakka Unplanned Area	1.442 sq km
Cyclone	Low	Pakka Planned Area	0.09 sq km
		Pakka Unplanned Area	0.027 sq km
		Range Land	0.002 sq km
		Health Facilities	1
		Police Stations	1
		Road Network	0.137 km

		Population	4730
		Household	746
Tsunami	Low - Medium	Pakka Planned Area	0.027 sq km
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Muzzafarabad Colony			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	1.644 sq km
		Education Facilities	18
		Industries	19
		Mobile Towers	3
		Petrol Pumps	1
		Post Offices	1
		Irrigation and Drainage Network	0.262 km
		Road Network	11.031 km
		Population	50146
		Household	7913
Meteorological Drought	Low - Medium	Population	50344
		Household	7945
Heatwave	Low - Medium	Population	50024
		Household	7894
		Pakka Planned Area	1.638 sq km
Cyclone	Low	Pakka Planned Area	0.093 sq km
		Education Facilities	3
		Post Offices	1
		Road Network	0.351 km
		Population	3820
		Household	602
Tsunami	Low - Medium	Pakka Planned Area	0.027 sq km
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	

Quaidabad			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	3.728 sq km
		Pakka Planned Area	4.482 sq km
		Pakka Unplanned Area	0.82 sq km
		Range Land	0.149 sq km
		Bridges	5
		Bus Stops	3
		Education Facilities	25
		Health Facilities	1
		Industries	25
		Mobile Towers	21
		Petrol Pumps	6
		Post Offices	2
		Irrigation and Drainage Network	6.232 km
		Railway Line	2.975 km
		Road Network	15.423 km
		Population	166672
		Household	26317
Meteorological Drought	Low - Extreme	Agriculture Area	3.748 sq km
		Range Land	0.569 sq km
		Population	167853
		Household	26499
Agricultural Drought	Low	Agriculture Area	0.005 sq km
		Range Land	0.601 sq km
		Population	4974
		Household	785
Heatwave	Low - Extreme	Population	166238
		Household	26244
		Agriculture Area	3.717 sq km
		Pakka Planned Area	4.474 sq km
		Pakka Unplanned Area	0.817 sq km
Cyclone	Low	Agriculture Area	3.716 sq km
		Pakka Planned Area	0.429 sq km
		Pakka Unplanned Area	0.141 sq km
		Range Land	0.018 sq km
		Bridges	2
		Education Facilities	6
		Industries	1
		Mobile Towers	1

		Petrol Pumps	2
		Irrigation and Drainage Network	2.833 km
		Railway Line	0.075 km
		Road Network	4.566 km
		Population	21709
		Household	3425
Tsunami	Low - Medium	Pakka Planned Area	0.027 sq km
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC is not prone to flood hazard due to Indus River. However, Malir River passes through the UC and has potential to produce flooding during monsoon / heavy rains. In case of excessive water in Malir river, overtopping / breaching and consequent residual risk of flooding cannot be ruled out for UC.	

Rehri			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Forest Area	0.002 sq km
		Pakka Planned Area	4.539 sq km
		Pakka Unplanned Area	1.185 sq km
		Range Land	0.061 sq km
		Bus Stops	1
		Education Facilities	12
		Industries	39
		Mobile Towers	9
		Petrol Pumps	2
		Tourist Places	1
		Irrigation and Drainage Network	2.108 km
		Railway Line	2.799 km
		Road Network	34.685 km
		Population	120439
		Household	19008
Meteorological Drought	Low - Extreme	Forest Area	0.462 sq km
		Range Land	0.902 sq km
		Population	121180
		Household	19123
Agricultural Drought	Low	Forest Area	0.187 sq km
		Range Land	0.574 sq km
Heatwave	Low - Extreme	Population	119810

		Household	18906
		Pakka Planned Area	4.515 sq km
		Pakka Unplanned Area	1.179 sq km
Cyclone	Low	Pakka Planned Area	0.161 sq km
		Pakka Unplanned Area	0.058 sq km
		Range Land	0.003 sq km
		Education Facilities	1
		Tourist Places	1
		Irrigation and Drainage Network	0.093 km
		Road Network	0.323 km
		Population	8976
		Household	1416
Tsunami	Low - Extreme	Forest Area	0.256 sq km
		Pakka Planned Area	0.276 sq km
		Pakka Unplanned Area	0.616 sq km
		Range Land	0.279 sq km
		Education Facilities	4
		Mobile Towers	1
		Tourist Places	1
		Irrigation and Drainage Network	0.32 km
		Road Network	7.249 km
		Population	27564
		Household	4348
Storm Surge	Low - Extreme	Forest Area	0.127 sq km
		Pakka Planned Area	0.119 sq km
		Pakka Unplanned Area	0.058 sq km
		Range Land	0.014 sq km
		Tourist Places	1
		Road Network	1.568 km
		Population	2384
		Household	375
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Sharafi Goth			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	5.288 sq km
		Pakka Planned Area	1.458 sq km
		Pakka Unplanned Area	0.547 sq km
		Range Land	0.029 sq km
		Bridges	1

		Bus Stops	3
		Education Facilities	18
		Grid Stations	1
		Industries	16
		Mobile Towers	6
		Petrol Pumps	1
		Power Plants	2
		Irrigation and Drainage Network	5.779 km
		Railway Line	0.466 km
		Road Network	13.4 km
		Population	52094
		Household	8234
Meteorological Drought	Low - Extreme	Agriculture Area	5.306 sq km
		Range Land	0.244 sq km
		Population	50176
		Household	7933
Heatwave	Low - Extreme	Population	52054
		Household	8229
		Agriculture Area	5.28 sq km
		Pakka Planned Area	1.456 sq km
		Pakka Unplanned Area	0.546 sq km
Cyclone	Low	Agriculture Area	5.281 sq km
		Pakka Planned Area	0.195 sq km
		Pakka Unplanned Area	0.125 sq km
		Range Land	0.005 sq km
		Bridges	1
		Education Facilities	3
		Mobile Towers	1
		Irrigation and Drainage Network	4.575 km
		Railway Line	0.428 km
		Road Network	5.402 km
		Population	12295
		Household	1941
Tsunami	Low - Extreme	Agriculture Area	0.01 sq km
		Pakka Planned Area	0.001 sq km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Riverine Flood	Nil	The UC is not prone to flood hazard due to Indus River. However, Malir River passes through the UC and has potential to produce flooding during monsoon / heavy rains. In case of excessive water in Malir river, overtopping / breaching and consequent residual risk of flooding cannot be ruled out for UC.

Silver Town			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	1.271 sq km
		Pakka Unplanned Area	0.333 sq km
		Education Facilities	13
		Health Facilities	2
		Petrol Pumps	3
		Police Stations	3
		Post Offices	1
		Tourist Places	1
		Irrigation and Drainage Network	0.159 km
		Road Network	10.819 km
		Population	75503
		Household	12415
Meteorological Drought	Low - Extreme	Population	75974
		Household	12492
Heatwave	Low - Extreme	Population	74981
		Household	12327
		Pakka Planned Area	1.264 sq km
		Pakka Unplanned Area	0.331 sq km
Cyclone	Low	Pakka Planned Area	0.176 sq km
		Pakka Unplanned Area	0.036 sq km
		Education Facilities	2
		Tourist Places	1
		Road Network	0.214 km
		Population	10603
		Household	1742
Tsunami	Low - Medium	Pakka Planned Area	0.003 sq km
		Education Facilities	3
		Road Network	0.03 km
		Population	64
		Household	10
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	

Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood

Songal			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	79.917 sq km
		Forest Area	0.121 sq km
		Pakka Planned Area	11.265 sq km
		Pakka Unplanned Area	4.262 sq km
		Range Land	2.268 sq km
		Bridges	6
		Bus Stops	4
		Education Facilities	30
		Mobile Towers	21
		Petrol Pumps	3
		Welfare Trust	1
		Irrigation and Drainage Network	48.697 km
		Road Network	284.026 km
		Population	137567
		Household	23180
Meteorological Drought	Low - Extreme	Agriculture Area	80.401 sq km
		Bare Area with sparse Natural Vegetation	65.165 sq km
		Forest Area	1.435 sq km
		Range Land	69.345 sq km
		Water Body	9 sq km
		Wet Area	0.061 sq km
		Population	138052
		Household	23250
Agricultural Drought	Low - Extreme	Agriculture Area	97.024 sq km
		Bare Area with sparse Natural Vegetation	74.347 sq km
		Forest Area	1.784 sq km
		Range Land	83.424 sq km
		Water Body	0.856 sq km
		Wet Area	0.075 sq km
		Population	166525
		Household	27973
Heatwave	Low - Extreme	Population	137298
		Household	23130

		Agriculture Area	79.72 sq km
		Pakka Planned Area	11.242 sq km
		Pakka Unplanned Area	4.257 sq km
Cyclone	Low	Agriculture Area	79.858 sq km
		Forest Area	0.011 sq km
		Pakka Planned Area	0.891 sq km
		Pakka Unplanned Area	0.566 sq km
		Range Land	0.389 sq km
		Bridges	1
		Education Facilities	15
		Irrigation and Drainage Network	3.408 km
		Road Network	68.258 km
		Population	6073
		Household	1205
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

ORGANIZATION STRUCTURE FOR DISASTER MANAGEMENT AT DISTRICT LEVEL

INTRODUCTION

Each year natural disasters kill thousands of people and inflict billions of dollars in economic losses. No nation or community is immune to the damage of disasters and certainly, the province of Sindh is no exception. Almost every year, a major or minor natural disaster disrupts the life and economy of people living in the province, especially those with high economic vulnerability or the poor strata of the population. Unless action is taken to reduce the toll of natural disasters, the damages and losses of disasters can only be expected to rise. The scientific and technological advances of today's world provide unprecedented opportunities for responding to the urgent need to mitigate the impacts of natural hazards.

It is a globally recognized fact that natural hazards do not kill but poor planning does. Better disaster management and disaster risk reduction can only be achieved through collective efforts in integrating hazard reduction policy and practice throughout the province. It is a need of the time and opportunity to reassess the approach to natural hazards and to develop strategies for reducing losses by prevention and preparedness.

Disaster management can be achieved through the collective effort of all segments of life. A central authority, like Provincial Disaster Management Authority, can oversee, plan, manage and coordinate for disaster management at the provincial scale, however, it is the responsibility of concerned departments and authorities to implement and execute disaster management measures at the grass-root level. For effective disaster management, it is also imperative to take onboard and empower communities at high disaster risk as first responders. The disaster management plan will be effective once the roles and responsibilities of each individual and department are well understood and disaster management measures are implemented.

Keeping in view the importance of disaster management at all levels i.e., from the Provincial level to UC or village level, different disaster management committees have been recommended to be constituted. These committees are District Disaster Management Authority (DDMA), Taluka Disaster Management Committee (TDMC), and Union Council Disaster Management Committee (UCDMC). The recommended composition of each committee is given in Table-2 to 4.

Table 2: District Disaster Management Authority

Sr.#	Committee Representative	Role
1.	Deputy Commissioner	Chairperson
2.	Additional Deputy Commissioner	DDMO
3.	Senior Superintendent of Police	Member
4.	Assistant Director Local Government	Member
5.	District Information Officer	Member
6.	Cantonment Officer (Where Applicable)	Member
7.	District Health Officer	Member
8.	District Education Officer	Member

9.	District Food Controller	Member
10.	Deputy Director Civil Defense	Member
11.	District Officer Social Welfare	Member
12.	District Officer Livestock	Member
13.	District Chairman Zakat	Member
14.	Executive Engineer (Works and Services)	Member
15.	Executive Engineer Irrigation	Member
16.	Executive Engineer Public Health	Member
17.	Municipal Commissioners / CMOs / TMOs	Member(s)
18.	Representative Officer of Armed Forces	Member
19.	Two Elected Representatives nominated by the chair	Members
20.	Two Representatives of NGOs/Civil Society	Members
21.	Two Representatives of Business Community	Members
22.	Representative of Agriculture and Livestock Department	Member
23.	Representative of NHA	Member
24.	Representative of Electric Supply Corporation	Member
25.	Representative of SSGC	Member
26.	Representative of Red Crescent	Member
27.	Representative of Sindh Scouts	Member
28.	Representation of Volunteers from Communities at Risk	Member(s)

Table 3: TDMC Taluka Disaster Management Committee

Sr.#	Committee Representative	Role
1.	Assistant Commissioner	Chairperson
2.	Mukhtiarkar	Secretary
3.	Town Municipal Officer (TMO)	Member(s)
4.	Sub Divisional Police Officer	Member
5.	Taluka Education Officer	Member
6.	Medical Superintendent Taluka Level Medical Facility	Member
7.	Representative from Civil Defense	Member
8.	Representative from Social Welfare Department	Member
9.	Representative from Livestock Department	Member
10.	Assistant Engineer (Works and Services)	Member
11.	Assistant Engineer Irrigation	Member
12.	Assistant Engineer Public Health	Member
13.	Two Representatives of NGOs/Civil Society	Members
14.	Two Representatives of Business Community	Members
15.	Representative of Agriculture and Livestock Department	Member
16.	Representative of Electric Supply Corporation	Member
17.	Representative of SSGC	Member
18.	Representative of Red Crescent	Member
19.	Representative of Sindh Scouts	Member
20.	Representation of Volunteers from Communities at Risk	Member

Table 4: UCDMC Union Council Disaster Management Committee

Sr.#	Committee Representative	Role
1.	UC Administrator	Chairperson
2.	Secretary UC	Secretary
3.	Station House Officer (Police) – Concerned	Member
4.	Two Representatives of NGOs/Civil Society	Members
5.	Representation of Volunteers from Communities at Risk	Members
6.	Representation of Renowned Persons	Members

RESPONSIBILITY OF DISTRICT DISASTER MANAGEMENT AUTHORITY

- The DDMA shall work as a coordinating body of all government agencies and non-government organizations operating in the district and act as a focal authority in the conduction and implementation of plan and actions on disaster management
- Additional Deputy Commissioner who is proposed as Disaster Management Officer shall also work as Secretary DDMA and will provide administrative support to DDMA
- The DDMA shall ensure to take all possible disaster management measures in the district in accordance with the guidelines laid down by PDMA or NDMA
- The DDMA shall provide leadership by taking initiative to achieve MHVRA Informed Disaster Management Plan goals and objectives
- The DDMA shall coordinate with PDMA Sindh in disaster preparedness, response and recovery
- The DDMA shall provide guidance and support for the implementation of district response plans including management of the District Emergency Operation Centre

FUNCTION OF DDMA

- To review district disaster management plan, including district response plan in-line with Provincial and National disaster management plans and policies
- To ensure that risk maps are developed and updated and disaster-prone areas have been identified and prioritized in the district
- To coordinate the efforts for prevention and mitigation measures that are undertaken by the government and local authorities in the identified vulnerable areas of the district
- To organize and coordinate specialized disaster management training programs for different levels of officers, employees, and volunteer rescue workers in the district

- To facilitate community training and awareness programs with the support of local authorities, government and non-government organizations

- To set up, maintain, review and upgrade the mechanism for early warning and dissemination of accurate information to concerned authorities and the general public

- To review development plans prepared by the government departments, statutory or local authorities with a view that disaster management plan has been integrated into the development activities and projects of the plan

- To coordinate with, and give guidelines to, local authorities in the district to ensure that pre-disaster and post-disaster management activities in the district are carried out promptly and effectively

- To prepare, review and update district level response and contingency plans.

- To identify buildings and places which could, in the event of disaster situation be, used as relief centers and camps and make arrangements for water supply and sanitation in such buildings or places

- To distribute relief and facilitate rescue or ensure disaster preparedness and response

- To ensure operationalization of District Emergency Operation Centre (DEOC) equipped with all necessary gadgets

- To activate the District Emergency Operations Centre (DEOC) and ensure its uninterrupted operation during and after disaster events

- To carry out rapid damage and needs assessment and develop a report for assisting PDMA and other relevant stakeholders

- To coordinate and monitor early recovery and rehabilitation activities with the support of PDMA or relevant local and international stakeholders

- To prepare and continuously update databases of external agency projects, future priority areas, funding framework, available resources, areas of operations/expertise etc.

- To perform other functions as deemed necessary by the provincial government or provincial authority for disaster management in the district

RESPONSIBILITY OF TALUKA DISASTER MANAGEMENT COMMITTEE

- The TDMC shall work as front-line body for disaster management in the district and shall ensure implementation of disaster management measures set by DDMA and PDMA
- The TDMC shall interact directly with communities at risk in disaster preparedness, disaster risk reduction and response
- The TDMC shall Bridge between government and communities in disaster response
- The TDMC shall coordinate between DDMA, PDMA and all stakeholders working at grass-root level in pre, during and post disaster events

FUNCTION OF TALUKA DISASTER MANAGEMENT COMMITTEE

- Identification and updation of all hazards in their respective locations and conduct of risk and vulnerability analysis and communicate with DDMA and subsequently with PDMA
- Ensure that the officers and employees are trained in disaster management
- Ensure that resources relating to disaster management are maintained and readily available for use in the event of any threatening disaster situation or disaster
- To coordinate and monitor disaster management plan mainstreaming operations in the district and over all disaster management initiatives
- Land use planning and zoning within the municipality by preparing master plans while keeping the multi hazard of the municipality and Taluka in context
- To ensure the implementation of bylaws related to encroachment at hazardous places, building codes, land use planning and zonation etc.
- To identify evacuation/shelter places to face any disaster/emergency
- To monitor the disaster management activities of NGOs, UCDMCs and private sectors
- To share initial damage and needs assessment reports to DDMA and subsequently to PDMA
- To carry out relief, rehabilitation and reconstruction activities in the affected areas in accordance with the DDMA and PDMA

RESPONSIBILITY OF UNION COUNCIL DISASTER MANAGEMENT COMMITTEE

1. UCDMC shall work as front-line, first responder body at village, mohalla and ward level.
2. Shall assist TDMC, DDMA and PDMA especially in disaster response.
3. Shall encourage and keep record of volunteers in Union Council.
4. Shall formulate different groups to respond disaster and emergency events such as evacuation group, camp management group etc. and share this record with TDMC, DDMA and PDMA.
5. Shall prepare awareness and capacity development proposals and training programs and follow-up with TDMC, DDMA and PDMA for arranging such events at grass root level.

FUNCTION OF UCDMC

1. Identification and updation of all hazards in their respective locations and conduct of risk and vulnerability analysis and communicate with TDMC, DDMA and subsequently with PDMA.
2. To prepare/update UC level disaster management plan for emergent hazards or new hazards caused by any disaster event.
3. To make an analysis of disaster risk and to prepare a list of vulnerable villages and areas of the concerned union councils.
4. To mobilize community for maintaining public ways, public streets, culverts, Bridges and public buildings, and other development activities.
5. To coordinate with the village and neighborhood UCs in case of emergency in order to get quick information about the severity and extent of a disaster impact and report it to the TDMC and DDMA.
6. To report cases of handicapped, destitute and socially excluded groups to TDMC, DDMA and PDMA in order to streamline their special needs in relief and response operation.
7. Mobilizing and coordinating work of volunteers and ensuring community participation.
8. Conduct of search and rescue operations in coordination with the rescue teams and Police.
9. To provide assistance to other agencies for mobility/transport of staff, including rescue parties, relief personnel and relief materials. To communicate with the TDMC, DDMA or PDMA for required additional resources.

10. To monitor NGO activities and provide necessary support to ensure community participation by establishing coordination mechanisms among NGOs and local communities.

ESTABLISHMENT OF EMERGENCY OPERATION CENTERS

PROVINCIAL EMERGENCY OPERATION CENTER (PEOC)

As envisioned by PDMA Sindh, PEOC is established at HQ of PDMA Sindh. The center is equipped with modern tools and techniques for management and operation activities in pre, during and post disaster events. The center works under the management of PDMA with 24/7 operation.

The functions of PEOC are summarized below;

- Coordinating node for planning, management and operations of disaster management activities
- Inventory management and goods distribution.
- Assets and vehicles management and monitoring
- Monitoring of extreme weather and disasters
- Issuance of early warnings
- Disposal and monitoring of man and material resources during disaster events
- Coordination with community based associations, volunteers, NGOs and other relevant institutions involved in disaster management
- Assessment of disaster risk and elements at risk and dissemination of information to concerned departments
- Coordination for evacuation, medical, search, rescue and relief
- Preparation and collection of damage assessment reports
- Coordination with all management tiers
- Daily briefings on disaster events, search and rescue operations, damages and losses, recovery and rehabilitation
- Hosting of online meetings
- Damage data collection through imaging drones

DISTRICT EMERGENCY OPERATION CENTER (DEOC)

The PEOC established at PDMA HQ is connected with districts through DEOC. The DEOC is supposed to work as filed arm of PEOC for execution and implementation of instructions passed on by PEOC. The center is equipped with modern tools and techniques for management and operation activities in pre, during and post disaster events. The center works under the management of DDMA with 24/7 operation during disasters.

FUNCTION OF DEOC

The functions of DEOC are appended below;

- Receive information and instructions from PEOC regarding implementation and execution of action plans
- Monitor the situation and put everything ready and functional in the DEOC
- Dissemination of early warnings issued from PEOC to stakeholders and communities
- To coordinate with PEOC, PDMA, concerned departments and other stakeholders
- To monitor emergency operations and make efforts for preventing secondary hazards
- To conduct rapid assessment of the relief needs by collecting information from affected areas and circulate to PDMA and other concerned departments and stakeholders
- To deploy evacuation, medical, search and rescue teams in the affected areas
- To provide relief assistance in terms of relief camps, medical and sanitation facilities and temporary shelter to the affected population in the district
- To establish a liaison with concerned departments and stakeholders engaged in emergency response by anticipating resource inventory
- To collect information for daily briefings on disaster situation for PEOC, media, general public and other stakeholders
- Record keeping and preparation of consolidated reports and response plans and projects.
- Coordination and mobilization of community based associations, volunteers, NGOs and other relevant institutions involved in disaster management

SECTOR WISE ROLES AND RESPONSIBILITIES OF GOVERNMENT FUNCTIONARIES

PROVINCIAL DISASTER MANAGEMENT AUTHORITY (PDMA)

Pre-Disaster

- Close coordination with national and international institutions engaged in disaster forecasting.
- Coordinate meeting and engage DDMA for preparation of anticipated disasters
- Ensure readiness of equipment and inventory
- Disseminate disaster alerts to concerned DDMA with action plans for forecastable disasters
- Ensure availability of relief goods and other relevant stuff before anticipated disaster
- Advise concerned departments on removal of congestion from water ways before monsoon
- Aware and sensitize public and private departments on main streaming disaster risk reduction in developing planning
- Ensure availability and functioning of provincial emergency operation center
- Provide and report high risk population and infrastructure in anticipated hazard areas.
- Capacity building of line and stakeholder department on disaster risk reduction and management.

During-Disaster

- Coordination and mobilization of man and material resources
- For rescue and evacuation of people, provide and manage temporary shelter and life restoration equipment in disaster affected regions
- Coordinate with line departments for health and veterinary services in the affected regions and ensure to control outbreak of any communicable diseases
- Coordinate with DDMA and line departments
- Coordinate with individual donors, donor organizations, NGOs and INGOs and ensure distribution of relief among disaster affectees

Post-Disaster

- Coordination with DDMA and line departments for need and damage assessment

- Need and damage assessment reporting to higher management, NGOs, INGOs and other agencies for rehabilitation
- Ensure rehabilitation on build back better principle

DISTRICT DISASTER MANAGEMENT AUTHORITY (DDMA)

Pre-Disaster

- Close coordination with PDMA and other relevant stakeholders
- Risk assessment and identification of disaster-prone areas
- Aware and sensitize public and private departments on main streaming disaster risk reduction in developing planning
- Coordinate meeting and engage TDMC for preparation of anticipated disasters.
- Ensure readiness of equipment and inventory
- Disseminate disaster alerts to concerned TDMC with action plans for forecastable disasters
- Ensure availability of relevant staff before anticipated disaster
- Advise concerned departments on removal of congestion from water ways before monsoon
- Ensure availability and functioning of district emergency operation center
- Arrange emergency response exercises and drills along with volunteer groups, social welfare and civil defense on various disaster scenarios

During-Disaster

- Mobilization of man and material resources
- For rescue and evacuation of people, provide and manage temporary shelter and life restoration equipment in disaster affected regions
- Coordinate with TDMC and line departments
- The DDMA shall lead the evacuation of people to safer places with the assistance of PDMA. DDMA shall also ensure safety, security, supply chain, life commodities and management of relief camps

- Only authorized officials of DDMA shall brief media on disaster situation and the response activities.

Post-Disaster

- Coordination with TDMC and line departments for need and damage assessment
- Need and damage assessment reporting to PDMA
- Ensure rehabilitation on Build Back Better principle

CIVIL DEFENSE

Pre-Disaster

- Assign representatives for DDMA to participate in meetings
- Information sharing regarding capacities and needs of Civil Defense department regarding disaster risk management
- Capacity building of Civil Defense department regarding disaster risk management
- Information sharing regarding technical and personnel expertise with DDMA
- Conduct trainings for Volunteers regarding Rescue and other relevant expertise in collaboration with Health department and PDMA
- Create awareness regarding rescue, evacuation and first aid
- Effectively establish, train and systemize volunteers initiatives in collaboration with education department / institutions

During-Disaster

- Fire fighting
- Rescue and evacuation
- Assign volunteers in coordination with PDMA and DDMA
- Communicate to DEOC about details of all activities
- Communicate to DEOC any additional resources required for performing the above tasks

- Facilitate line departments as per demand in disaster response

Post-Disaster

- Assist in rehabilitation process if required

EDUCATION DEPARTMENT

Pre-Disaster

- Assign representatives for DDMA and participate in meetings
- Information sharing regarding capacities and needs of Education department regarding disaster risk management
- Teachers and students are informed about the disaster prone areas of the district
- Teachers and students are informed of their responsibilities to take care of materials and documents to safe places during disaster
- Facilitate and collaborate with PDMA in preparation of disaster management curriculum
- Collaborate with PDMA and DDMA in synergizing volunteers

During-Disaster

- Mobilize human resources for intervention during disaster
- Inform schools situated in high risk areas about hazard and hazard forecast
- Assist in arrangement of relief and shelter camps in educational institutes for the disaster affectees
- Facilitate Health department and other relevant entities in arranging medical camps, blood donations and provision of medical aid during disaster and emergencies
- Coordinate with PDMA and DDMA in assigning volunteers for emergency response

Post-Disaster

- Assessment of damages occurred to educational institutes
- Provide assistance to teachers, students and other staff who are victimized by disasters (lack of food, shelter, etc.)

- Rehabilitation and reconstruction of affected educational facilities
- Facilitate institutions / NGOs / INGOs which focus on rehabilitation of educational facilities
- Prepare overall report of the department regarding intervention and disseminate to PDMA and DDMAs

FINANCE DEPARTMENT

Pre-Disaster

- Regular coordination with PDMA
- Allocate budget on contingency basis, to handle any emergency situations
- Facilitate other departments in planning and meeting their financial needs

During-Disaster

- Provide funds to PDMA and other line departments for procurement of material and equipment required for emergency response
- Provide funds to PDMA and other line departments for rescue and relief activities

Post-Disaster

- Get statistical data regarding actual damage and recovery needs from all line departments
- Provide funds for execution of rehabilitation process

HEALTH DEPARTMENT

Pre-Disaster

- Assign representatives for DDMA, and participate in meetings
- Information sharing regarding capacities and needs of Health department regarding disaster risk management
- Build capacity of health department regarding disaster risk management and preventive health care especially in disaster prone areas
- Monitor the general health situation, e.g. monitor outbreak of diseases

- Provide specific information required regarding precautions for epidemics
- Establish a health mobile team in district and taluka headquarter hospital
- Set-up an information Centre to organize sharing of information for public information purposes
- Prepare first aid kits, medicines, water test kits, chloramines and anti-snake venom serum.
- Collaboration with relevant organizations / partner NGOs for participation and support through technical resources
- Up-gradation and smooth functioning of hospitals, BHUs, equipped with required staff, medicines and equipment
- Database and linkages with ambulance services/blood banks
- Health and hygiene awareness and education
- Ensure proper disposal of hospital waste

During-Disaster

- Provide emergency treatment for the seriously injured
- Ensure emergency supplies of medicines and first-aid
- Supervise food, water supplies, sanitation and disposal of waste
- Assess and co-ordinate provision of ambulances and hospitals where they could be sent (public and private);
- Provide special information required regarding precautions for epidemics
- Set-up an information Centre to organize sharing of information for public information purposes
- Conduct disaster impact assessment on health
- Intervene in case of disease outbreak
- Medical camps and vaccination

- Ongoing surveillance with regard to health issues and disease outbreaks

Post-Disaster

- Conduct disaster impact assessment on health situation
- Prepare plan for the following year along with reports and submit to PDMA and concerned department.
- Medical camps and vaccination
- Rehabilitation of health infrastructure affected during disaster
- Preparation of impact assessment surveys covering strengths and weaknesses of interventions and impact on affected victims and dissemination of learning to PDMA and other concerned institutions

INFORMATION DEPARTMENT

Pre-Disaster

- Close coordination and liaison with PDMA and DDMA
- Issuance of press releases regarding hazards and preparedness plans of the government during monsoon, and other forecastable hazards
- Issue and publish disaster alerts on appropriate media forums
- Coverage and publication of government initiatives on disaster risk reduction and management
- Ensure media coverage and publication of PDMA and DDMA meetings for pre disaster preparations

During-Disaster

- Coordination with PDMA and DDMA for announcement of warnings and updates on disasters
- Publication of bulletins on government actions, facilities, relief and rescue efforts
- Publication of camp management and relief distribution announcements
- Publication of safety measures during disasters to minimize disaster domino effects
- Communicate voice of affectees to concerned departments

Post-Disaster

- Focus on problems being faced by the people of the affected area
- Publish, broadcast /telecast programs highlighting strengths, weaknesses and scams in disaster response activities
- Publish, broadcast /telecast programs highlighting government initiatives and collective response of NGOs, INGOs and other departments for relief and rehabilitation

PAKISTAN METEOROLOGICAL DEPARTMENT (PMD)

Pre-Disaster

- Update and upgrade forecast equipment
- Timely and authentic forecast of rains, windstorms and other forecastable hazards
- Timely transfer of information regarding abnormal weather conditions to PDMA

During-Disaster

- Forecasting for any confluencing disaster
- Issuance of precautionary measures to avoid domino effects of disaster

Post-Disaster

- Technical assistance in rescue and rehabilitation process

POLICE DEPARTMENT

Pre-Disaster

- Coordinate with the DDMA in the pre-disaster planning
- Participate in DDMA meetings
- Capacity building of Police department regarding disaster risk management
- Information dissemination through 15 helpline service to local residents
- Prepare team for emergency intervention
- Prepare plan for shifting to safer places and early warning system

During-Disaster

- Co-ordinate with DEOC
- Assistance in shifting of rescued/affected people to relief camps and hospitals
- Provide protection and easy access to rescue and relief personnel/vehicles
- Maintain law and order
- Provide warning / instruction to travelers
- Divert traffic on alternate routes as and when necessary
- Ensure security to workers of NGOs and INGOS who perform duties for disaster response
- Ensure safety and security of relief goods and maintain discipline during relief distribution process
- Provide security in Relief Camps

Post-Disaster

- Assist in relief and rehabilitation process

REVENUE DEPARTMENT

Pre-Disaster

- Assign representatives for DDMA, and participate in meetings
- Information sharing regarding capacities and needs of Revenue department regarding disaster risk management
- Capacity building of Revenue department regarding disaster risk management
- Assessment of high prone areas and estimation of possible damage and needs for recovery in case of emergency
- Arrangement of financial resources
- Facilitate getting tax exemptions to institutions/NGOs/INGOs focus on disaster risk management

- Collect and update population data at village level

During-Disaster

- Coordination with the DEOC
- Establish relief distribution centers
- Accept relief donations and relief support
- Timely release of funds

Post-Disaster

- Allocation of funds for recovery and rehabilitation process
- Assessment of damage of industry/business, and settlement of applicable taxes accordingly in coordination with Industry, and relevant departments

KARACHI WATER AND SEWERAGE BOARD

Pre-Disaster

- Develop emergency response plans for water and wastewater management
- Cleaning of sewerage lines and drains across the city
- Plan for emergency drinking water supplies
- Make incident action checklists for water utilities

During-Disaster

- Ensure supply of drinking water to affected communities
- Coordinate with local bodies to develop temporary sewerage system in shelter places to avoid diseases

After Disaster

- Conduct disaster impact assessment on water situation
- Prepare plan for the following year along with reports and submit to PDMA and concerned department
- Rehabilitation of sewage infrastructure affected during disaster

- Preparation of impact assessment surveys covering strengths and weaknesses of interventions and impact on affected victims and dissemination of learning to PDMA and other concerned institutions

ARMED FORCES

Pre-Disaster

- Coordinate with the DDMA in the pre-disaster planning
- Prepare necessary equipment, labor, transportation and other materials for emergency interventions
- Assist in evacuation of people to safe places

During-Disaster

- Maintain liaison with the DEOC for vital inputs during response
- Collect information and warn appropriate Army units for engagement in safety, rescue and evacuation activities
- Establish communication infrastructure and supplement the civil communication set-up if required
- Coordinate all military activity required by the civil administration
- Provision of medical care with the help of the medical teams, including treatment at the nearest armed forces hospital
- Transportation of relief material
- Provision of logistic back-up (aircrafts, helicopters, boats)
- Assist in establishment of Relief Camps
- Assist in evacuation of people to safe places during the disaster

Post-Disaster

- Cooperate and coordinate with district authorities
- Assist in rehabilitation process if required

SOCIAL WELFARE AND COMMUNITY DEVELOPMENT

Pre-Disaster

- Coordination with NGOs and civil society organizations working for disaster risk management
- Empower the extremely vulnerable people emphasizing women and children through public awareness involving respective departments for various fields such as Education, Health etc.
- Capacity building of community based groups and volunteers engaged in disaster management activities

During-Disaster

- Provide information on the situation of the disaster to the DEOC
- Coordinate all NGOs / INGOs and civil society organizations working during the emergency response
- Monitor progress of relief operations in the affected areas
- In coordination with PDMA, Health, Revenue and other line departments, ensure delivery of relief to most vulnerable segments of society such as children, orphans, widows, destitute
- Assist and facilitate Damage and Needs Assessment teams from NGOs
- Share human resources with DDMA

Post-Disaster

- Monitor and follow up the status of the extremely vulnerable people
- Assist and facilitate Damage and Needs Assessment teams from NGOs
- Conduct impact assessment studies and analysis of strengths and weaknesses of stakeholders and disseminate learning to PDMA, DDMA and other concerned institutions
- Facilitate institutions / NGOs/ INGOs which focus on rehabilitation activities

NGOs / INGOs

Pre-Disaster

- Facilitate PDMA and DDMA for capacity building regarding disaster risk management

- Capacity building of community groups regarding disaster risk management
- Linkages with concerned departments and institutions for providing technical and financial resources regarding diverse sectors related to disaster management
- Resource mobilization at local and international level

During-Disaster

- Collaborate and facilitate in relief operations
- Incorporate local and international expertise in disaster response
- Facilitate establishment of temporary shelters and camps
- Facilitate in overall disaster response in collaboration with concerned departments
- Regular updates and alerts to local and international partners
- Utilization of existing resources and further mobilization at local and international level
- Assessment of losses using sphere standards

Post-Disaster

- Collaborate and facilitate in rehabilitation activities
- Incorporate local and international expertise in rehabilitation activities
- Facilitate overall rehabilitation in collaboration with concerned departments
- Impact assessment studies and sharing findings with PDMA, DDMA, local and international partners
- Linkages with partners for sustainable resources mobilization

DISASTER MANAGEMENT GUIDELINES

INTRODUCTION

Multi-hazard vulnerability Risk Assessment of Malir district reveals that the district is relatively safe in terms of natural disasters. The pertinent hazards to district are meteorological hazards including Cyclone and Heatwave. The risk of geophysical hazards is low in the district. In modern technological era, meteorological hazards can be precisely forecasted and action can be taken well in time to minimize damages and losses. In other words, the vulnerabilities and risks are manageable and losses and damages can be minimized through adoption of best management practices and mobilization of resources.

These guidelines introduce best practices which can be adopted to manage risk of natural disasters in the district.

Riverine Flood	According to MHVRA Study 2022, there is no riverine flood hazard in district Malir
Earthquake	1. The geology of Sindh is divisible in three main regions, the mountain ranges of Kirthar, Pab containing a chain of minor hills in the west and in east it is covered by the Thar Desert and part of Indian Platform where the main exposure is of Karoonjhar Mountains, which is famous for Nagar Parkar Granite. District Malir falls away from any major fault line and is unlikely to be affected by a massive earthquake. 2. Some of prominent faults situated in Sindh are (a) Karachi-Jati, (b) Surjan-Jhimpir, (c) Pab Fault (d) Hub Fault and (e) Allah Bund-Rann of Kutch faults. 3. Though risk of geophysical hazards in Malir district is low but still some actions must be taken to avoid losses in case of minor jolts. Urban settings are most likely to be affected by jolts. Malir is a populous district with high-frequency of buildings and closely spaced houses. It is highly recommended to identify old and weak buildings in the city and other urban settings of the district. Local concerned authorities may decide evacuation or retrofitting of such buildings / structures. 4. It is also recommended that, new housing schemes, societies and infrastructure be built with proper town planning and following Building Codes recommended for the zone in which Malir district is situated. 5. Local government departments must be strengthened to manage situation

	arisen from earthquake jolts. Strengthening must include capacity building to act as first responder in any likely situation.
Heatwave	1. The district has witnessed rapidly increased severity of heatwave in the past five years. The district is densely populated, which significantly increases the chances of severe heatwave impacts. 2. Heatwaves are forecastable hazards and actions can be taken well before occurrence of heatwaves. The most suitable action is issuance of warnings and alerts in public for precautions and safety. Suitable media for the purpose is social media and SMS. 3. Scientific studies suggest that, frequency and intensity of heatwaves is increased due to climate change. Though climate change is global phenomena, however, its impacts can be minimized through local interventions. The most efficient and cost-effective solution is tree plantation. Tree plantation must be encouraged at different levels including government functionaries, NGOs, community and individual levels. 4. Additionally, introduction of reduced Urban Heat Islands (UHI) through policies and implementation in infrastructure development will significantly reduce impacts of heatwaves.
Cyclone	1. The cyclone hazard threat to Malir district is **Cat-1 TC**. The frequency and intensity of cyclone formation in Arabian Sea may further increase due to climate change and global warming. Fortunately, cyclone is forecastable hazard, its intensity, possible landfall, timings etc. can be precisely predicted before landfall. If population to be affected is well aware and already prepared for likely event, then major losses and damages can be minimized. Such example can be seen in regional countries like India, Bangladesh and Philippines etc. 2. It is utmost important to strengthen cyclone detection and warning systems in the coastal belt along entire coast in Sindh. Community based disaster risk management, capacity development of prone communities, establishment of permanent shelters and provision of life support facilities will increase the trust and confidence of communities on government functionaries in early evacuation process.

	3. The introduction and construction of cyclone resistant human dwellings and infrastructure will further ensure minimized damages and losses.
Drought	1. Climatic condition of the district can be categorized as Warm and Semi-Arid (Climate Classification of Pakistan (Khan et al., 2010). Average annual rainfall received during a year across the district is 173.75 mm. 2. Drought is also forecastable hazard and can be predicted well in advance. The best practice to manage drought related impacts is storage of food supplies for both humans and animals. 3. The situation of drought may vary in future due to climate change effects, therefore, efficient use of available water resources is also required.
Tsunami	1. The only known Tsunami which hit some parts of Sindh coast happened to major earthquake in Makran coast in Balochistan which triggered tsunami in the region. This event happened in November 1945. No authentic record is available on damage and losses caused by Tsunami in coastal belt of Sindh. The effects of the Tsunami of December, 2004 caused by earthquake in Indonesia were along the coastline of Pakistan in the form of abnormal changes in tide gauge stations placed at Keti Bunder. 2. As Tsunami is consequence of major earthquake, hence not forecastable hazard in true sense but once the earthquake is occurred in sea or near coast, special sensors can detect the occurrence of tsunami. Once tsunami is detected little time is left for evacuation. However, installation of tsunami early warning system along the coast may greatly impact losses. The best approaches to tsunami response are; o Installation of tsunami early warning and dissemination system in coastal settlements o Awareness of communities at risk on tsunami precautions and response

STANDARD OPERATING PROCEDURES

INTRODUCTION

Overall, disaster risk reduction is collective responsibility of concerned departments, associated line departments, private sector and communities. Synergized and coherent efforts are required at each cycle of disaster in order to minimize and avoid disaster losses and damages. The implementation of this disaster management plan would only be possible until roles and responsibilities of every department are defined and well understood.

ACTION PLAN FOR FORECASTABLE DISASTERS

Severe weather, cyclone, heatwave and drought are only forecastable hazards. For such hazards following action plan is recommended

Table 5: Action Plan for Cyclone Hazard Management

Action	Timelines	Responsibility
Interaction with PMD for forecasting and monitoring of cyclone and likely landfall	Based on forecast	PDMA
Dissemination of forecast to concerned DDMA and local community	Based on forecast	PDMA
Evacuation of population likely to be affected to safe places	Before forecasted landfall	PDMA and DDMA
Temporary shelter and camp management for affected population and livestock	Before forecasted landfall	PDMA and DDMA
Arrangement of initial relief for affectees	During disturbance period	PDMA and DDMA
Recovery and resettlement of population to native places	Post disaster	PDMA and DDMA

Table 6: Action Plan for Heatwave Hazard Management

Action	Timelines	Responsibility
Interaction with PMD for forecasting and monitoring of heatwave	Based on forecast	PDMA
Dissemination of forecast to concerned DDMA and local community	Based on forecast	PDMA
Mobilization of NGOs, INGOs and individuals for arrangement of heat stroke and medical camps within affected areas	During disturbance period	PDMA and DDMA

Table 7: Action Plan for Drought Hazard Management

Action	Timelines	Responsibility
Interaction with PMD for forecasting and monitoring of drought	Based on forecast	PDMA
Dissemination of forecast to concerned DDMA and local community	Based on forecast	PDMA
Mobilization of NGOs, INGOs and individuals for stocking of food and life support items to prevent and mitigate famine conditions depending upon severity and spell of drought	During disturbance period	PDMA and DDMA

ACTION PLAN FOR UNFORECASTABLE HAZARDS

Earthquake/Tsunami

The earthquake and consequential tsunami are unforecastable hazards and do not provide reaction time to prevent damages. The recommended post disaster action plan are as follows

Table 8: Action Plan for Earthquake/Tsunami Hazard Management

Action	Timelines	Responsibility
Mobilization of man and material resources for rescue and recovery	Post disaster	PDMA and DDMA
Mobilization of NGO, INGO, volunteer groups, scouts and armed services for rescue and recovery	Post disaster	PDMA and DDMA
Coordination and establishment of relief camps, mobile medical camps, life support facilities and provision of relief to affectees	Post disaster	PDMA and DDMA
Coordination and mobilization of rescue teams to search and rescue life in collapsed structures	Post disaster	PDMA and DDMA
Coordination with National Disaster Management Authority (NDMA) for seeking assistance from international agencies (depending on severity of events and damages/losses)	Post disaster	PDMA
Coordination and mobilization of resources on Build Back Better principles	Post disaster	PDMA

SOP FOR PEOC AND DEOCs

- For the smooth operation of the emergency activities the PEOC and District Emergency Response Centre (DEOC) will work under defined Standard Operating Procedures (SOPs). These SOPs are broadly categorized in three sections

a. Action on receipt of early warning, safe evacuation, search and rescue, initial assessment, relief distribution, recovery and deactivation of response.

b. Coordination and information dissemination

c. Contingency planning and response actions

- For localized emergencies, the situation shall be dealt within the regular operating mode of the emergency management services in the district.
- DDMA shall activate the DEOC and take the operational lead for the district government response.
- The DEOC will serve as the center for receiving early warning and issuing information to public at village level, taking measures to evacuate people, updating relevant departments, response agencies, and media etc.
- The DEOC will lead the coordination and management of relief operations in affected areas in the district with the assistance of PEOC.
- DEOC will coordinate with all concerned departments and humanitarian agencies at district level.
- DEOC will coordinate for early recovery with the assistance of PDMA and other concerned departments.
- In standby position, PEOC and DEOC shall be alert and ready to start emergency operations. The PEOC shall coordinate with concerned departments like NDMA, PMD, etc. for regular updates on likely disaster events. Once the threat is established, the PDMA shall approve the alert and activate response mechanism of PEOC and DEOC.
- Once PEOC and DEOC activation is approved or issued, both centers will remain fully operational on 24/7 basis and coordination shall be established with all concerned departments.
- PEOC and DEOC will collect regular updates on disaster situation and after normalization of situation and with mutual consultation shall inform PDMA to issue stand down or disaster deactivation call and final report on emergency operations will be circulated to stakeholders.
- The operationalization of PEOC and DEOC means complete activation of centers during disaster situation. Management of PDMA shall ensure full functionalities of PEOC including stock for emergency food, office supplies, communication system with backup support, electricity generators, computers, screens, multimedia projectors and other necessary equipment. While Deputy Commissioner Malir shall ensure availability of all necessary equipment and supplies at DEOC for 24/7 operations. The deputy commissioner or chairperson DDMA will also ensure availability and

presence of representatives of DDMA in DEOC during emergency operations for liaison and close coordination and smooth emergency response.

- A contact information of relevant government officials, influential personnel, political figures, volunteer groups, social welfare organizations and communities of high disaster risk prone areas shall be collected and maintained by PEOC and DEOC. For establishing quick liaison and coordination this contact information shall be used by both PEOC and DEOC. In addition to these contacts, PEOC will arrange random SMS alerts, robo calls etc. through commercial cellular services.

- The PEOC will establish the direct contact/coordination with district disaster management officer for disaster alerts and warnings and onward dissemination and other immediate actions.

- All warnings and alerts shall be carefully scrutinized by the central body i.e. PDMA and disaster warning alerts shall only be issued through single nodal agency to avoid any circulation of misinformation etc.

- During the disaster, all instructions, guidelines, action plans and advisories on disaster events, evacuation, relief operations etc. shall be issued by PEOC or DEOC in consultation with PEOC.

DISASTER MANAGEMENT PLAN

INTRODUCTION

Following disaster management measures are recommended for effective preparation, response and rehabilitation of communities. PDMA may identify suitable partners/agencies to carry out each of the below-mentioned measures to maximize the effectiveness of disaster management plan and minimize losses in case of any disaster.

Riverine Flood	
UCs At Risk	Nil
General Description	According to MHVRA Study 2022, there is no risk of riverine flood in Karachi Malir district.

Earthquake	
UCs At Risk	All UCs
General Description	1. The Karachi Malir district, sits close to a plate boundary and within reach of earthquakes on numerous tectonically active structures surrounding the city. 2. The district lies approximately 150 km east of the triple junction between the Arabian, Indian, and Asian plates. The western and north-trending arms of the triple junction sustain convergent and transcurrent rates of 28–33 mm/ yr respectively (Apel et al. 2006). 3. Although residents of Karachi Malir felt shaking from the 1945 Makran and 2001 Bhuj earthquakes, and occasional shaking from M 4–5 earthquakes on faults north and northwest of the city, no earthquake has ever produced documented damage in Karachi Malir district. 4. The earthquake hazard intensity for district Karachi Malir is "**Low**" 5. The earthquake risk intensity for district Karachi Malir is "**Low**".
Disaster Management Measures	
Preparedness	
1. Identifying and inventorying weak buildings and structures especially in urban settings of the district and situation demanding action by concerned departments. 2. Preparation of landuse plans, town plans and implementation of building codes in new residential schemes, schools, public and private offices. 3. Implementation of disaster risk reduction measures in public infrastructure development schemes. 4. Establishment of search and rescue infrastructure and services which can be mobilized as first responder in post-earthquake situation. 5. Mobilize NGOs, INGOs, community development organizations and volunteers, and conduct earthquake safety awareness campaigns and drills especially in main urban settings. 6. Availability of necessary material and equipment required for establishing temporary shelters with life support facilities i.e. mobile medical camps, schools, power supply, water and sanitation etc. 7. Availability of alternative communication system in case if usual communication means are	

disturbed by earthquake. 8. Preparation of medical emergency plan to manage mass casualties in face of any major earthquake event.
Response
1. Obtain firsthand information on intensity of earthquake and damages; prioritize areas for search and rescue operation. 2. Mobilize community-based volunteers, scouts and other trained personnel to hard hit areas to assess situation and help victims. 3. Establish emergency camps / shelters with necessary life support facilities. 4. Establish medical camps for provision of first aid and possible medical assistance to injured. 5. Evacuate people from damaged houses to safe places and shelters. 6. Provide security in affected areas and maintain law and order situation to prevent incidents of thefts and stampede. 7. Arrangement and conduct of aerial / drone survey of the affected areas. 8. Establish information and help desks for facilitation of affectees. 9. Restore essential services like power, water supply, and telecommunication of critical infrastructure like hospitals, control Rooms, etc. on priority basis.
Recovery and Rehabilitation
1. Detailed damage and need assessment for recovery and rehabilitation. 2. Rehabilitation on built back better principal.

Heatwave	
UCs At Risk	All UCs
General Description	1. Heatwave is a condition of atmospheric temperature that leads to physiological stress, which sometimes can claim human life. 2. Karachi Malir has a Warm and Semi-Arid climate (Climate Classification of Pakistan (Khan et al., 2010)) dominated by a long "Summer Season" while moderated by oceanic influence from the Arabian Sea. 3. The district enjoys a tropical climate encompassing mild winters and warm summers. The humidity levels usually remain high from March to November, while very low in winter as the wind direction in winter is north-east. 4. Summers in Karachi Malir are hot and humid, and the district is prone to deadly heatwaves. 5. The warmest month of the year is May. 6. The month of January is the coolest month of the year in the district. The influx of very cold and very dry Siberian winds (called "Quetta Waves" in common parlance), bring brief and cold spells to the region, dropping the night temperatures to below 10°C. The average high for the month is 25°C while the average low for the month is a mild 13°C. 7. A severe heatwave with temperatures as high as 49°C struck Karachi in June 2015. It caused the deaths of about 2,000 people from dehydration and heat stroke across the city.

	8. Higher daily peak temperatures of longer duration and more intense heatwaves are becoming increasingly frequent globally due to climate change. Sindh too is feeling the impact of climate change in terms of increased instances of heat wave with each passing year. 9. Very high temperature not only affects vegetation but also creates problem for the individuals like heat stroke, skin burn etc. 10. According to MHVRA Study 2022, heatwave hazard intensity for district Karachi Malir is "**Severe to Extreme**". 11. According to MHVRA Study 2022, heatwave risk for district Karachi Malir is "**Low to Extreme**".
Disaster Management Measures	
Preparedness	
1. Consistent future development strategy: Tree plantation, restoration of natural ecosystem, construction of environment friendly and well planned residential societies, offices, infrastructure and human dwellings. 2. Monitoring for hot weather alerts through local and international sources and issuance of timely Hot Day Advisories, and Hot Day Warnings. 3. Upgradation of major public health care facilities with necessary equipment and medicines to treat heatstroke patients. 4. Heatstroke awareness campaigns and wide public coverage through media, social media, SMS, NGOs and social welfare organizations. 5. Arrangements for uninterrupted supply of electricity and water in vulnerable areas.	
Response	
1. Mobilization of NGOs, social welfare organization and volunteers for arranging heatstroke facilitation camps and distribution of fresh drinking water in affected areas. 2. Local radio FM broadcasts to disseminate heatstroke safety and precautions. 3. Mobilize mobile medical teams for first-aid and other medical emergency support in affected area. 4. Record keeping of heatwave patients and fatalities.	
Recovery and Rehabilitation	
1. Post event review of heatwave plan and modifications if required.	

Cyclone	
UCs at Risk (05)	**Quaidabad, Rehri, Sharafi Goth, Silver Town, Songal**
UCs not at Risk (19)	**100 Quarters, Cattle Colony, Darsanno Channo, Dauod Chowrangi, Gadap, Garibabad, Gazi Brohi, Ghaghar, Gujjiro, Gulshan-E-Hadeed, Hasrat Mohani, Jaffar Tayyar, Korangi, Landhi, Malir Cantonment, Moinabad, Murad Memon, Muslimabad, Muzzafarabad colony**
General Description	1. Though cyclones are rare in the Arabian sea which is a part of North Indian Ocean. Cyclones that form in Arabian sea mostly move towards Western India rather than Pakistan. 2. Due to its geographical setting, district Karachi Malir is vulnerable to cyclone hazard.

	3. Some of the major tropical cyclones that have hit the coastal areas occurred during May 1902, June 1926, June 1964, November 1993, June 1998, May 1999, June 2007 and 2011 and June 2014. The Cyclone Yemyin in 1999 hit three coastal districts of Sindh, where 244 lives were lost, 40177 animals were perished and effected population of 0.5 million was reported. 4. A cyclone in November, 1993 caused massive rainfall and flooding in Karachi, Thatta, Sujawal and Badin districts and killed 609 people while displaced some 200,000 others. 5. In May, 1999, the strongest cyclone hit Pakistan moved ashore near Keti Bandar at Category 3 intensity on the Saffir–Simpson scale. 6. Very hot and dry weather with gusty winds continued for two days in Karachi, Hyderabad, Shaheed Banzirabad, Badin, Mirpurkhas, Tando Allahyar and Thatta districts due to tropical cyclone "TAUKTAE-2021" in the east-central Arabian Sea. 7. The cyclone hazard in the district is of ""**Tropical Storm to Cat-1 TC**" intensity. 8. According to MHVRA Study 2022, cyclone risk for district Karachi Malir is "**Low**". 9. The Storm Surge hazard intensity for district Karachi Malir is "**Low to Very high**" 10. The Storm Surge risk intensity for district Karachi Malir is "**Low to High"**
Disaster Management Measures	
Preparedness	
1. Community based disaster risk reduction measures and inclusion of disaster prone communities in disaster management cycle, specially preparedness, evacuation and resettlement. 2. Establishment of multipurpose permanent shelters with all life support facilities to facilitate safe evacuation of people and livestock. 3. Disaster Risk Reduction mainstreaming in development planning. 4. Strengthening of cyclone detection, forecasting and warning dissemination centres. 5. Launching a series of public awareness campaign in the district by various means including Radio, TV and other media. 6. Training of local administration in warning dissemination and evacuation techniques. 7. Mobilization of NGOs and community based organizations for awareness on construction of houses, billboards, roof tops, and boundary walls, keeping in view effects of high winds. 8. Review/Update emergency response plans and disaster recovery plans. 9. Stocking of key equipment and supplies to carry out immediate response activities including evacuation, shelters, medical camps, water and sanitation, power supply, alternate communication means etc. 10. Design, practice and implementation of evacuation plans with emphasis on self-reliance. 11. Cleaning of water channel, drainage and sewerage before cyclone season in Arabian Sea. 12. Readiness of de-watering machines before start of monsoon and cyclone season.	
Response	
1. Issue early reliable warning through siren or other relevant means to reduce the severity of the cyclone related disasters and save valuable human lives.	

2. Identify, involve and mobilize local NGOs which can assist in community awareness and mobilisation for response.
3. Identify and mobilize volunteers' / volunteer organizations which can assist various facets of response like provision of emergency healthcare and relief items.
4. Initiate preliminary damage assessment and run search and rescue operations.
5. Provision of immediate relief including provision of food and potable water to affectees.
6. Deployment of emergency medical support.
7. Provide emergency health care to the affected population, in order to cover risk of spread of epidemic prone diseases like acute watery diarrhea, typhoid fever, malaria and measles, relapsing of fever and acute respiratory illness.

Recovery and Rehabilitation

1. Assess damage to buildings across the impacted areas to gather information about the extent and severity of damage.
2. Monitor potential water quality issues.
3. Rehabilitation on built back better principal.

Drought	
UCs At Risk	All UCs
General Description	1. Karachi Malir is a densely populated district, with little agriculture being practiced around the outskirts of the district. 2. Climatic condition of the district can be categorized as Warm and Semi-Arid (Climate Classification of Pakistan (Khan et al., 2010) 3. Average annual rainfall received during a year across the district is 194.77 mm. 4. According to MHVRA Study 2022, a. Meteorological drought hazard for district Karachi Malir is "**Extreme**" b. Meteorological drought risk for district Karachi Malir is "**Medium to Extreme**" c. Agricultural drought hazard for district Karachi Malir is "**Mild to Extreme**" d. Agricultural drought risk for district Karachi Malir is "**Low to Extreme**".
Disaster Management Measures	
Preparedness	
1. Implement Drought Early Warning System (EWS) at provincial/district level to get clear indications of the impending drought and its consequences, e.g. forecast of impending drought conditions related to changing weather conditions linked to El Nino or La Nina events. 2. Monitoring of temperature, precipitation, potential evapotranspiration, soil moisture, groundwater levels, and reservoirs. 3. Building of small-scale reservoir for rainwater harvesting 4. Implementation of water supply and demand management.	

5. Control ground water extraction from upper and lower aquifers to be within the sustainable yield limits.
Response
1. Assess data about the nature of drought conditions and their impact. 2. Provision and installation of solar water pumps for availability of clean drinking water. 3. Public information campaign for water management and saving.
Recovery and Rehabilitation
1. Awareness and encouragement of on best practices for water conservation.

Tsunami	
UCs at Risk (10)	**100 Quarters, Cattle Colony, Ghaghar, Hasrat Mohani, Landhi, Malir Cantonment, Rehri, Sharafi Goth, Silver Town**
UCs not at Risk(14)	**Darsanno Channo, Daood Chowrangi, Gadap, Garibabad, Gazi Brohi, Gujjiro, Gulshan-e-Hadeed, Jaffar Tayyar, Korangi, Moinabad, Murad Memon, Muslimabad, Muzzafarabad, Quaidabad, Songal**
General Description	1. Due to geographical location, District Karachi Malir can be affected by the tsunami. A tsunami hit the Makran coast in Balochistan Province during November 1945. The tsunami generated sea waves of 12-15 meters height killed about 4,000 people in the Makran coast. Although Karachi and Thatta were away from the epicenter, but still 6 feet high sea waves affected harbor facilities and coast of Sindh. 2. The effects of Tsunami of December, 2004 generated by earthquake in Indonesia were also felt along the coastline of Pakistan. The abnormal rise in water detected by tide gauge station in Keti Bunder area created panic in the coastal population including Karachi. 3. According to MHVRA study 2022, the hazard of Tsunami in the district is "**Medium to Extreme**". 4. According to MHVRA study 2022, the risk of Tsunami in district is "**Low to Extreme**"
Disaster Management Measures	
Preparedness	
1. Strengthening of tsunami detection, forecasting and warning dissemination centers. 2. Installation of tsunami early warning systems in coastal belt of Sindh Province. 3. Launching a series of public awareness campaign through NGOs and community development organizations. 4. Training of local administration in warning dissemination and evacuation techniques. 5. Plantation of mangroves and coastal forests along the coast line 6. Development of a network of local knowledge centers (rural/urban) along the coast lines to provide necessary training and emergency communication during crisis time. 7. Design, practice and implementation of evacuation plans and shelter sites with emphasis on self-reliance. 8. Plan the timing of initial actions to be taken in the event of a Tsunami.	

9. Ensure all communities and response agencies are prepared and ready to respond to a tsunami event.
10. Identify buildings and places that could, in the event of a Tsunami, be used as relief centers or camps and make arrangements for water supply and sanitation in such buildings or places.
11. Protect hazardous material storage facility located in tsunami prone area

Response

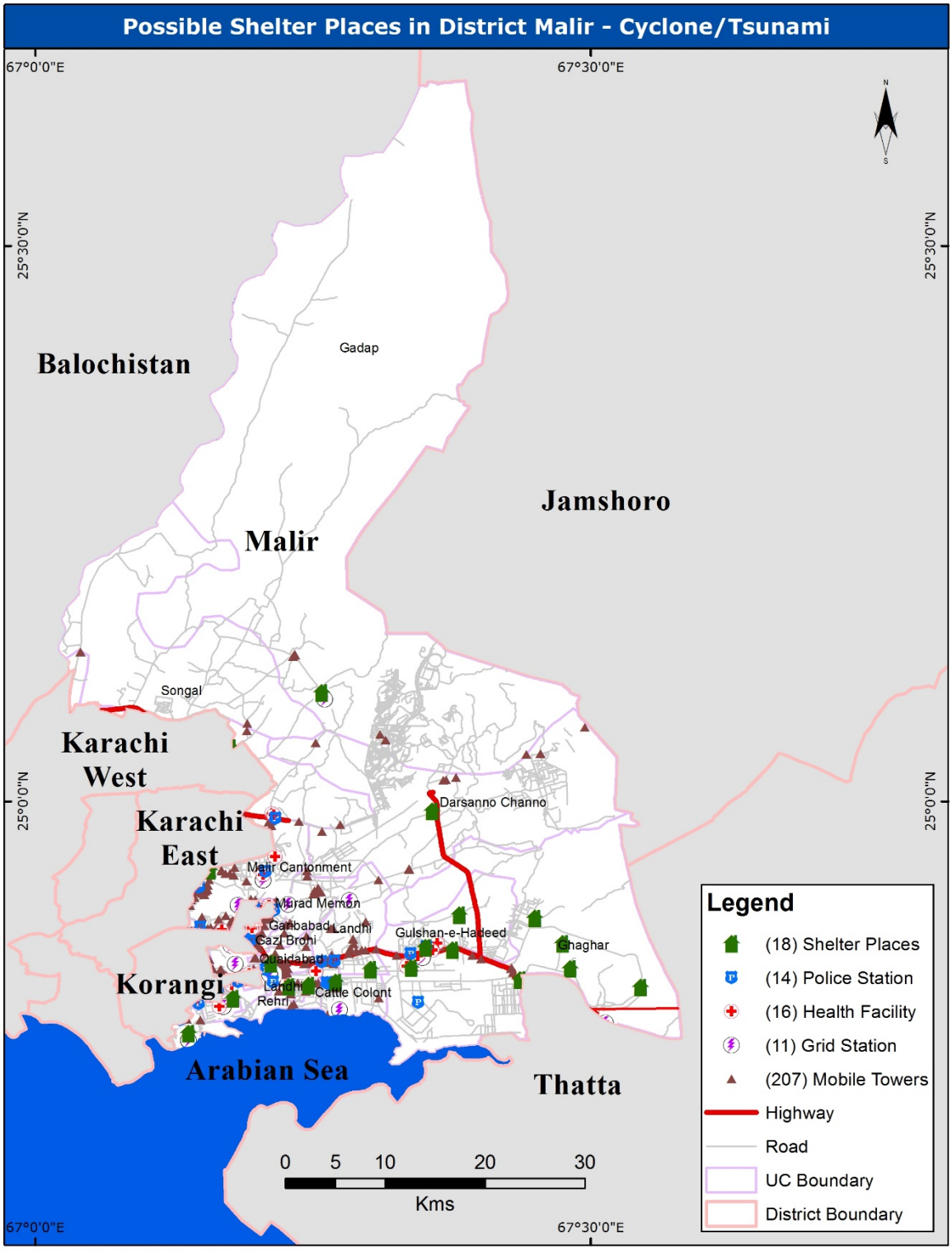
1. Coordination with Pakistan Meteorological Department as nodal agency for earthquake and tsunami detection service and dissemination of alerts and warnings through dedicated tsunami warning systems in coastal belt.
2. Immediate evacuation of nearest coastal belt population to safe sides emphasizing population living near coastal creeks.
3. Arrangement for alternate communication links like satellite phones, HF/ VHF communication, VSAT, etc.
4. Establishment of shelters with all necessary life support facilities
5. Mobilize and deploy resources e.g. search and rescue, medical teams in the Tsunami affected areas.
6. Supply food, drinking water, medical supplies to the affected population.
7. Assess hygiene of affected area and preventing the spread of disease.

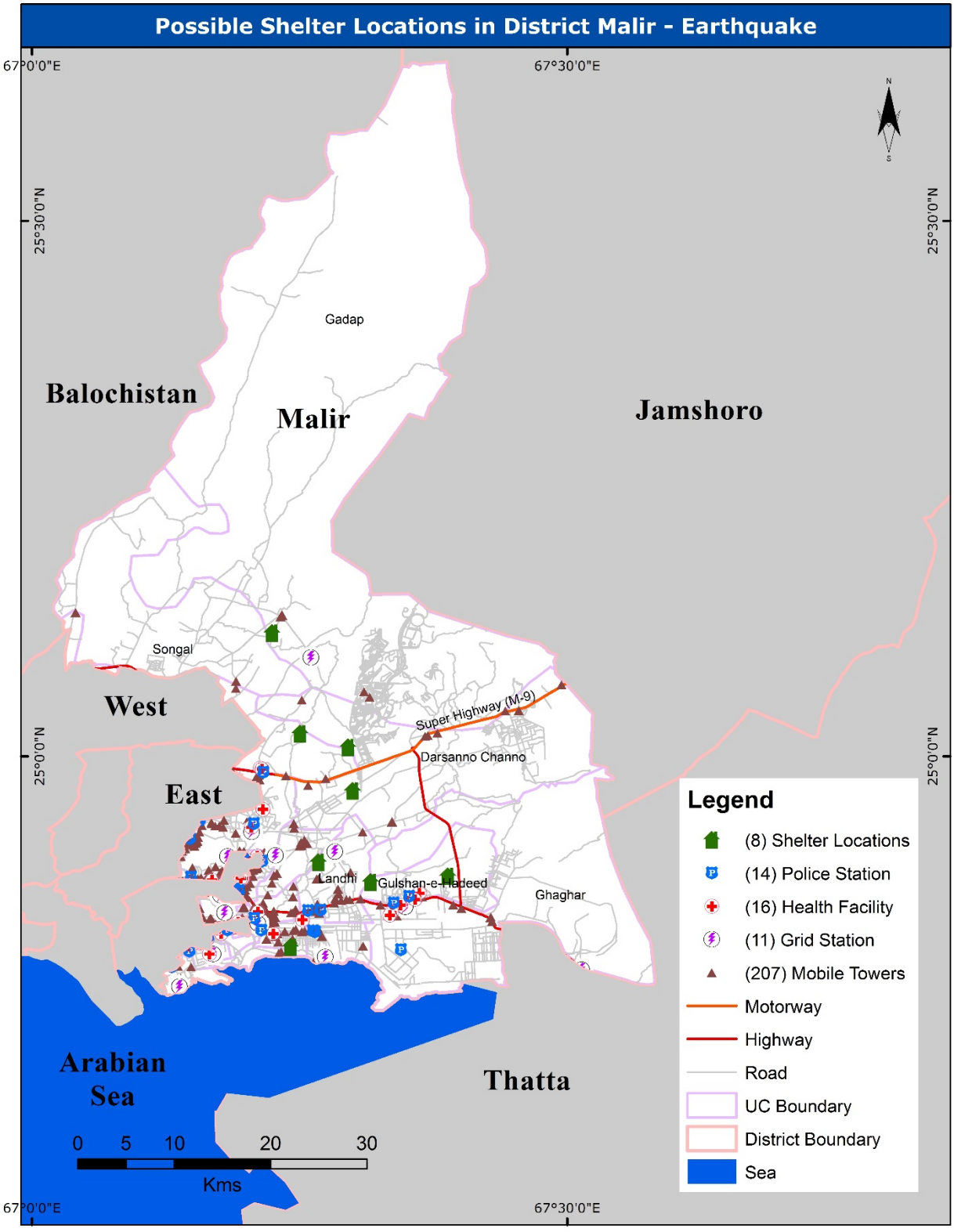
Recovery and Rehabilitation

1. Reconstruction of essential infrastructure, such as access to roads, water supply and sanitation, waste water treatment and solid waste disposal.
2. Enhance the ability of the natural system to act as a bio-shield to protect people and their livelihoods by conserving, managing and restoring wetlands, mangroves, spawning areas, seagrass beds and coral reefs.
3. Conduct post-Tsunami damage assessment analysis to provide a clear, and concise picture of post disaster situation, to identify damage caused to different sectors and to develop strategies for rehabilitation, reconstruction and recovery on built back better principal.

SHELTER LOCATION MAP

As part of preparedness, response, and rehabilitation against hazards, shelter places are integral. These are necessary to relocate, evacuate, or replenish the population that may be affected from hazards. Proposed shelters are illustrated in the maps.





***Annex - A details the list of earthquake shelter locations**

PROPOSED PRIORITY DISASTER RISK MANAGEMENT PROJECTS

INTRODUCTION

Following are the recommended disaster risk management projects, which may be initiated to ensure effective disaster management in district Malir. PDMA may identify suitable partnering agencies / line departments to carry out and prioritize each proposed project.

Hazard wise list of Priority Disaster Risk Management Projects	
Disaster Risk Management Projects/ Studies	**Brief**
Earthquake	
1. Ensure implementation of building codes and standards.	Prepare policy and SOP to ensure new buildings in the district are constructed as per the seismic codes and standard of the area.
2. Identification and retrofitting of weak existing structures and unsafe buildings (schools, hospitals and government offices).	Coordinate with local community regarding unsafe buildings and regularly conduct building safety surveys to check structural integrity of buildings against the seismic risk of the district and take necessary retrofitting measures to strengthen weak structures. Create database of vulnerable and unsafe buildings and retrofitting measures taken to strengthen the structure of such buildings.
3. Preparation of rescue and rehabilitation plan	Coordinate with line departments to create a comprehensive plan with clearly defined roles and responsibilities of first responding departments, as well as, correspond with rescue agencies/NGOs for their role in an event of earthquake. The plan should also details the rescue equipment available with concerned departments.
Drought	
1. Conduct feasibility study for identification of suitable sites for rainwater harvesting and aquifer recharge in the district.	The rainwater harvesting sites should be identified by using geospatial technologies and ancillary data, which can be used as clean water aquifers by communities, which in turn can use it for drinking, and irrigation purposes. Potential rainwater harvesting sites may be identified by using Analytical Hierarchy Process (AHP) and spatial analyst tool, with multiple thematic layers (rain data, population, digital elevation model, soil type, etc.)
Cyclone/Tsunami	
1. Establishment of tsunami/cyclone early warning detection and dissemination system using Common Alert Protocol (CAP).	A single emergency alert using Common Alert Protocol (CAP) can trigger a variety of public warning systems, increasing the likelihood that people receive the alert by one or more communication pathways. The CAP is capable to disseminate rich multimedia such as photographs, maps, streaming video and audio. An early warning system based on CAP may be established at suitable location.
2. Construction of permanent multipurpose Cyclone / Tsunami shelters.	Multi-Purpose Shelters are meant to provide refuge to vulnerable populations at the time of a cyclonic storm and otherwise to be used as community centers etc. The Multi-Purpose Cyclone Shelters act as a safe shelter for people living in a cyclone threatened region or meant for those who fail to evacuate due to various reasons. The number of Multi-Purpose Shelters should be proportionate to the population size with due examination of its safety and sustainability aspects.
3. Preparation of cyclone/Tsunami response and evacuation plan	Collaborate with community leaders to create community evacuation plans, including evacuation zones and routes. Identify and prepare shelter locations above sea level and conduct emergency evacuation trainings to ensure readiness of communities.
4. Installation of tidal gauges along the coast.	Install digital tide gauges as part of the early warning system, to continuously record the height of the surrounding water level

	and send real-time notifications to monitoring centers.
5. Establishment of a meteorological radar system along coastal areas.	Update and expand meteorological radar stations across the coastal belt as part of early warning system to detect precipitation particles in the atmosphere and send real-time notifications for any in-coming cyclone / heavy precipitation.
6. Construction of coastal dikes along major public facilities against tsunamis and storm surges (cyclones).	Dikes can provide a high degree of protection against flooding in low-lying coastal areas. Important public infrastructure like schools, hospitals and shelter places should be secured by constructing protection dikes with a slope. The sloped dike forces the wave to break when the water becomes shallow, and therefore reduces the energy of the wave.
7. Conduct of District Level Mock Exercise (DLME).	Develop a calendar for mock exercises to assess the preparedness, review the District Disaster Management Plans, Standard Operating Procedures and to evaluate the readiness of various departments to any disaster or emergency.
8. Development of insurance policy for financial risk management	Collaborate with Provincial Govt. and Private Partners to devise a disaster insurance policy for vulnerable communities. Disaster insurance provides a means of covering losses incurred through disasters and catastrophic events and reducing disasters' severe financial impact on individuals and communities. Financial liquidity provided by insurance helps mitigate disasters' effects on food security, health and livelihood assets.

COST BENEFIT ANALYSIS

INTRODUCTION

1. Cost Benefit Analysis (CBA) is a key analytical tool that can provide quantitative information regarding the prioritization of risk reduction based on comparing benefits of an actual or planned intervention with its costs.

2. Cost Benefit Analysis (CBA) can play a pivotal role in advocacy and decision-making on Disaster Risk Reduction (DRR) by demonstrating the financial and economic value of incorporating DRR initiatives into planning.

3. In an age of austerity, cost–benefit analysis continues to be an important tool for prioritizing efficient DRM measures but with a shifting emphasis from infrastructure-based options (hard resilience) to preparedness and systemic interventions (soft resilience), other tools such as cost-effectiveness analysis, multi-criteria analysis and robust decision-making approaches deserve more attention.

4. Studies categorize interventions into hard and soft type of measures. Hard resilience refers to the strengthening of structures and physical components of systems in order to brace against shocks imposed by extremes such as earthquakes, storms and floods. In contrast, soft resilience (Behavioural DRR) refers to less tangible and process-oriented measures as well as policy in order to robustly cope with events as they occur and minimize the adverse outcomes.

5. The studies find that many of the highest economic returns exist for behavioural DRR strategies

6. The benefits of hazard mitigation are the avoided losses, i.e., those losses that would have occurred in a probabilistic sense if the mitigation activity had not been implemented.

COST BENEFIT ANALYSIS – MALIR DISTRICT

The existing nature of disasters in Malir district can be categorized as low to Extreme. The prominent hazard in the district is heatwave, storm surge and tsunami. The district is susceptible to effects of cyclone and the risk is categorized as low. There is low to high risk of storm surge in some UCs of the district. Few UCs of the district are prone to Tsunami. The risk of earthquake is determined to be low. The Agriculture and meteorological drought risk for Malir district range from low to extreme. There is no risk of riverine flood in the district. Based on the results of the MHVRA study the hazards of the district can be managed through soft and enhanced management measures. In this scenario, cost benefit analysis of proposed interventions is appended in table below:

Table 9: Cost Benefit Analysis of Disaster Risk Measures in District Malir

S. no.	Soft resilience (Behavioral DRR)	Cost	Benefit
1.	Early warning system for heatwave	Dissemination of forecast of heatwaves from the meteorological department through public radio announcements, print and digital media to increase the preparedness of local populace against the impending hazard.	Early warnings give people time to prepare in advance and postpone activities after daytime. Local authorities would get ample time to establish relief centers with provisions of shade and hydration. Hospitals would be prepared to receive more patients than usual. An overall reduction in emergency cases would reflect in less mortality and more savings in medical expenditure.
2.	Awareness campaigns	Public private partnership and use of electronic/print media for raising public awareness is a cost-effective approach to build society resilience and improved disaster risk management capabilities of vulnerable communities. Awareness campaigns and information dissemination for evacuation and safe practices in event of earthquake.	Public awareness and public education for disaster reduction helps to reduce disaster risks. It mobilizes people through clear messages, supported with detailed information. People who know how to react in case of a disaster, community leaders who have learned to warn their people in time, and whole social layers who have been taught how to prepare themselves for natural hazards can contribute to better mitigation strategies and dissemination of information on the consequences of hazards. Education and knowledge can provide people with tools for vulnerability reduction and life-improving self-help strategies.
3.	Early warning for heavy rainfall	Dissemination of information regarding forecast of heavy rainfall using print/digital media and radio broadcasts and issuance of warning of possible urban flooding. Coordinated action by responsible agencies to be ready to deal with issues arising from urban flooding.	Equipping people with information of heavy rainfall prediction would allow people to take protective measure to secure their property against possible urban flooding. Unnecessary activities would be postponed and this would reduce the exposure of community to a certain extent.
4.	Early warning system for storm surge and tsunami warning	System to disseminate information through print / digital media and radio broadcast to villages and communities along the shoreline about rough conditions at sea and possibility of storm surges to prevent fishermen from venturing	Provision of information beforehand will enable people to take informed decisions and prevent fishermen community from venturing in the sea during unfavorable weather conditions. Alerting emergency services in advance would ensure reduced response time. People can arrange for alternate arrangements to take shelter and secure

		into the seas. Emergency medical services to be alerted.	belongings in the event their settlements are under impending danger.
5.	Pre-emptive maintenance of water drainage system	Maintenance and cleaning activities in storm water drains, sewers and along the natural streams to increase water flow capacity prior to the onset of rainy season.	Improved water drainage capacity will ensure smooth flow of surface runoff and prevent accumulation of water in urban areas, preventing incidents of drowning, electrocution, loss of property and less hindrance to traffic flow. These efforts will prevent loss of property and life.
6.	Strengthening of mobile health care facilities	Setup of temporary health facilities reduce difficulty in patients' transportation to permanent hospital facilities. Mobile health care units are already available with government of Sindh, their mobilization to disaster management will ensure lifesaving.	Mobile health facilities play a very significant role in the mitigation of disaster because of their particular function in providing essential first aid. Ease of access to basic health facilities will reduce burden on hospitals. The systematic organization and easy mobilization of the staff, equipment and medical supplies in a safe environment are crucial if disaster response is to be prompt and effective.
7.	Shelters for heatwave mitigation	Temporary roadside shelters with provision of shade and hydration to provide necessary relief from humid and hot climate during periods of heatwave. Encouragement of plantation of trees, which can provide cool shade when fully grown.	Shelters can provide hydration to people with ease of access. Shade would provide relief from sunlight and provide an area of temporary recess. This would reduce the number of heatstroke cases, which in turn would reduce the number of emergency cases arriving at the hospital. Overall benefit would be a reduction in medical expenses and prevention of avoidable mortality.

ANNEX – A – SHELTER LOCATIONS DESCRIPTION – EARTHQUAKE

The given shelter locations for earthquake are proposed on the findings of the MHVRA 2022 study and information obtained through satellite technology and online verifiable sources. It is recommended to conduct on ground physical surveys to evaluate their suitability.

Shelter location	Co-ordinates	Area (acres)	Estimated Tents (numbers)	Avg. elevation (ft)
1	Upper right corner: 25° 7'23.19"N 67°13'58.13"E Upper left corner: 25° 7'16.98"N 67°13'5.68"E Lower right corner: 25° 6'37.49"N 67°14'19.14"E Lower left corner: 25° 6'28.64"N 67°12'44.45"E	804	~36,000	435
2	Upper right corner: 25° 1'30.55"N 67°15'2.30"E Upper left corner: 25° 1'25.72"N 67°14'49.66"E Lower right corner: 25° 1'5.97"N 67°15'14.97"E Lower left corner: 25° 1'1.29"N 67°14'57.45"E	89.9	~4,000	276
3	Upper right corner: 25° 0'48.00"N 67°18'5.16"E Upper left corner: 25° 0'29.48"N 67°17'15.00"E Lower right corner: 25° 0'31.02"N 67°18'11.75"E Lower left corner: 25° 0'14.52"N 67°17'20.50"E	198	~8,800	295
4	Upper right corner: 24°58'27.09"N 67°18'17.71"E Upper left corner: 24°58'2.60"N 67°17'39.17"E Lower right corner: 24°58'10.87"N 67°18'11.82"E Lower left corner: 24°57'46.61"N 67°17'56.49"E	122	~5,400	207
5	Upper right corner: 24°54'11.00"N 67°16'2.28"E Upper left corner: 24°54'6.77"N 67°15'55.75"E Lower right corner: 24°54'5.77"N 67°16'8.65"E Lower left corner: 24°53'55.15"N 67°16'4.13"E	20.4	~900	130

6	Upper right corner: Upper left corner: Lower right corner: Lower left corner:	24°53'45.32"N 24°53'42.98"N 24°52'53.20"N 24°52'50.38"N	67°23'50.42"E 67°23'1.38"E 67°23'52.59"E 67°22'22.68"E	773	~34,700	189
7	Upper right corner: Upper left corner: Lower right corner: Lower left corner:	24°53'16.98"N 24°53'9.39"N 24°52'37.92"N 24°52'35.62"N	67°19'28.18"E 67°18'26.24"E 67°19'9.33"E 67°18'27.74"E	505	~22,700	186
8	Upper right corner: Upper left corner: Lower right corner: Lower left corner:	24°49'27.61"N 24°49'28.56"N 24°49'8.71"N 24°49'13.11"N	67°14'41.80"E 67°14'19.94"E 67°14'37.94"E 67°14'18.67"E	81.8	~3,600	91

A total of 8 shelter locations have been selected as Earthquake shelter places across the district. The shelter locations are selected based on their proximity to the population vulnerable to earthquake, and accessibility to roads and other basic facilities (healthcare, education, police station, etc.) A total of 116,100 tents approximately (tent with size of 45 sq. m each) can be set up within the demarcated shelter places.