MHVRA

INFORMED DISASTER MANAGEMENT PLAN 2023-2032

DISTRICT KARACHI SOUTH

DEVELOPED BY
PDMA SINDH

THROUGH
SUPARCO

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CONTENTS

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 Karachi South 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 Karachi South 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 Karachi South 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 KARACHI SOUTH

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

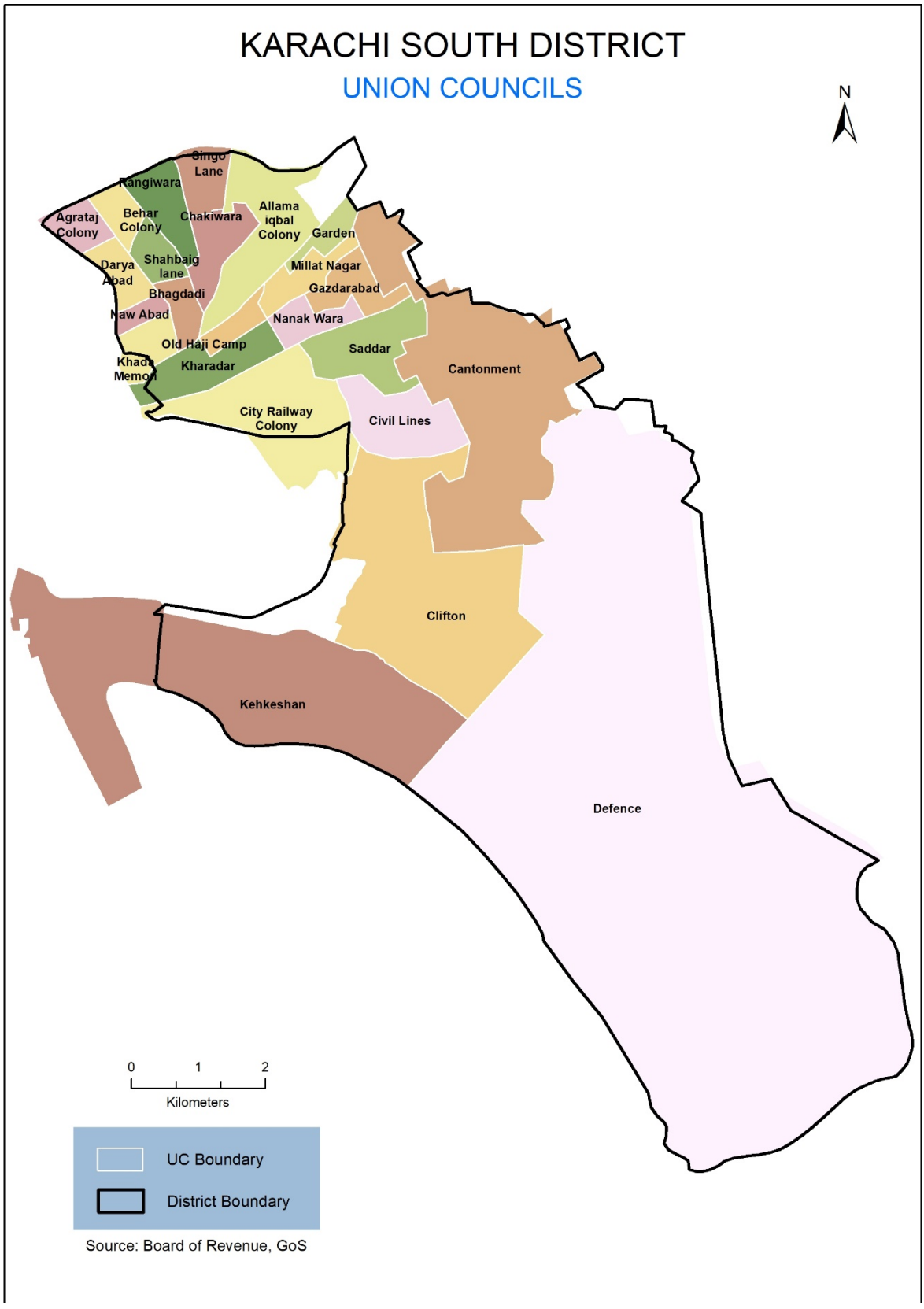
MODES OF REVIEW

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 KARACHI SOUTH

DISTRICT KARACHI SOUTH AT A GLANCE



GEOGRAPHY

District area in Sq. Km	159	
Coordinates	Longitude 67◦ 1' 11" to 67◦ 12' 65" East Latitude 24◦ 49' 49" to 25◦ 0' 47" North	
Surrounding Districts	Malir in the East Korangi in South Karachi Central in West Karachi West in North	
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	-	

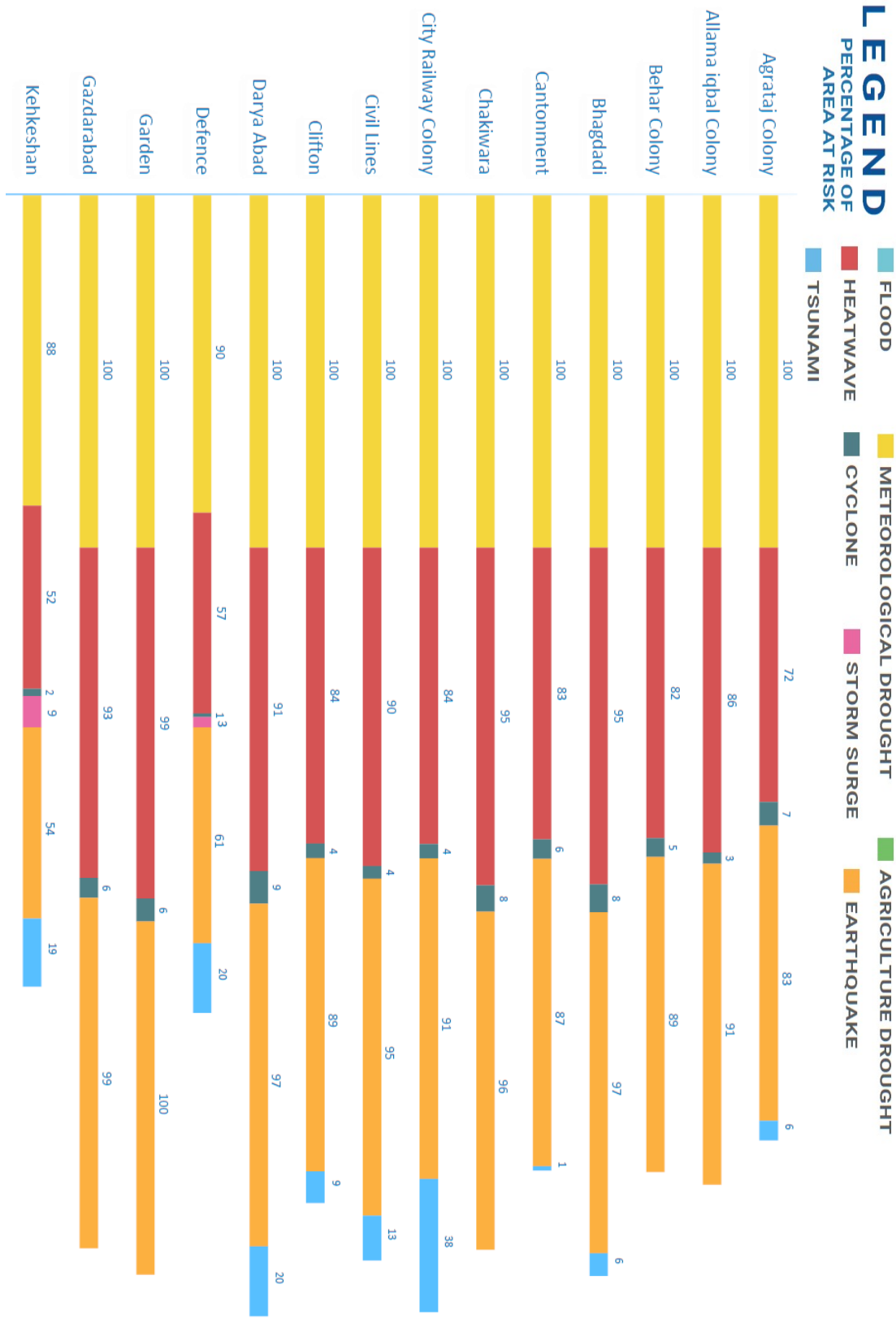
DEMOGRAPHY

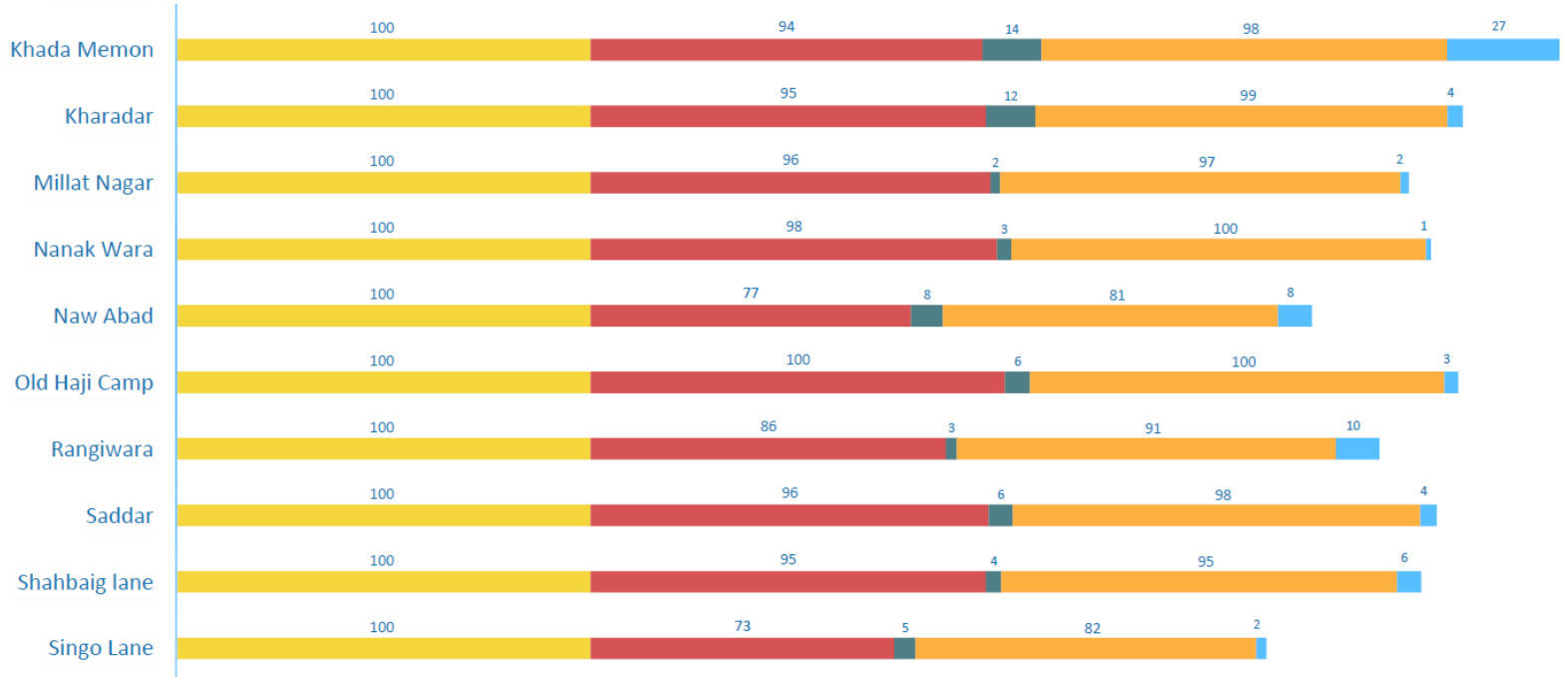
	Year-1998	**Year-2017**
Population	1,447,529	2,875,315
Urban	1,447,529	2,875,315
Rural	-	-
No. of Household	-	509,647
Average Annual Growth Rate 1998-2017	3.67 %	

ECONOMY

Industries	Wearing Apparel, Food Products and Beverages, Textile and Chemical and Chemical products

TALUKA NAMES	UC NAMES
1. Aram Bagh 2. Civil Lines 3. Clifton Cantonment 4. Garden 5. Karachi Cantonment 6. Lyari 7. Saddar	1. Agrataj Colony 2. Allama Iqbal Colony 3. Behar Colony 4. Bhagdadi 5. Cantonment 6. Chakiwara 7. City Railway Colony 8. Civil Lines 9. Clifton 10. Darya Abad 11. Defence 12. Garden 13. Gazdarabad 14. Kehkeshan 15. Khada Memon 16. Kharadar 17. Millat Nagar 18. Nanak Wara 19. Naw Abad 20. Old Haji Camp 21. Rangiwara 22. Saddar 23. Shahbaig Lane 24. Singo Lane


LEGEND
PERCENTAGE OF AREA AT RISK
FLOOD
HEATWAVE
CYCLONE
METEOROLOGICAL DROUGHT
STORM SURGE
AGRICULTURE DROUGHT
EARTHQUAKE
TSUNAMI
Agrataj Colony 100 72 7 83 6
Allama iqbal Colony 100 86 3 91
Behar Colony 100 82 5 89
Bhagdadi 100 95 8 97 6
Cantonment 100 83 6 87 1
Chakiwara 100 95 8 96
City Railway Colony 100 84 4 91 38
Civil Lines 100 90 4 95 13
Clifton 100 84 4 89 9
Darya Abad 100 91 9 97 20
Defence 90 57 1 3 61 20
Garden 100 99 6 100
Gazdarabad 100 93 6 99
Kehkeshan 88 52 2 9 54 19


Khada Memon
100
94
14
98
27
Kharadar
100
95
12
99
4
Millat Nagar
100
96
2
97
2
Nanak Wara
100
98
3
100
1
Naw Abad
100
77
8
81
8
Old Haji Camp
100
100
6
100
3
Rangiwara
100
86
3
91
10
Saddar
100
96
6
98
4
Shahbaig lane
100
95
4
95
6
Singo Lane
100
73
5
82
2

UC WISE RISK PROFILE

Agra Taj Colony			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.086 sq km
		Pakka Unplanned Area	0.287 sq km
		Bridges	1
		Education Facilities	5
		Mobile Towers	1
		Welfare Trust	2
		Irrigation and Drainage Network	0.861 km
		Road Network	1.769 km
		Population	48465
		Household	8289
Meteorological Drought	Medium	Population	48643
		Household	8319
Heatwave	Medium – Extreme	Pakka Planned Area	0.086 sq km
		Pakka Unplanned Area	0.288 sq km
		Population	48507
		Household	8296
Cyclone	Low	Pakka Planned Area	0.016 sq km
		Pakka Unplanned Area	0.02 sq km
		Welfare Trust	1
		Population	4624
		Household	789
Tsunami	Low - Medium	Pakka Planned Area	0.012 sq km
		Pakka Unplanned Area	0.007 sq km
		Education Facilities	2
		Irrigation and Drainage Network	0.015 km
		Road Network	0.46 km
		Population	2431
		Household	415
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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, 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.	
Allama Iqbal Colony			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.869 sq km
		Pakka Unplanned Area	1.028 sq km
		Bridges	3
		Education Facilities	70
		Mobile Towers	4
		Petrol Pumps	3
		Police Stations	2
		Post Offices	1
		Welfare Trust	3
		Irrigation and Drainage Network	2.733 km
		Road Network	10.163 km
		Population	179699
		Household	32646
Meteorological Drought	Medium	Population	179996
		Household	32700
Heatwave	Medium – Extreme	Pakka Planned Area	0.869 sq km
		Pakka Unplanned Area	1.026 sq km
		Population	179572
		Household	32624
Cyclone	Low	Pakka Planned Area	0.024 sq km
		Pakka Unplanned Area	0.044 sq km
		Mobile Towers	1
		Irrigation and Drainage Network	0.03 km
		Road Network	0.253 km
		Population	6450
		Household	1196
Tsunami	Low - Medium	Pakka Planned Area	0.003 sq km
		Pakka Unplanned Area	0.004 sq km
		Bridges	1
		Education Facilities	3
		Irrigation and Drainage Network	0.017 km
		Road Network	0.493 km
		Population	509
		Household	92

Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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, 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.

Behar Colony			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.285 sq km
		Pakka Unplanned Area	0.087 sq km
		Education Facilities	6
		Mobile Towers	1
		Irrigation and Drainage Network	0.538 km
		Road Network	1.479 km
		Population	48345
		Household	8268
Meteorological Drought	Medium	Population	48527
		Household	8299
Heatwave	Medium – Extreme	Pakka Planned Area	0.285 sq km
		Pakka Unplanned Area	0.087 sq km
		Population	48415
		Household	8280
Cyclone	Low	Pakka Planned Area	0.022 sq km
		Pakka Unplanned Area	0.002 sq km
		Education Facilities	3
		Road Network	0.087 km
		Population	3159
		Household	540
Tsunami	Low - Medium	Road Network	0.048 km
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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, 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.

Bhagdadi			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.209 sq km
		Pakka Unplanned Area	0.218 sq km
		Bridges	1
		Education Facilities	7
		Police Stations	1
		Post Offices	1
		Welfare Trust	1
		Irrigation and Drainage Network	0.715 km
		Road Network	1.58 km
		Population	53041
		Household	9071
Meteorological Drought	Medium	Population	53096
		Household	9080
Heatwave	Medium – Extreme	Pakka Planned Area	0.209 sq km
		Pakka Unplanned Area	0.218 sq km
		Population	53001
		Household	9064
Cyclone	Low	Pakka Planned Area	0.016 sq km
		Pakka Unplanned Area	0.014 sq km
		Road Network	0.277 km
		Population	3784
		Household	647
Tsunami	Low - Medium	Pakka Planned Area	0.013 sq km
		Pakka Unplanned Area	0.016 sq km
		Education Facilities	2
		Irrigation and Drainage Network	0.052 km
		Road Network	0.124 km
		Population	3135
		Household	537
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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

Cantonment			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	5.14 sq km
		Pakka Unplanned Area	1.07 sq km
		Ambulance Services	2
		Bridges	5
		Bus Stops	5
		Education Facilities	24
		Fire Stations	1
		Grid Stations	1
		Health Facilities	6
		Mobile Towers	19
		Petrol Pumps	14
		Police Stations	2
		Post Offices	2
		Tourist Places	6
		Welfare Trust	10
		Irrigation and Drainage Network	1.079 km
		Railway Line	6.608 km
		Road Network	29.951 km
		Population	79176
		Household	14998
Meteorological Drought	Medium	Population	79449
		Household	15047
Heatwave	Medium– Extreme	Pakka Planned Area	5.124 sq km
		Pakka Unplanned Area	1.068 sq km
		Population	78910
		Household	14945
Cyclone	Low	Pakka Planned Area	0.324 sq km
		Pakka Unplanned Area	0.06 sq km
		Education Facilities	1
		Mobile Towers	2
		Petrol Pumps	1
		Tourist Places	6
		Welfare Trust	2

		Irrigation and Drainage Network	0.135 km
		Railway Line	0.1 km
		Road Network	1.894 km
		Population	4551
		Household	874
Tsunami	Low – High	Pakka Planned Area	0.069 sq km
		Pakka Unplanned Area	0.007 sq km
		Railway Line	0.052 km
		Road Network	0.606 km
		Population	1384
		Household	258
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Chakiwara			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.188 sq km
		Pakka Unplanned Area	0.616 sq km
		Education Facilities	23
		Mobile Towers	3
		Petrol Pumps	1
		Police Stations	1
		Welfare Trust	2
		Irrigation and Drainage Network	0.426 km
		Road Network	3.143 km
		Population	98357
		Household	16960
Meteorological Drought	Medium	Population	98422
		Household	16972
Heatwave	Medium – Extreme	Pakka Planned Area	0.188 sq km
		Pakka Unplanned Area	0.616 sq km
		Population	98334
		Household	16957
Cyclone	Low	Pakka Planned Area	0.035 sq km
		Pakka Unplanned Area	0.029 sq km

		Mobile Towers	1
		Road Network	0.264 km
		Population	7992
		Household	1377
Tsunami	Low - Medium	Pakka Planned Area	0.002 sq km
		Pakka Unplanned Area	0.004 sq km
		Education Facilities	1
		Road Network	0.153 km
		Population	736
		Household	125
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

City Railway Line Colony			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Forest Area	0.002 sq km
		Pakka Planned Area	1.972 sq km
		Pakka Unplanned Area	0.656 sq km
		Ambulance Services	1
		Bridges	3
		Bus Stops	1
		Education Facilities	25
		Grid Stations	1
		Health Facilities	2
		Mobile Towers	3
		Petrol Pumps	3
		Police Stations	2
		Post Offices	3
		Tourist Places	3
		Welfare Trust	2
		Irrigation and Drainage Network	2.723 km
		Railway Line	3.647 km
		Road Network	15.126 km
		Population	72075
		Household	13842
Meteorological Drought	Medium - High	Forest Area	0.046 sq km
		Population	72296

		Household	13886
Heatwave	Medium – Extreme	Pakka Planned Area	1.966 sq km
		Pakka Unplanned Area	0.655 sq km
		Population	71854
		Household	13800
Cyclone	Low	Pakka Planned Area	0.098 sq km
		Pakka Unplanned Area	0.014 sq km
		Bridges	1
		Education Facilities	2
		Tourist Places	3
		Irrigation and Drainage Network	0.129 km
		Railway Line	0.217 km
		Road Network	0.729 km
		Population	4400
		Household	871
Tsunami	Low - Extreme	Forest Area	0.035 sq km
		Pakka Planned Area	0.678 sq km
		Pakka Unplanned Area	0.345 sq km
		Bridges	1
		Bus Stops	1
		Education Facilities	14
		Mobile Towers	2
		Petrol Pumps	1
		Irrigation and Drainage Network	0.941 km
		Railway Line	1.96 km
		Road Network	6.601 km
		Population	25222
		Household	4637
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Civil Lines			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	1.345 sq km
		Pakka Unplanned Area	0.048 sq km
		Bridges	2

		Bus Stops	1
		Education Facilities	9
		Mobile Towers	2
		Post Offices	1
		Tourist Places	2
		Welfare Trust	1
		Irrigation and Drainage Network	0.949 km
		Railway Line	1.792 km
		Road Network	6.929 km
		Population	29074
		Household	5392
Meteorological Drought	Medium	Population	29140
		Household	5403
Heatwave	Medium – Extreme	Pakka Planned Area	1.341 sq km
		Pakka Unplanned Area	0.047 sq km
		Population	28965
		Household	5370
Cyclone	Low	Pakka Planned Area	0.048 sq km
		Pakka Unplanned Area	0.008 sq km
		Tourist Places	2
		Road Network	0.347 km
		Population	1000
		Household	185
Tsunami	Low – Extreme	Pakka Planned Area	0.137 sq km
		Pakka Unplanned Area	0.035 sq km
		Tourist Places	1
		Irrigation and Drainage Network	0.183 km
		Railway Line	0.67 km
		Road Network	1.166 km
		Population	2588
		Household	478
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Clifton

Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Forest Area	0.002 sq km
		Pakka Planned Area	5.115 sq km
		Pakka Unplanned Area	0.912 sq km
		Ambulance Services	1
		Bridges	9
		Bus Stops	1
		Education Facilities	22
		Fire Stations	1
		Health Facilities	2
		Mobile Towers	17
		Petrol Pumps	2
		Police Stations	2
		Post Offices	4
		Tourist Places	3
		Welfare Trust	2
		Irrigation and Drainage Network	3.716 km
		Railway Line	2.632 km
		Road Network	33.669 km
		Population	147783
		Household	27394
Meteorological Drought	Medium - High	Forest Area	0.047 sq km
		Population	148362
		Household	27503
Heatwave	Medium – Extreme	Pakka Planned Area	5.106 sq km
		Pakka Unplanned Area	0.909 sq km
		Population	147471
		Household	27337
Cyclone	Low	Pakka Planned Area	0.219 sq km
		Pakka Unplanned Area	0.067 sq km
		Education Facilities	4
		Tourist Places	3
		Welfare Trust	1
		Irrigation and Drainage Network	0.094 km
		Railway Line	0.083 km
		Road Network	0.505 km
		Population	6760
		Household	1253
Tsunami	Low - Extreme	Forest Area	0.038 sq km

		Pakka Planned Area	0.324 sq km
		Pakka Unplanned Area	0.177 sq km
		Bridges	3
		Education Facilities	3
		Mobile Towers	1
		Tourist Places	1
		Irrigation and Drainage Network	0.174 km
		Railway Line	1.829 km
		Road Network	6.244 km
		Population	11120
		Household	2056
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Darya Abad			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.076 sq km
		Pakka Unplanned Area	0.436 sq km
		Education Facilities	17
		Grid Stations	1
		Mobile Towers	3
		Petrol Pumps	2
		Welfare Trust	3
		Railway Line	0.854 km
		Road Network	2.236 km
		Population	65793
		Household	11251
Meteorological Drought	Medium	Population	65821
		Household	11256
Heatwave	Medium – Extreme	Pakka Planned Area	0.076 sq km
		Pakka Unplanned Area	0.436 sq km
		Population	65814
		Household	11255
Cyclone	Low	Pakka Planned Area	0.012 sq km
		Pakka Unplanned Area	0.035 sq km
		Mobile Towers	1

		Petrol Pumps	1
		Road Network	0.312 km
		Population	6122
		Household	1047
Tsunami	Low - High	Pakka Planned Area	0.046 sq km
		Pakka Unplanned Area	0.038 sq km
		Education Facilities	8
		Grid Stations	1
		Mobile Towers	1
		Petrol Pumps	1
		Railway Line	0.634 km
		Road Network	1.079 km
		Population	10251
		Household	1751
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Defense			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Forest Area	0.003 sq km
		Pakka Planned Area	22.731 sq km
		Pakka Unplanned Area	0.131 sq km
		Ambulance Services	1
		Bridges	1
		Bus Stops	1
		Education Facilities	5
		Grid Stations	2
		Health Facilities	9
		Mobile Towers	10
		Petrol Pumps	13
		Police Stations	3
		Post Offices	16
		Power Plants	2
		Tourist Places	4
		Welfare Trust	7
		Irrigation and Drainage Network	3.124 km
		Road Network	179.59 km
		Population	301848

		Household	57182
Meteorological Drought	Medium	Forest Area	0.291 sq km
		Population	302279
		Household	57263
Heatwave	Medium – Extreme	Pakka Planned Area	22.669 sq km
		Pakka Unplanned Area	0.131 sq km
		Population	301029
		Household	57027
Cyclone	Low	Pakka Planned Area	0.416 sq km
		Pakka Unplanned Area	0.004 sq km
		Petrol Pumps	1
		Tourist Places	4
		Irrigation and Drainage Network	0.057 km
		Road Network	1.418 km
		Population	5479
		Household	1033
Tsunami	Low - Extreme	Pakka Planned Area	6.683 sq km
		Pakka Unplanned Area	0.004 sq km
		Education Facilities	2
		Health Facilities	3
		Petrol Pumps	7
		Police Stations	2
		Post Offices	2
		Power Plants	2
		Tourist Places	1
		Welfare Trust	2
		Irrigation and Drainage Network	0.251 km
		Road Network	96.674 km
		Population	82560
		Household	15637
Storm Surge	Low - Extreme	Pakka Planned Area	0.807 sq km
		Petrol Pumps	1
		Road Network	18.52 km
		Population	5664
		Household	1074
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

Garden			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.338 sq km
		Pakka Unplanned Area	0.061 sq km
		Education Facilities	3
		Mobile Towers	3
		Petrol Pumps	2
		Police Stations	1
		Welfare Trust	2
		Road Network	2.131 km
		Population	38429
		Household	7176
Meteorological Drought	Medium	Population	38429
		Household	7176
Heatwave	Medium	Pakka Planned Area	0.337 sq km
		Pakka Unplanned Area	0.061 sq km
		Population	38365
		Household	7164
Cyclone	Low	Pakka Planned Area	0.011 sq km
		Pakka Unplanned Area	0.015 sq km
		Education Facilities	1
		Population	2525
		Household	471
Tsunami	Low - Medium	Pakka Planned Area	0.003 sq km
		Population	301
		Household	56
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Gazdarabad			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.681 sq km
		Education Facilities	17

		Fire Stations	2
		Health Facilities	1
		Mobile Towers	2
		Petrol Pumps	3
		Post Offices	1
		Tourist Places	1
		Welfare Trust	4
		Irrigation and Drainage Network	1.045 km
		Road Network	4.26 km
		Population	38603
		Household	7242
Meteorological Drought	Medium	Population	38617
		Household	7245
Heatwave	Medium	Pakka Planned Area	0.679 sq km
		Population	38493
		Household	7221
Cyclone	Low	Pakka Planned Area	0.037 sq km
		Education Facilities	1
		Tourist Places	1
		Irrigation and Drainage Network	0.048 km
		Road Network	0.234 km
		Population	1198
		Household	228
Tsunami	Low - Medium	Pakka Planned Area	0.002 sq km
		Population	233
		Household	44
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Kehkeshan			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	5.286 sq km
		Pakka Unplanned Area	0.088 sq km
		Ambulance Services	2
		Education Facilities	2

		Health Facilities	2
		Mobile Towers	3
		Police Stations	1
		Power Plants	23
		Tourist Places	5
		Railway Line	5.458 km
		Road Network	23.581 km
		Population	53192
		Household	9788
Meteorological Drought	Medium – Extreme	Water Body	0.166 sq km
		Population	53502
		Household	9844
Heatwave	Medium	Pakka Planned Area	5.282 sq km
		Pakka Unplanned Area	0.088 sq km
		Population	53101
		Household	9770
Cyclone	Low	Pakka Planned Area	0.199 sq km
		Tourist Places	5
		Road Network	0.706 km
		Population	4252
		Household	786
Tsunami	Low - Extreme	Pakka Planned Area	1.86 sq km
		Pakka Unplanned Area	0.021 sq km
		Education Facilities	2
		Mobile Towers	1
		Power Plants	9
		Tourist Places	2
		Railway Line	4.025 km
		Road Network	9.96 km
		Population	6155
		Household	1122
Storm Surge	Low - Extreme	Pakka Planned Area	0.893 sq km
		Power Plants	2
		Tourist Places	2
		Road Network	0.991 km
		Population	273
		Household	51
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

Khadda Memon Society			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.225 sq km
		Pakka Unplanned Area	0.352 sq km
		Bridges	2
		Education Facilities	10
		Industries	1
		Mobile Towers	2
		Police Stations	3
		Welfare Trust	1
		Irrigation and Drainage Network	0.906 km
		Railway Line	0.122 km
		Road Network	2.824 km
		Population	61249
		Household	10447
Meteorological Drought	Medium	Population	61276
		Household	10451
Heatwave	Extreme	Pakka Planned Area	0.224 sq km
		Pakka Unplanned Area	0.352 sq km
		Population	61229
		Household	10443
Cyclone	Low	Pakka Planned Area	0.038 sq km
		Pakka Unplanned Area	0.042 sq km
		Bridges	1
		Irrigation and Drainage Network	0.091 km
		Road Network	0.439 km
		Population	9045
		Household	1541
Tsunami	Low - Extreme	Pakka Planned Area	0.109 sq km
		Pakka Unplanned Area	0.036 sq km
		Bridges	1
		Education Facilities	5
		Mobile Towers	2
		Irrigation and Drainage Network	0.281 km
		Railway Line	0.118 km

		Road Network	1.186 km
		Population	10556
		Household	1789
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Kharadar			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	1.016 sq km
		Pakka Unplanned Area	0.146 sq km
		Bridges	2
		Education Facilities	10
		Fire Stations	1
		Health Facilities	3
		Industries	2
		Mobile Towers	7
		Petrol Pumps	2
		Police Stations	1
		Post Offices	1
		Tourist Places	4
		Welfare Trust	11
		Irrigation and Drainage Network	0.523 km
		Road Network	10.494 km
		Population	71637
		Household	14192
Meteorological Drought	Medium	Population	71643
		Household	14193
Heatwave	Medium - Extreme	Pakka Planned Area	1.011 sq km
		Pakka Unplanned Area	0.146 sq km
		Population	71410
		Household	14148
Cyclone	Low	Pakka Planned Area	0.108 sq km
		Pakka Unplanned Area	0.03 sq km
		Education Facilities	1
		Tourist Places	4
		Irrigation and Drainage Network	0.085 km

		Road Network	0.698 km
		Population	7587
		Household	1528
Tsunami	Low - High	Pakka Planned Area	0.039 sq km
		Pakka Unplanned Area	0.001 sq km
		Bridges	1
		Education Facilities	1
		Mobile Towers	2
		Welfare Trust	1
		Road Network	0.418 km
		Population	2053
		Household	377
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Millat Nagar			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.626 sq km
		Ambulance Services	1
		Education Facilities	30
		Fire Stations	3
		Health Facilities	1
		Mobile Towers	1
		Police Stations	1
		Welfare Trust	5
		Irrigation and Drainage Network	0.211 km
		Road Network	1.514 km
		Population	60232
		Household	11247
Meteorological Drought	Medium	Population	60294
		Household	11259
Heatwave	Medium	Pakka Planned Area	0.625 sq km
		Population	60195
		Household	11240
Cyclone	Low	Pakka Planned Area	0.015 sq km

		Population	1486
		Household	278
Tsunami	Low - Medium	Pakka Planned Area	0.013 sq km
		Education Facilities	1
		Road Network	0.002 km
		Population	1279
		Household	240
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Nanak Wara			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.564 sq km
		Education Facilities	22
		Health Facilities	1
		Mobile Towers	1
		Petrol Pumps	1
		Police Stations	1
		Tourist Places	1
		Welfare Trust	2
		Irrigation and Drainage Network	0.317 km
		Road Network	6.86 km
		Population	39727
		Household	7821
		Population	39727
		Household	7821
Heatwave	Medium	Pakka Planned Area	0.563 sq km
		Population	39658
		Household	7807
Cyclone	Low	Pakka Planned Area	0.02 sq km
		Education Facilities	1
		Tourist Places	1
		Irrigation and Drainage Network	0.034 km
		Road Network	0.349 km
		Population	1487

		Household	291
Tsunami	Low - Medium	Pakka Planned Area	0.007 sq km
		Education Facilities	8
		Road Network	0.055 km
		Population	479
		Household	94
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Naw Abad			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.006 sq km
		Pakka Unplanned Area	0.196 sq km
		Petrol Pumps	1
		Road Network	0.674 km
		Population	25588
		Household	4376
Meteorological Drought	Medium	Population	25662
		Household	4389
Heatwave	Medium - Extreme	Pakka Planned Area	0.006 sq km
		Pakka Unplanned Area	0.197 sq km
		Population	25631
		Household	4384
Cyclone	Low	Pakka Planned Area	0.003 sq km
		Pakka Unplanned Area	0.015 sq km
		Population	2300
		Household	393
Tsunami	Low - High	Pakka Unplanned Area	0.014 sq km
		Petrol Pumps	1
		Road Network	0.277 km
		Population	1737
		Household	297
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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

Old Haji Camp			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.239 sq km
		Pakka Unplanned Area	0.138 sq km
		Education Facilities	12
		Health Facilities	1
		Police Stations	1
		Post Offices	1
		Welfare Trust	1
		Irrigation and Drainage Network	0.073 km
		Road Network	2.684 km
		Population	31107
		Household	5956
Meteorological Drought	Medium	Population	31107
		Household	5956
Heatwave	Extreme	Pakka Planned Area	0.239 sq km
		Pakka Unplanned Area	0.138 sq km
		Population	31104
		Household	5955
Cyclone	Low	Pakka Planned Area	0.009 sq km
		Pakka Unplanned Area	0.014 sq km
		Road Network	0.15 km
		Population	1638
		Household	322
Tsunami	Low - Medium	Pakka Planned Area	0.013 sq km
		Education Facilities	2
		Road Network	0.129 km
		Population	1235
		Household	230
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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

Ranjiwara			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.064 sq km
		Pakka Unplanned Area	0.68 sq km
		Education Facilities	35
		Fire Stations	1
		Mobile Towers	2
		Welfare Trust	2
		Irrigation and Drainage Network	0.824 km
		Road Network	2.397 km
		Population	89137
		Household	15244
Meteorological Drought	Medium	Population	89383
		Household	15286
Heatwave	Medium – Extreme	Pakka Planned Area	0.064 sq km
		Pakka Unplanned Area	0.681 sq km
		Population	89248
		Household	15263
Cyclone	Low	Pakka Planned Area	0.001 sq km
		Pakka Unplanned Area	0.022 sq km
		Road Network	0.077 km
		Population	2927
		Household	501
Tsunami	Low - Extreme	Pakka Planned Area	0.018 sq km
		Pakka Unplanned Area	0.07 sq km
		Education Facilities	3
		Welfare Trust	1
		Road Network	0.361 km
		Population	9051
		Household	1548
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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, 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.

Saddar			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	1.463 sq km
		Bus Stops	1
		Education Facilities	12
		Mobile Towers	9
		Petrol Pumps	2
		Police Stations	2
		Post Offices	1
		Tourist Places	4
		Welfare Trust	4
		Irrigation and Drainage Network	0.739 km
		Road Network	11.713 km
		Population	10873
		Household	2130
Meteorological Drought	Medium	Population	10878
		Household	2131
Heatwave	Medium	Pakka Planned Area	1.459 sq km
		Population	10807
		Household	2117
Cyclone	Low	Pakka Planned Area	0.088 sq km
		Mobile Towers	1
		Tourist Places	4
		Road Network	0.686 km
		Population	821
		Household	162
Tsunami	Low - High	Pakka Planned Area	0.057 sq km
		Mobile Towers	1
		Tourist Places	1
		Irrigation and Drainage Network	0.03 km
		Road Network	0.619 km
		Population	179
		Household	36

Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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

Shah Baig Lane			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.018 sq km
		Pakka Unplanned Area	0.461 sq km
		Education Facilities	21
		Mobile Towers	1
		Welfare Trust	2
		Road Network	0.627 km
		Population	59795
		Household	10227
Meteorological Drought	Medium	Population	59861
		Household	10238
Heatwave	Medium – Extreme	Pakka Planned Area	0.018 sq km
		Pakka Unplanned Area	0.46 sq km
		Population	59763
		Household	10221
Cyclone	Low	Pakka Unplanned Area	0.019 sq km
		Road Network	0.085 km
		Population	2423
		Household	413
Tsunami	Low - Medium	Pakka Planned Area	0.001 sq km
		Pakka Unplanned Area	0.028 sq km
		Education Facilities	3
		Welfare Trust	1
		Population	3700
		Household	633
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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	

Singo Lane			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Pakka Planned Area	0.019 sq km
		Pakka Unplanned Area	0.481 sq km
		Bridges	2
		Education Facilities	18
		Health Facilities	1
		Mobile Towers	3
		Police Stations	1
		Irrigation and Drainage Network	0.84 km
		Road Network	1.851 km
		Population	64903
		Household	11099
Meteorological Drought	Medium	Population	65065
		Household	11127
Heatwave	Medium – Extreme	Pakka Planned Area	0.019 sq km
		Pakka Unplanned Area	0.481 sq km
		Population	64922
		Household	11103
Cyclone	Low	Pakka Planned Area	0.009 sq km
		Pakka Unplanned Area	0.026 sq km
		Education Facilities	2
		Road Network	0.241 km
		Population	4487
		Household	766
Tsunami	Low - Medium	Pakka Planned Area	0.001 sq km
		Pakka Unplanned Area	0.013 sq km
		Road Network	0.12 km
		Population	1855
		Household	318
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture 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, 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.	

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

Post-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 Karachi South 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 Karachi South
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 Karachi South 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 Karachi South 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. Karachi South 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 Karachi South 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 Karachi South 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. There is no agricultural drought risk for district Karachi South 3. Meteorological drought risk for district Karachi South is Very Low to Extreme 4. 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. 5. 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; ○ Installation of tsunami early warning and dissemination system in coastal settlements ○ 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 coherence 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 Karachi South 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 South district.

Earthquake	
UCs At Risk	All UCs
General Description	1. The Karachi South 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 South 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 South district. 4. The earthquake hazard intensity for district Karachi South is "**Low**" 5. The earthquake risk intensity for district Karachi South 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 South 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 South 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 South is "**Extreme**". 11. According to MHVRA Study 2022, heatwave risk for district Karachi South is "**Medium 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	All UCs
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 South 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 "**Cat-1 TC**" intensity 8. According to MHVRA Study 2022, cyclone risk for district Karachi South is "**Low**". 9. The Storm Surge hazard intensity for district Karachi South is "**Low to Very 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 South 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 South is "**Extreme**" b. Meteorological drought risk for district Karachi South is "**Medium to Extreme**" c. Agricultural drought hazard for district Karachi South is "**Mild**" d. Agricultural drought risk for district Karachi South is "**None**".

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 (23)	**Agra Taj Colony, Allama Iqbal Colony, Behar Colony, Bhagdadi, Cantonment, Chakiwara, City Railway Colony, Clifton, Darya Abad, Defence, Garden, Gazdarabad, Kehkeshan, Khada Memon, Kharadar, Millat Nagar, Nanak Wara, Naw Abad, Old Haji Camp, Rangiwara, Saddar, Shahbaig lane, Singo Lane**
UCs not at Risk (01)	**Millat Nagar**
General Description	1. Due to geographical location, District Karachi South 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 Karachi South. 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

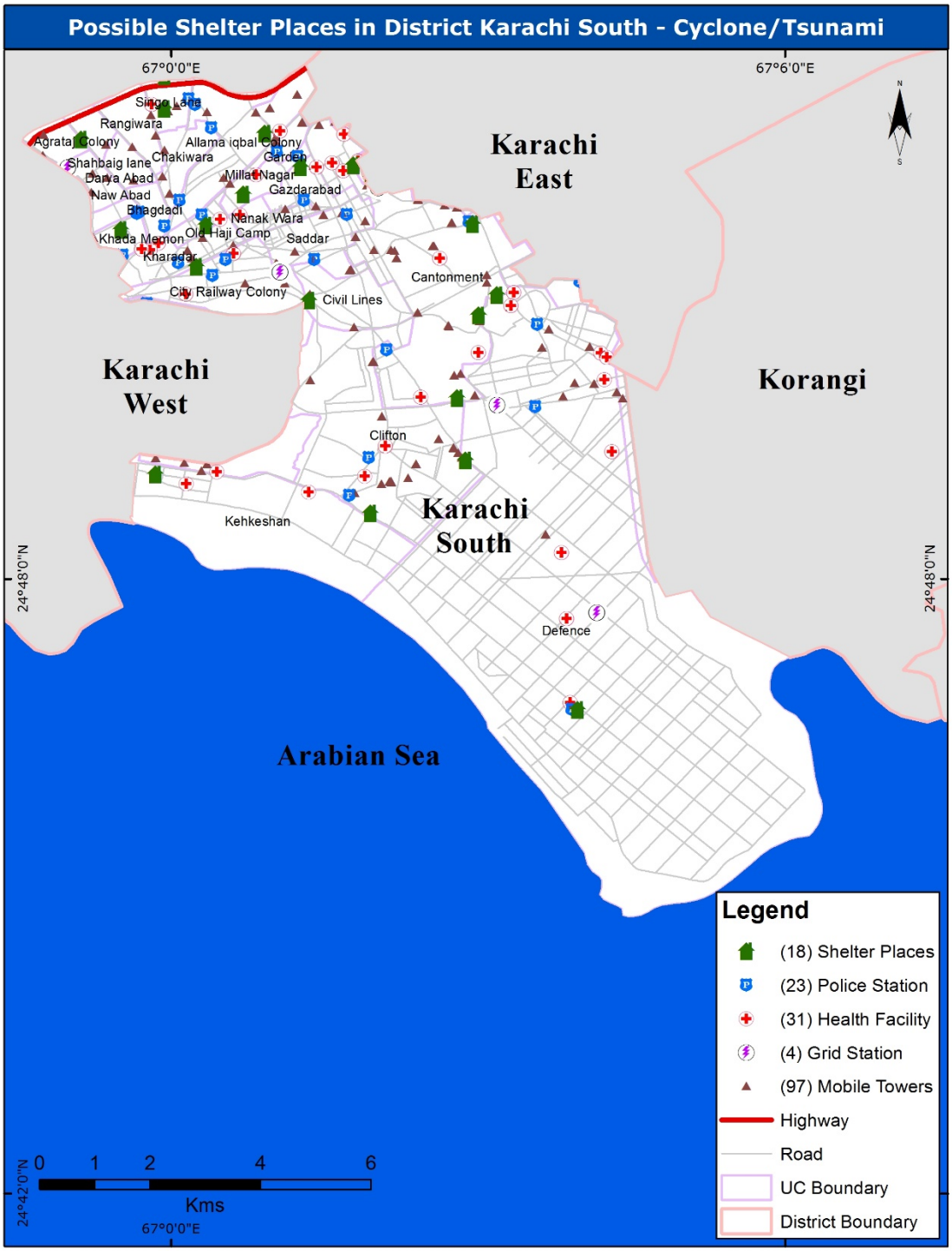
1. Coordination with Pakistan Meteorological Department as nodal agency for earthquake and tsunami detection service and dissemination of alerts and warnings through dedicated tsunami warning systems in coastal belt.
2. Immediate evacuation of nearest coastal belt population to safe sides emphasizing 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.

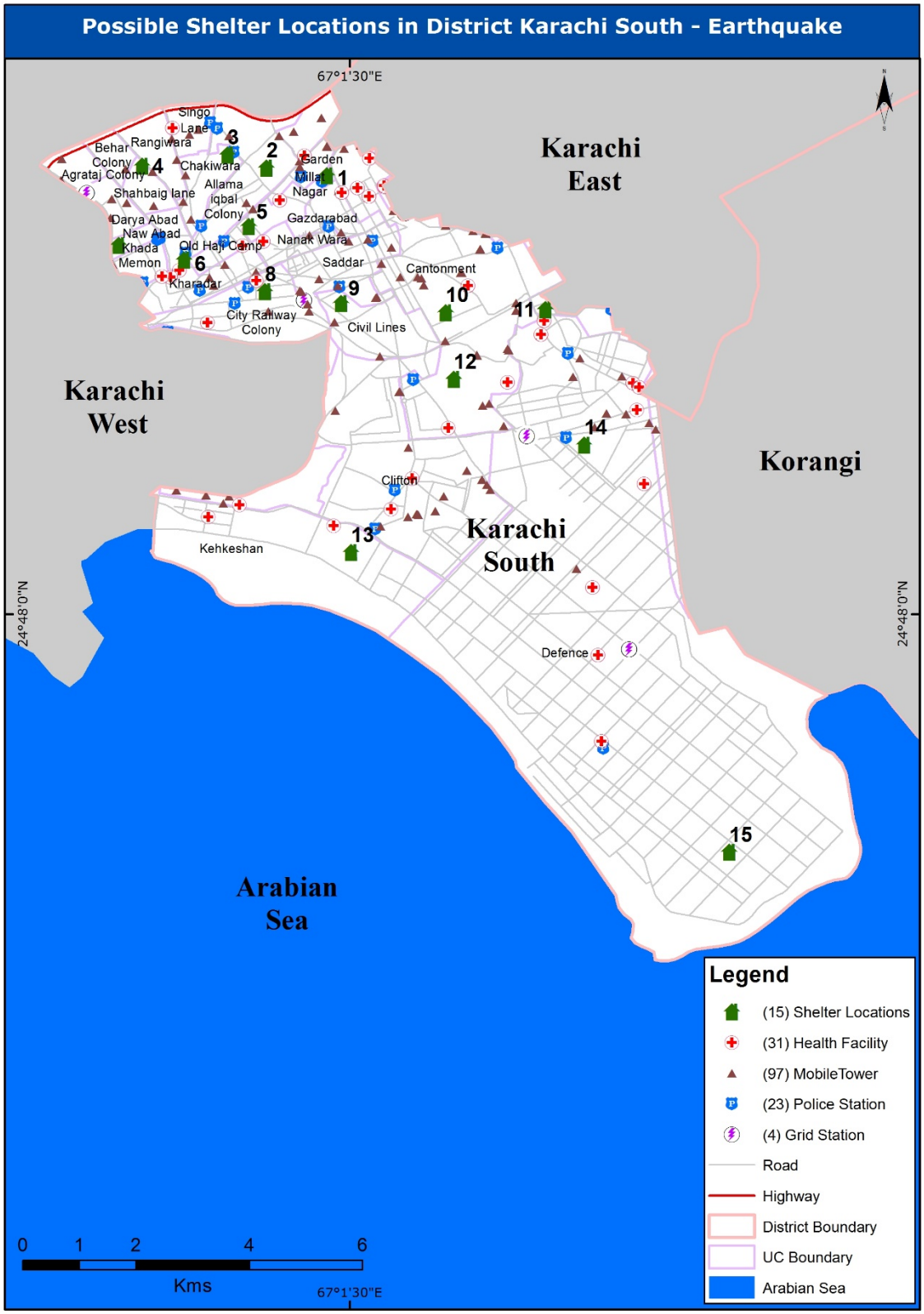
Recovery and Rehabilitation

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 Karachi South. 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 – KARACHI SOUTH DISTRICT

The existing nature of disasters in Karachi South 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 extreme 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. There is no Agriculture drought risk for Karachi South district, whereas, risk of meteorological drought is medium 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 Karachi South

S. no.	Soft resilience (Behavioral DRR)	Cost	Benefit
1.	Identification and management of shelters for earthquake, cyclone, storm surge and Tsunami	Identification and management of shelter spaces is a cost-effective way to ensure rapid, and effective management of population at times of crisis. Government schools can serve as ideal cost-effective shelter spaces in district Karachi South, as these can accommodate large number of people during disasters. Gradually, permanent multi-purpose shelters specially in near coast line and at safe location can be established in future to avoid use of education facilities.	Shelter places are highly beneficial at times of disaster as it offers a unified accommodation place for displaced people. Shelter place also help administration in effective management of displaced people and provide them with much needed relief. Shelter space keeps people off the highways during and after disaster. Shelters are often the only safe heaven for those without the financial means to take other protective measures.
2.	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.
3.	Awareness campaigns for disasters	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.	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 cam 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.
4.	Shelters for heatwave mitigation	Temporary roadside shelters with provision of shade and hydration to provide necessary relief from	Shelters can provide hydration to people with ease of access. Shade would provide relief from sunlight and provide an area of temporary recess. This

		humid and hot climate during periods of heatwave. Encouragement of plantation of trees, which can provide cool shade when fully grown.	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.
5.	Strengthening of mobile health care facilities	In the aftermath of a natural disaster, most of medical functions are provided from temporary locations to avoid 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 treating the injured and handling outbreaks of disease. 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.

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:	24°52'12.81"N 67° 1'17.76"E	2.75	~245	19
	Upper left corner:	24°52'11.07"N 67° 1'14.06"E			
	Lower right corner:	24°52'10.13"N 67° 1'19.37"E			
	Lower left corner:	24°52'8.37"N 67° 1'15.75"E			
2	Upper right corner:	24°52'15.16"N 67° 0'44.51"E	2.27	~200	21
	Upper left corner:	24°52'17.18"N 67° 0'41.62"E			
	Lower right corner:	24°52'12.72"N 67° 0'43.19"E			
	Lower left corner:	24°52'15.05"N 67° 0'39.86"E			
3	Upper right corner:	24°52'24.01"N 67° 0'22.31"E	2.85	~250	19
	Upper left corner:	24°52'23.47"N 67° 0'16.50"E			
	Lower right corner:	24°52'21.73"N 67° 0'22.73"E			
	Lower left corner:	24°52'20.86"N 67° 0'18.37"E			
4	Upper right corner:	24°52'18.90"N 66°59'30.33"E	3.00	~270	11
	Upper left corner:	24°52'17.19"N 66°59'28.44"E			
	Lower right corner:	24°52'15.16"N 66°59'33.96"E			
	Lower left corner:	24°52'13.34"N 66°59'31.54"E			
5	Upper right corner:	24°51'44.23"N 67° 0'32.22"E	3.16	~280	11
	Upper left corner:	24°51'42.13"N 67° 0'29.19"E			
	Lower right corner:	24°51'41.18"N 67° 0'35.01"E			
	Lower left corner:	24°51'39.23"N 67° 0'31.91"E			
6	Upper right corner:	24°51'24.27"N 66°59'57.90"E	3.72	~330	11
	Upper left corner:	24°51'25.06"N 66°59'55.10"E			
	Lower right corner:	24°51'19.21"N 66°59'54.50"E			
	Lower left corner:	24°51'21.71"N 66°59'52.62"E			
7	Upper right corner:	24°51'34.85"N 66°59'19.06"E	7.54	~675	9
	Upper left corner:	24°51'33.57"N 66°59'14.76"E			
	Lower right corner:	24°51'28.79"N 66°59'21.43"E			

	Lower left corner:	24°51'26.78"N 66°59'17.54"E			
8	Upper right corner: Upper left corner: Lower right corner: Lower left corner:	24°51'7.09"N 67° 0'43.62"E 24°51'6.79"N 67° 0'38.84"E 24°51'2.01"N 67° 0'44.24"E 24°51'1.70"N 67° 0'39.98"E	5.48	~490	6
9	Upper right corner: Upper left corner: Lower right corner: Lower left corner:	24°51'5.25"N 67° 1'25.55"E 24°50'59.58"N 67° 1'14.99"E 24°50'54.08"N 67° 1'32.08"E 24°50'51.30"N 67° 1'26.21"E	25.2	~2200	9
10	Upper right corner: Upper left corner: Lower right corner: Lower left corner:	24°50'57.26"N 67° 2'24.83"E 24°50'50.10"N 67° 2'19.10"E 24°50'50.97"N 67° 2'29.01"E 24°50'48.05"N 67° 2'20.37"E	10	~900	25
11	Upper right corner: Upper left corner: Lower right corner: Lower left corner:	24°50'58.16"N 67° 3'23.28"E 24°50'55.23"N 67° 3'16.47"E 24°50'53.58"N 67° 3'26.97"E 24°50'50.86"N 67° 3'21.25"E	8.81	~800	60
12	Upper right corner: Upper left corner: Lower right corner: Lower left corner:	24°50'27.33"N 67° 2'36.51"E 24°50'25.13"N 67° 2'22.38"E 24°50'1.70"N 67° 2'37.98"E 24°50'2.78"N 67° 2'21.95"E	85.6	~7700	14
13	Upper right corner: Upper left corner: Lower right corner: Lower left corner:	24°48'40.73"N 67° 1'46.55"E 24°48'51.40"N 67° 1'28.75"E 24°48'19.81"N 67° 1'34.28"E 24°48'32.26"N 67° 1'13.78"E	107	~9500	7
14	Upper right corner: Upper left corner: Lower right corner: Lower left corner:	24°49'42.08"N 67° 3'52.16"E 24°49'39.78"N 67° 3'36.06"E 24°49'29.21"N 67° 3'45.39"E 24°49'36.18"N 67° 3'36.06"E	21.7	~1950	7
15	Upper right corner: Upper left corner: Lower right corner: Lower left corner:	24°45'45.38"N 67° 5'58.84"E 24°46'27.83"N 67° 5'5.30"E 24°45'4.24"N 67° 5'12.43"E 24°45'40.52"N 67° 4'20.72"E	1009	~10000	8

A total of 15 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 35,790 tents approximately (tent with size of 45 sq. m each) can be set up within the demarcated shelter places

ANNEX – B – LIST OF EQUIPMENT AVAILABLE IN DISTRICT KARACHI SOUTH

Equipment	Quantity
De-watering Machine	5
Dumper	35
Fire Brigade / Engine / Tender	1
Tractor / Trolley / Blade	17
Loader	7
Shawal	8
Diesel / Petrol Engine	2
Water Tanker	1
Ambulances	2
Crane	1
Refuge Van	32
Arm Roll	23
Fogging Van	2
Bobkit	23
Compactor	5

***Source**: Provincial Monsoon contingency plan 2020 – PDMA, Government of Sindh*