

# MHVRA

## INFORMED DISASTER MANAGEMENT PLAN

### 2023-2032

## DISTRICT TANDO MUHAMMAD KHAN



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## PREFACE

Multi-Hazard Vulnerability Risk Assessment (MHVRA) and resultant database are the foundation for evidence-based disaster management plan. Such databases are also an integral part of the implementation of disaster risk reduction and disaster risk management strategies. The MHVRA study of the Tando Muhammad Khan 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 Tando Muhammad Khan 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 Tando Muhammad Khan 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.

### - - Disclaimer - -

*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.*

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# **INTRODUCTION TO DISASTER MANAGEMENT PLAN OF DISTRICT TANDO MUHAMMAD KHAN**

## 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**

<b>Committee Representative</b>	<b>Role</b>
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

## **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 TANDO MUHAMMAD KHAN**



<b>District area in Sq. Km</b>	1,765	
<b>Coordinates</b>	Longitude 68° 17' 22" to 68° 46' 24" East Latitude 24° 54' 8" to 25° 7' 40" North	
<b>Surrounding Districts</b>	Thatta and Sujawal in the West The River Indus flows through North-West Hyderabad and Tando Allahyar in the North Badin in the South and East	
<b>Climate Conditions</b>	Hot And Semi-Arid	
<b>Coldest Month</b>	January	
<b>Hottest Month</b>	May	
<b>Seasonal Temperatures</b>	<b>Max Mean (°C)</b>	<b>Min Mean (°C)</b>
Spring (March and April)	38.41	20.65
Dry Summer (May and June)	42.18	27.25
Wet Summer (July to September)	38.16	26.53
Autumn (October to November)	35.92	19.73
Winter (December to February)	28.48	12.05
<b>Average Rainfall</b>	137.62mm/year	
<b>Physiographic Features</b>	River Indus flows through North-West	

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## DEMOGRAPHY

	Year-1998	Year-2017
<b>Population</b>	438,624	677,098
Urban	69,645	142,037
Rural	368,979	535,061
<b>No. of Household</b>	-	131,565
<b>Average Annual Growth Rate 1998-2017</b>	2.31 %	

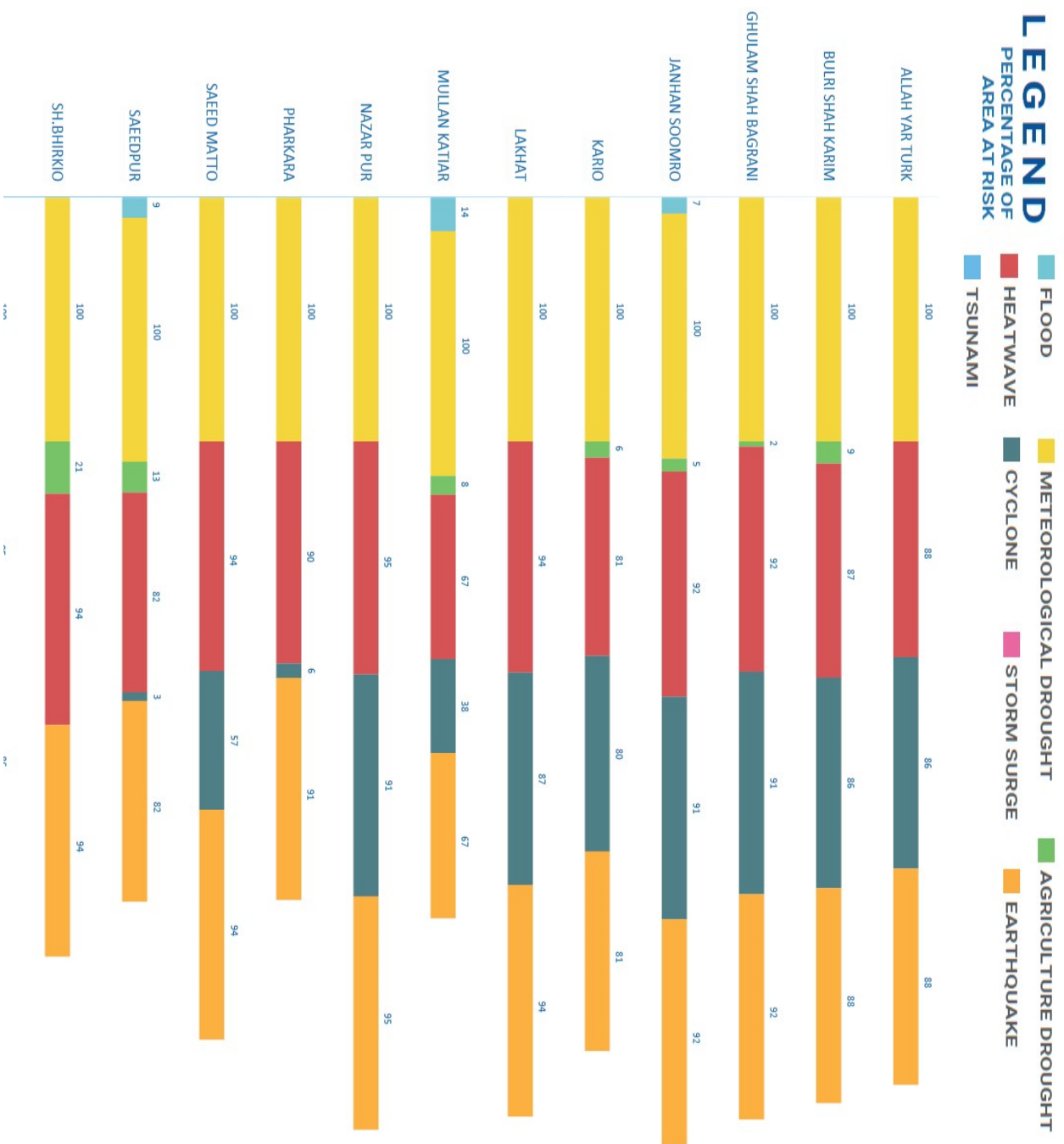
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## ECONOMY

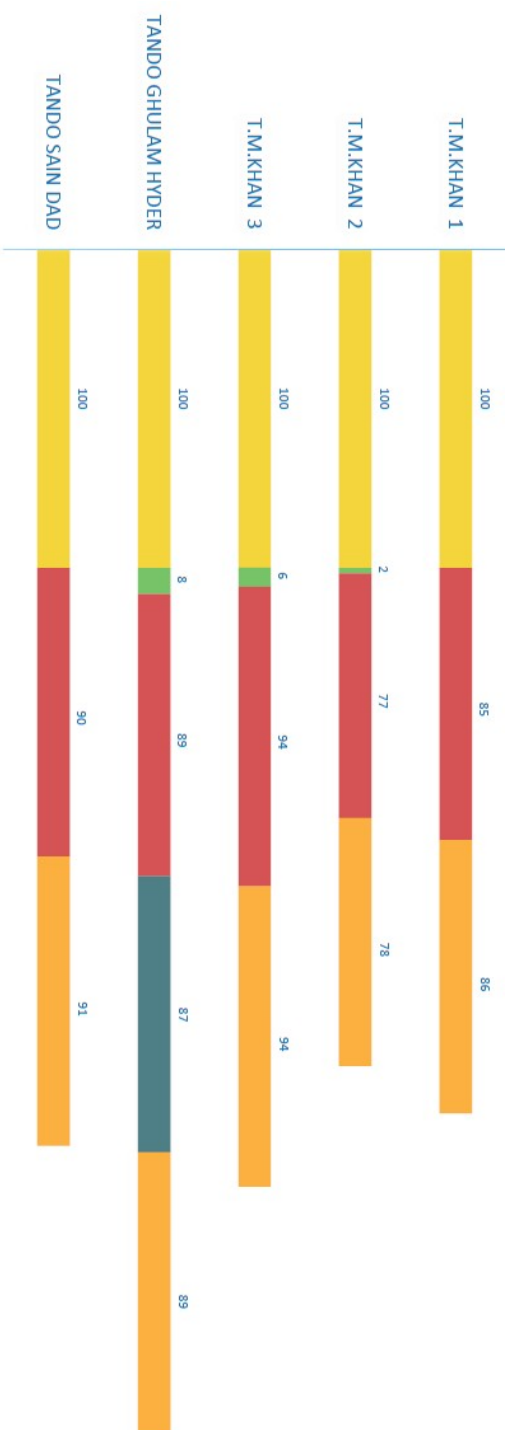
<b>Industries</b>	Agriculture, sugar, rice & flour mills and ajrak industries
<b>Agriculture</b>	<b>Production in M.tons as per (2016-17)</b>
<b>Major Crops</b>	
Rice	55,504
Wheat	45,092
Sugarcane	1,478,145
Cotton	3,397
<b>Minor Crops</b>	
Rapeseed and Mustard	109
Barley	21
Maize	81
Gram	28
Jowar	16

<b>TALUKA NAMES</b>	<b>UC NAMES</b>
<ol style="list-style-type: none"><li>1. Bulri Shah Karim Taluka</li><li>2. Tando Ghulam Hyder Taluka</li><li>3. Tando Muhammad Khan Taluka</li></ol>	<ol style="list-style-type: none"><li>1. Allah Yar Turk</li><li>2. Bulri Shah Karim</li><li>3. Ghulam Shah Bagrani</li><li>4. Janhan Soomro</li><li>5. Kario</li><li>6. Lakhath</li><li>7. Mullan Katiar</li><li>8. Nazar Pur</li><li>9. Pharkara</li><li>10. Saeed Matto</li><li>11. Saeedpur</li><li>12. Sh. Bhirkio</li><li>13. T.M. Khan 1</li><li>14. T.M. Khan 2</li><li>15. T.M. Khan 3</li><li>16. Tando Ghulam Hyder</li><li>17. Tando Sain Dad</li></ol>

# TANDO MUHAMMAD KHAN DISTRICT MULTI-HAZARD RISK PROFILES







ALLAH YAR TURK			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	125.559 sq km
		Forest Area	0.049 sq km
		Pakka Planned Area	0.621 sq km
		Pakka Unplanned Area	2.623 sq km
		Range Land	0.172 sq km
		Bridges	9
		Education Facilities	78
		Health Facilities	1
		Industries	2
		Mobile Towers	3
Meteorological Drought	Medium -Extreme	Settlements	104
		Agriculture Area	125.947 sq km
		Forest Area	0.765 sq km
		Range Land	4.245 sq km
		Water Body	3.45 sq km
		Wet Area	8.368 sq km
		Population	39004
		Household	7609
Agricultural Drought	Low	Agriculture Area	1.548 sq km
		Wet Area	0.003 sq km
Heatwave	Low - Extreme	Settlements	101
		Population	38571
		Household	7520
		Agriculture Area	125.388 sq km
		Pakka Planned Area	0.623 sq km
Cyclone	Low	Agriculture Area	125.468 sq km
		Forest Area	0.03 sq km
		Pakka Planned Area	0.032 sq km
		Pakka Unplanned Area	0.759 sq km
		Range Land	0.095 sq km
		Bridges	7
		Education Facilities	41
		Health Facilities	1
		Mobile Towers	3
		Petrol Pumps	3

		Settlements	104
		Irrigation and Drainage Network	53.312 km
		Road Network	237.773 km
		Population	13436
		Household	2614
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

BULRI SHAH KARIM			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	82.266 sq km
		Pakka Planned Area	0.143 sq km
		Pakka Unplanned Area	2.051 sq km
		Range Land	0.046 sq km
		Bridges	1
		Education Facilities	31
		Mobile Towers	2
		Petrol Pumps	1
		Police Stations	1
		Settlements	55
		Irrigation and Drainage Network	27.023 km
		Road Network	141.04 km
		Population	35181
		Household	6827
Meteorological Drought	Medium-Extreme	Settlements	87
		Agriculture Area	200.186 sq km
		Forest Area	0.025 sq km
		Range Land	1.855 sq km
		Water Body	0.154 sq km
		Wet Area	26.434 sq km
		Population	43700
Agricultural Drought	Low - Medium	Agriculture Area	23.152 sq km
		Forest Area	0.029 sq km
		Range Land	1.579 sq km
		Water Body	0.012 sq km
		Wet Area	0.392 sq km
		Population	381
		Household	74

Heatwave	Low - Extreme	Settlements	87
		Population	43243
		Household	8413
		Agriculture Area	199.314 sq km
		Kachcha Area	0.052 sq km
		Pakka Planned Area	0.97 sq km
Cyclone	Low	Agriculture Area	199.494 sq km
		Forest Area	0.001 sq km
		Kachcha Area	0.052 sq km
		Pakka Planned Area	0.015 sq km
		Pakka Unplanned Area	0.627 sq km
		Range Land	0.059 sq km
		Bridges	5
		Education Facilities	52
		Mobile Towers	1
		Petrol Pumps	2
		Settlements	87
		Tourist Places	1
		Irrigation and Drainage Network	85.84 km
		Road Network	245.415 km
		Population	11932
		Household	2326
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>GHULAM SHAH BAGRANI</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	106.666 sq km
		Forest Area	0.004 sq km
		Kachcha Area	0.289 sq km
		Pakka Unplanned Area	1.781 sq km
		Range Land	0.02 sq km
		Bridges	4
		Education Facilities	56
		Health Facilities	2
		Mobile Towers	1
		Police Stations	2
		Settlements	82

		Irrigation and Drainage Network	48.505 km
		Road Network	110.651 km
		Population	26866
		Household	5109
		Agriculture Area	106.666 sq km
		Forest Area	0.004 sq km
Meteorological Drought	Medium - Extreme	Settlements	82
		Agriculture Area	106.891 sq km
		Forest Area	0.04 sq km
		Range Land	0.3 sq km
		Water Body	2.422 sq km
		Wet Area	6.629 sq km
		Population	22419
Agricultural Drought	Low	Agriculture Area	2.984 sq km
		Range Land	0.027 sq km
		Water Body	0 sq km
		Wet Area	0.003 sq km
		Population	72
Cyclone	Low	Agriculture Area	106.608 sq km
		Forest Area	0.001 sq km
		Kachcha Area	0.289 sq km
		Pakka Unplanned Area	0.532 sq km
		Range Land	0.011 sq km
		Bridges	4
		Education Facilities	41
		Police Stations	1
		Settlements	82
		Irrigation and Drainage Network	47.716 km
		Road Network	104.065 km
		Population	10621
		Household	2021
Heatwave	Low - Extreme	Settlements	81
		Population	22187
		Household	4214
		Agriculture Area	106.589 sq km
		Kachcha Area	0.29 sq km
		Pakka Unplanned Area	1.788 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

<b>Storm Surge</b>	Nil	The UC falls out of vulnerable zone for Storm Surge
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<b>JANHAN SOOMRO</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	108.736 sq km
		Forest Area	0.016 sq km
		Natural Vegetation in Wet Areas	0.082 sq km
		Pakka Unplanned Area	1.533 sq km
		Range Land	0.037 sq km
		Bridges	5
		Bus Stops	2
		Education Facilities	58
		Health Facilities	2
		Petrol Pumps	4
		Settlements	62
		Tourist Places	1
		Irrigation and Drainage Network	64.652 km
		Road Network	234.776 km
		Population	27966
		Household	5455
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	62
		Agriculture Area	108.94 sq km
		Forest Area	0.137 sq km
		Natural Vegetation in Wet Areas	2.758 sq km
		Range Land	0.983 sq km
		Water Body	0.946 sq km
		Wet Area	3.652 sq km
		Population	23345
		Household	4551
<b>Agricultural Drought</b>	Low - Medium	Agriculture Area	4.879 sq km
		Natural Vegetation in Wet Areas	2.355 sq km
		Range Land	0.319 sq km
		Wet Area	0.001 sq km
		Population	9
		Household	2
<b>Heatwave</b>	Low - Extreme	Settlements	61
		Population	23102
		Household	4503
		Agriculture Area	108.649 sq km
		Pakka Unplanned Area	1.54 sq km

Cyclone	Low	Agriculture Area	108.684 sq km
		Forest Area	0.007 sq km
		Natural Vegetation in Wet Areas	0.024 sq km
		Pakka Unplanned Area	0.49 sq km
		Range Land	0.031 sq km
		Bridges	4
		Education Facilities	45
		Health Facilities	2
		Petrol Pumps	4
		Settlements	62
		Tourist Places	1
		Irrigation and Drainage Network	63.39 km
		Road Network	220.768 km
Riverine Flood	Low - Extreme	Agriculture Area	6.321 sq km
		Natural Vegetation in Wet Areas	2 sq km
		Pakka Unplanned Area	0.006 sq km
		Settlements	1
		Road Network	0.462 km
		Population	117
		Household	23
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>KARIO</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	49.539 sq km
		Kachcha Area	0.105 sq km
		Natural Vegetation in Wet Areas	0.009 sq km
		Pakka Unplanned Area	0.881 sq km
		Range Land	0.182 sq km
		Education Facilities	1
		Settlements	44
		Irrigation and Drainage Network	20.846 km
		Road Network	51.941 km
		Population	12737
		Household	2421
		Agriculture Area	49.539 sq km
		Kachcha Area	0.105 sq km
		Natural Vegetation in Wet Areas	0.009 sq km
		Pakka Unplanned Area	0.881 sq km

		Range Land	0.182 sq km
Meteorological Drought	Medium - Extreme	Settlements	44
		Agriculture Area	49.757 sq km
		Natural Vegetation in Wet Areas	1 sq km
		Range Land	3.372 sq km
		Water Body	5.585 sq km
		Wet Area	1.672 sq km
		Population	10662
		Household	2021
Agricultural Drought	Low	Agriculture Area	1.544 sq km
		Natural Vegetation in Wet Areas	0.062 sq km
		Range Land	2.397 sq km
		Water Body	0.925 sq km
		Wet Area	0 sq km
		Population	157
		Household	28
Heatwave	Low - Extreme	Settlements	42
		Population	10545
		Household	2003
		Agriculture Area	49.467 sq km
		Kachcha Area	0.106 sq km
		Pakka Unplanned Area	0.886 sq km
Cyclone	Low	Agriculture Area	49.511 sq km
		Kachcha Area	0.105 sq km
		Natural Vegetation in Wet Areas	0.008 sq km
		Pakka Unplanned Area	0.216 sq km
		Range Land	0.074 sq km
		Education Facilities	1
		Settlements	44
		Irrigation and Drainage Network	16.911 km
		Road Network	41.161 km
		Population	4154
		Household	790
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	



LAKHAT			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	107.583 sq km
		Forest Area	0.007 sq km
		Kachcha Area	0.006 sq km
		Natural Vegetation in Wet Areas	0.011 sq km
		Pakka Unplanned Area	2.06 sq km
		Range Land	0.023 sq km
		Bridges	1
		Education Facilities	104
		Health Facilities	2
		Settlements	108
		Irrigation and Drainage Network	37.663 km
		Railway Line	2.643 km
		Road Network	146.451 km
		Population	33290
		Household	6512
Meteorological Drought	Medium - Extreme	Settlements	108
		Agriculture Area	107.781 sq km
		Forest Area	0.149 sq km
		Natural Vegetation in Wet Areas	0.241 sq km
		Range Land	0.54 sq km
		Water Body	1.058 sq km
		Wet Area	4.267 sq km
		Population	27795
		Household	5438
Agricultural Drought	Low	Agriculture Area	0.799 sq km
		Population	68
		Household	13
Heatwave	Low - Extreme	Settlements	108
		Population	27457
		Household	5376
		Agriculture Area	107.49 sq km
		Kachcha Area	0.006 sq km
		Pakka Unplanned Area	2.068 sq km
Cyclone	Low	Agriculture Area	100.082 sq km
		Forest Area	0.005 sq km
		Kachcha Area	0.006 sq km
		Natural Vegetation in Wet Areas	0.003 sq km
		Pakka Unplanned Area	0.636 sq km

		Range Land	0.015 sq km
		Education Facilities	76
		Health Facilities	2
		Settlements	96
		Irrigation and Drainage Network	31.869 km
		Road Network	126.634 km
		Population	10371
		Household	2023
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

MULLAN KATIAH			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	118.724 sq km
		Forest Area	0.001 sq km
		Kachcha Area	0.312 sq km
		Natural Vegetation in Wet Areas	0.196 sq km
		Pakka Planned Area	0.006 sq km
		Pakka Unplanned Area	1.477 sq km
		Range Land	0.017 sq km
		Bridges	4
		Education Facilities	43
		Health Facilities	1
		Mobile Towers	2
		Petrol Pumps	1
		Police Stations	2
		Settlements	50
		Irrigation and Drainage Network	89.024 km
		Road Network	215.715 km
		Population	32742
		Household	6390
Meteorological Drought	Medium - Extreme	Settlements	50
		Agriculture Area	119.103 sq km
		Forest Area	0.016 sq km
		Natural Vegetation in Wet Areas	20.618 sq km
		Range Land	0.647 sq km
		Water Body	0.685 sq km
		Wet Area	28.204 sq km
		Population	27158

		Household	5296
<b>Agricultural Drought</b>	Low	Agriculture Area	4.398 sq km
		Natural Vegetation in Wet Areas	12.148 sq km
		Range Land	0.178 sq km
		Wet Area	0.014 sq km
		Population	24
		Household	5
<b>Heatwave</b>	Low - Extreme	Settlements	47
		Population	26940
		Household	5255
		Agriculture Area	118.548 sq km
		Kachcha Area	0.313 sq km
		Pakka Planned Area	0.006 sq km
		Pakka Unplanned Area	1.481 sq km
<b>Cyclone</b>	Low	Agriculture Area	68.79 sq km
		Kachcha Area	0.057 sq km
		Natural Vegetation in Wet Areas	0.034 sq km
		Pakka Unplanned Area	0.146 sq km
		Range Land	0.005 sq km
		Bridges	1
		Education Facilities	18
		Petrol Pumps	1
		Settlements	28
		Irrigation and Drainage Network	49.753 km
		Road Network	116.128 km
		Population	3712
		Household	725
<b>Riverine Flood</b>	Low - Extreme	Agriculture Area	8.768 sq km
		Natural Vegetation in Wet Areas	16.467 sq km
		Pakka Planned Area	0.006 sq km
		Pakka Unplanned Area	0.042 sq km
		Range Lands	0.001 sq km
		Bridges	1
		Education Facilities	1
		Settlements	4
		Road Network	4.325 km
		Population	881
		Household	171
<b>Tsunami</b>	Nil	The UC falls out of vulnerable zone for Tsunami	

<b>Storm Surge</b>	Nil	The UC falls out of vulnerable zone for Storm Surge
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<b>NAZAR PUR</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	82.195 sq km
		Kachcha Area	0.048 sq km
		Natural Vegetation in Wet Areas	0.016 sq km
		Pakka Planned Area	1.775 sq km
		Pakka Unplanned Area	1.86 sq km
		Range Land	0 sq km
		Bridges	8
		Education Facilities	77
		Grain Mandi	1
		Grid Stations	1
		Health Facilities	4
		Industries	2
		Mobile Towers	3
		Petrol Pumps	6
		Police Stations	2
		Post Offices	1
		Settlements	82
		Tourist Places	1
		Irrigation and Drainage Network	45.365 km
		Railway Line	14.72 km
		Road Network	137.585 km
		Population	40406
		Household	7668
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	82
		Agriculture Area	82.349 sq km
		Natural Vegetation in Wet Areas	0.146 sq km
		Range Land	0.144 sq km
		Water Body	2.483 sq km
		Wet Area	0.959 sq km
		Population	33482
		Household	6354
<b>Heatwave</b>	Low - Extreme	Settlements	80
		Population	33230
		Household	6304
		Agriculture Area	82.13 sq km
		Kachcha Area	0.048 sq km
		Pakka Planned Area	1.775 sq km
		Pakka Unplanned Area	1.864 sq km

Cyclone	Low	Agriculture Area	81.224 sq km
		Kachcha Area	0.048 sq km
		Natural Vegetation in Wet Areas	0.003 sq km
		Pakka Planned Area	0.068 sq km
		Pakka Unplanned Area	0.47 sq km
		Range Land	0.00046 sq km
		Bridges	5
		Education Facilities	43
		Grid Stations	1
		Petrol Pumps	4
		Settlements	81
		Tourist Places	1
		Irrigation and Drainage Network	42.29 km
		Railway Line	10.586 km
		Road Network	117.37 km
		Population	7157
		Household	1356
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture Drought	

PHARKARA			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	7.32 sq km
		Pakka Unplanned Area	0.2 sq km
		Education Facilities	12
		Settlements	11
		Irrigation and Drainage Network	7.575 km
		Railway Line	0.359 km
		Road Network	18.518 km
		Population	2909
		Household	562
Meteorological Drought	Medium - Extreme	Settlements	11
		Agriculture Area	7.342 sq km
		Water Body	0.631 sq km
		Wet Area	0.146 sq km

		Population	2427
		Household	468
Heatwave	Low - Extreme	Settlements	11
		Population	2398
		Household	460
		Agriculture Area	7.308 sq km
		Pakka Unplanned Area	0.201 sq km
Cyclone	Low	Agriculture Area	0.488 sq km
		Irrigation and Drainage Network	0.193 km
		Railway Line	0.359 km
		Road Network	1.002 km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture Drought	

SAEED MATTO			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	93.176 sq km
		Forest Area	0.003 sq km
		Kachcha Area	0.237 sq km
		Pakka Planned Area	0.165 sq km
		Pakka Unplanned Area	1.278 sq km
		Range Land	0.068 sq km
		Bridges	3
		Bus Stops	1
		Education Facilities	65
		Health Facilities	2
		Mobile Towers	1
		Petrol Pumps	2
		Settlements	76
		Irrigation and Drainage Network	51.197 km
		Road Network	155.28 km
		Population	27624
		Household	5393
Meteorological	Medium - Extreme	Settlements	76

Drought		Agriculture Area	93.371 sq km
		Forest Area	0.101 sq km
		Range Land	1.653 sq km
		Water Body	0.371 sq km
		Wet Area	3.726 sq km
		Population	23001
		Household	4489
Heatwave	Low - Extreme	Settlements	75
		Population	22782
		Household	4447
		Agriculture Area	93.082 sq km
		Kachcha Area	0.238 sq km
		Pakka Planned Area	0.166 sq km
		Pakka Unplanned Area	1.284 sq km
Cyclone	Low	Agriculture Area	56.797 sq km
		Forest Area	0.003 sq km
		Kachcha Area	0.147 sq km
		Pakka Planned Area	0.004 sq km
		Pakka Unplanned Area	0.23 sq km
		Range Land	0.039 sq km
		Bridges	3
		Bus Stops	1
		Education Facilities	25
		Health Facilities	1
		Mobile Towers	1
		Petrol Pumps	2
		Settlements	46
		Irrigation and Drainage Network	30.395 km
		Road Network	86.113 km
		Population	6882
		Household	1340
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture Drought	

SAEEDPUR			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	120.892 sq km
		Forest Area	0.087 sq km
		Kachcha Area	0.288 sq km
		Natural Vegetation in Wet Areas	0.042 sq km
		Pakka Planned Area	0.251 sq km
		Pakka Unplanned Area	2.739 sq km
		Range Land	0.248 sq km
		Bridges	5
		Education Facilities	74
		Health Facilities	1
		Settlements	81
		Tourist Places	1
		Irrigation and Drainage Network	83.31 km
		Railway Line	5.663 km
		Road Network	205.078 km
		Population	55907
		Household	10964
Meteorological Drought	Medium - Extreme	Settlements	81
		Agriculture Area	121.299 sq km
		Bare Area with sparse Natural Vegetation	1.664 sq km
		Forest Area	0.821 sq km
		Natural Vegetation in Wet Areas	7.415 sq km
		Range Land	6.389 sq km
		Water Body	0.103 sq km
		Wet Area	7.825 sq km
		Population	46382
		Household	9092
Agricultural Drought	Low - High	Settlements	2
		Agriculture Area	11.783 sq km
		Forest Area	0.017 sq km
		Natural Vegetation in Wet Areas	8.759 sq km
		Range Land	1.21 sq km
		Water Body	0.011 sq km
		Wet Area	1.057 sq km
		Population	3664
		Household	716
Heatwave	Low - Extreme	Settlements	80
		Population	45991
		Household	9014
		Agriculture Area	120.695 sq km



		Kachcha Area	0.288 sq km
		Pakka Planned Area	0.252 sq km
		Pakka Unplanned Area	2.748 sq km
Cyclone	Low	Agriculture Area	5.268 sq km
		Pakka Unplanned Area	0.086 sq km
		Education Facilities	3
		Settlements	7
		Irrigation and Drainage Network	1.457 km
		Road Network	5.726 km
		Population	1421
		Household	278
Riverine Flood	Low - Extreme	Agriculture Area	5.631 sq km
		Forest Area	0.013 sq km
		Kachcha Area	0.197 sq km
		Natural Vegetation in Wet Areas	7.254 sq km
		Range Land	0.0019 sq km
		Education Facilities	1
		Settlements	3
		Population	3584
		Household	699
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>SH.BHIRKIO</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	100.331 sq km
		Forest Area	0.014 sq km
		Kachcha Area	0.275 sq km
		Natural Vegetation in Wet Areas	0.003 sq km
		Pakka Planned Area	0.533 sq km
		Pakka Unplanned Area	2.92 sq km
		Range Land	0.144 sq km
		Bridges	2
		Bus Stops	1
		Education Facilities	63
		Health Facilities	1
		Industries	2
		Mobile Towers	3
		Petrol Pumps	2
		Police Stations	1

		Power Plants	1
		Settlements	89
		Irrigation and Drainage Network	26.305 km
		Road Network	163.055 km
		Population	53737
		Household	10560
Meteorological Drought	Medium - Extreme	Settlements	89
		Agriculture Area	100.495 sq km
		Forest Area	0.101 sq km
		Natural Vegetation in Wet Areas	0.27 sq km
		Range Land	3.462 sq km
		Wet Area	1.333 sq km
		Population	44439
		Household	8737
Agricultural Drought	Low	Settlements	1
		Agriculture Area	27.114 sq km
		Natural Vegetation in Wet Areas	0.328 sq km
		Range Land	1.25 sq km
		Wet Area	0.009 sq km
		Population	317
		Household	61
Heatwave	Low - Extreme	Settlements	84
		Population	44124
		Household	8673
		Agriculture Area	100.267 sq km
		Kachcha Area	0.276 sq km
		Pakka Planned Area	0.532 sq km
		Pakka Unplanned Area	2.929 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for cyclone	

T.M.KHAN 1			
Hazard Type	Risk	Elements at Risk	
<b>Earthquake</b>	Low	Agriculture Area	8.272 sq km
		Forest Area	0.009 sq km
		Natural Vegetation in Wet Areas	0.021 sq km

		Pakka Planned Area	0.339 sq km
		Pakka Unplanned Area	1.008 sq km
		Range Land	0.004 sq km
		Bridges	2
		Education Facilities	29
		Health Facilities	2
		Mobile Towers	3
		Petrol Pumps	4
		Settlements	18
		Irrigation and Drainage Network	5.752 km
		Railway Line	0.44 km
		Road Network	26.721 km
		Population	34195
		Household	6874
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	18
		Agriculture Area	8.306 sq km
		Forest Area	0.041 sq km
		Natural Vegetation in Wet Areas	1.022 sq km
		Range Land	0.033 sq km
		Water Body	0.02 sq km
		Wet Area	0.177 sq km
		Population	28148
		Household	5656
<b>Heatwave</b>	Low - Extreme	Settlements	17
		Population	28038
		Household	5636
		Agriculture Area	8.261 sq km
		Pakka Planned Area	0.339 sq km
		Pakka Unplanned Area	1.007 sq km
<b>Tsunami</b>	Nil	The UC falls out of vulnerable zone for Tsunami	
<b>Storm Surge</b>	Nil	The UC falls out of vulnerable zone for Storm Surge	
<b>Riverine Flood</b>	Nil	The UC falls out of vulnerable zone for Riverine Flood	
<b>Cyclone</b>	Nil	The UC falls out of vulnerable zone for cyclone	
<b>Agriculture Drought</b>	Nil	The UC falls out of vulnerable zone for Agriculture Drought	

T.M.KHAN 2			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	8.802 sq km
		Pakka Unplanned Area	0.292 sq km
		Range Land	0.006 sq km
		Education Facilities	5
		Settlements	11
		Irrigation and Drainage Network	4.314 km
		Railway Line	4.119 km
		Road Network	12.438 km
		Population	4825
		Household	949
Meteorological Drought	Medium - Extreme	Settlements	11
		Agriculture Area	8.832 sq km
		Range Land	0.172 sq km
		Wet Area	2.44 sq km
		Population	3997
		Household	786
Agricultural Drought	Low	Agriculture Area	0.228 sq km
		Wet Area	0.002 sq km
Heatwave	Low - Extreme	Settlements	11
		Population	3959
		Household	779
		Agriculture Area	8.779 sq km
		Pakka Unplanned Area	0.292 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for cyclone	

T.M.KHAN 3			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	15.299 sq km
		Kachcha Area	0.175 sq km
		Pakka Planned Area	0.742 sq km
		Pakka Unplanned Area	0.492 sq km
		Range Land	0.019 sq km

		Bridges	2
		Bus Stops	1
		Education Facilities	8
		Health Facilities	1
		Industries	4
		Petrol Pumps	6
		Settlements	16
		Irrigation and Drainage Network	8.283 km
		Railway Line	0.923 km
		Road Network	28.222 km
		Population	9881
		Household	1963
Meteorological Drought	Medium - Extreme	Settlements	16
		Agriculture Area	15.329 sq km
		Range Land	0.21 sq km
		Wet Area	0.551 sq km
		Population	8183
		Household	1625
Agricultural Drought	Low	Agriculture Area	1.102 sq km
		Range Land	0.21 sq km
		Wet Area	0 sq km
		Population	129
		Household	25
Heatwave	Low - Extreme	Settlements	16
		Population	8131
		Household	1613
		Agriculture Area	15.281 sq km
		Kachcha Area	0.176 sq km
		Pakka Planned Area	0.743 sq km
		Pakka Unplanned Area	0.494 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for cyclone	

TANDO GHULAM HYDER			
Hazard Type	Risk	Elements at Risk	
<b>Earthquake</b>	Low	Agriculture Area	170.666 sq km

		Kachcha Area	0.072 sq km
		Pakka Unplanned Area	4.842 sq km
		Range Land	0.15 sq km
		Bridges	2
		Bus Stops	1
		Education Facilities	74
		Health Facilities	1
		Mobile Towers	4
		Petrol Pumps	2
		Police Stations	1
		Settlements	224
		Irrigation and Drainage Network	70.661 km
		Railway Line	15.199 km
		Road Network	257.722 km
		Population	94759
		Household	17530
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	224
		Agriculture Area	171.392 sq km
		Range Land	2.138 sq km
		Water Body	15.649 sq km
		Wet Area	4.252 sq km
		Population	79000
		Household	14618
<b>Agricultural Drought</b>	Low	Settlements	4
		Agriculture Area	7.607 sq km
		Range Land	1.611 sq km
		Water Body	10.238 sq km
		Wet Area	0.01 sq km
		Population	1538
		Household	288
<b>Heatwave</b>	Low - Extreme	Settlements	219
		Population	78183
		Household	14461
		Agriculture Area	170.41 sq km
		Kachcha Area	0.072 sq km
		Pakka Unplanned Area	4.855 sq km
<b>Cyclone</b>	Low	Agriculture Area	170.512 sq km
		Kachcha Area	0.072 sq km
		Pakka Unplanned Area	1.17 sq km
		Range Land	0.088 sq km
		Bridges	2

		Bus Stops	1
		Education Facilities	50
		Health Facilities	1
		Mobile Towers	4
		Petrol Pumps	2
		Settlements	224
		Irrigation and Drainage Network	65.664 km
		Railway Line	13.676 km
		Road Network	228.038 km
		Population	18770
Household	3522		
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

TANDO SAIN DAD			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	70.033 sq km
		Forest Area	0.002 sq km
		Kachcha Area	0.053 sq km
		Natural Vegetation in Wet Areas	0.063 sq km
		Pakka Planned Area	1.892 sq km
		Pakka Unplanned Area	3.294 sq km
		Range Land	0.053 sq km
		Ambulance Services	1
		Bridges	6
		Bus Stops	3
		Education Facilities	88
		Grid Stations	1
		Health Facilities	14
		Mobile Towers	4
		Petrol Pumps	9
		Police Stations	2
		Post Offices	1
		Settlements	76
		Irrigation and Drainage Network	19.503 km
		Railway Line	3.501 km
		Road Network	132.277 km
		Population	112808
		Household	22482

Meteorological Drought	Medium - Extreme	Settlements	76
		Agriculture Area	70.243 sq km
		Forest Area	0.036 sq km
		Natural Vegetation in Wet Areas	2.209 sq km
		Range Land	1.705 sq km
		Water Body	0.477 sq km
		Wet Area	1.338 sq km
		Population	93037
		Household	18546
Heatwave	Low - Extreme	Settlements	73
		Population	92660
		Household	18467
		Agriculture Area	69.939 sq km
		Kachcha Area	0.054 sq km
		Pakka Planned Area	1.893 sq km
		Pakka Unplanned Area	3.302 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for cyclone	
Agriculture Drought	Nil	The UC falls out of vulnerable zone for Agriculture Drought	



## **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

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## 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.

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## 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, de-silting of canals 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



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## **DISTRICT EMERGENCY OPERATION CENTER (DEOC)**

The PEOC established at PDMA HQ is connected with districts through DEOC. The DEOC is supposed to work as field 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.

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## **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**

## AGRICULTURE AND LIVESTOCK DEPARTMENT

### ***Pre-Disaster***

- Capacity building of department regarding disaster management and risk reduction and implementation of sector specific disaster risk reduction measures
- Provide recommendation on changing/rescheduling of cropping patterns with respect to changing climate and weather scenarios
- Create Community Seed Bank at Union Council level
- Provide livestock vaccination and de-worming
- Assessment of high prone areas and estimation of possible damage and needs for recovery regarding livestock, crops, irrigation facilities in case of any disaster
- Mass awareness regarding epidemics and diseases to livestock and crops
- Close coordination with PDMA and DDMA

### ***During-Disaster***

- Close and regular coordination with DDMA and PDMA
- Immediate transfer of current situation to DDMA and PDMA
- Vaccination of livestock

### ***Post-Disaster***

- Facilitation to institutions / NGOs/ INGOs which focus on rehabilitation activities as per guidelines provided by DDMA and PDMA
- Submit report on damages and needs to DDMA and PDMA
- Mass awareness regarding epidemics and diseases to livestock and crops
- Vaccination of livestock
- Upgrade Community Seed Bank (CSB)
- Timely compensation to affected farmers

- Prepare overall report of the department regarding intervention and disseminate to DDMA and PDMA

## **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 and flooding period
- 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 and flooding period
- 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 DDMA

### **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

### **IRRIGATION DEPARTMENT**

#### ***Pre-Disaster***

- Inspection and identification of vulnerable embankments
- Monitoring and dissemination of river water levels
- Implementation of SOPs defined by Bund Manual
- Ensure readiness of equipment and machinery before monsoon and flooding season
- Monitor and disseminate flood level information to DDMA and PDMA

- Initiate necessary embankments reinforcing interventions for vulnerable embankments
- Initiate interventions for river training where necessary
- Introduce and ensure water harvesting and modern water management interventions in likely drought affected areas
- Ensure safety and compactness of irrigation channels, canals, branches, etc. before start of monsoon season to avoid breaches in irrigation system during heavy rains
- Ensure removal of congestion from storm water and draining channels before monsoon

#### ***During-Disaster***

- Ensure 24/7 vigilance of vulnerable embankments
- Measure and report flood water inundation levels to DDMA and PDMA
- Ensure to drain/de-water from agriculture fields and its safe conveyance to minimize losses
- Coordinate with PDMA and DDMA during entire disaster event for execution of on-demand action plans

#### ***Post-Disaster***

- Conduct assessment of damages and needs and report to PDMA through DEOC
- Restore and repair damaged irrigation systems
- Prepare overall report of the department regarding intervention and disseminate to PDMA and DDMA

### **INFORMATION DEPARTMENT**

#### ***Pre-Disaster***

- Close coordination and liaison with PDMA and DDMA
- During monsoon, flooding season and forecastable hazards issuance of press releases regarding hazards and preparedness plans of the government
- 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***

- Monitoring of flood waters, river flows and sharing of information with PDMA
- 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, crops and livestock and settlement of applicable taxes accordingly in coordination with Industry, Agriculture and Irrigation departments

## ARMED FORCES

### *Pre-Disaster*

- Coordinate with the DDMA in the pre-disaster planning

- Prepare necessary equipment, labor, transportation and other materials for emergency interventions
- Provide training to soldiers and determine the role of soldiers who are stationed in flood prone areas
- 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
- Installation of temporary Bridges, Bunds

#### ***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 Tando Muhammad Khan district reveals that the district is prone to multiple natural disasters. The pertinent hazards to district are hydro-meteorological hazards including drought and riverine flood with the potential to cause urban flooding. The risk of geophysical hazards is low in the district. In modern technological era, hydro-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.

<b>Riverine Flood</b>	<ol style="list-style-type: none"><li>1. River Indus in Sindh can be segmented in three broad reaches Guddu to Hyderabad, Hyderabad to Kotri and Kotri to Arabian Sea. Additionally, during past years, road bridges have been built over river Indus at different location. Though such developments and interventions were essential to bring prosperity in the region, however, have embedded impacts on fluvial geomorphology and natural flood plain of the Indus. Further, extensive human interventions such as use of land for agriculture, road infrastructure, civil embankments, etc. are observed through satellite imagery within the existing flood plain. In such scenario, risk of breaches in flood protective embankments and consequential flooding of adjoining areas have been increased. To minimize this risk, it is essential to restore Indus flood plain in its natural form. This arrangement will significantly reduce riverine flood risk through adoption of ecosystem friendly disaster risk reduction. The arrangement will not only reduce disaster risk but restore and enrich biodiversity in Indus flood plain.</li><li>2. Though river Indus floodplain is bounded by flood protective embankment, but still some parts of district Tando Muhammad Khan adjoining river Indus are likely to be affected due to breaches in embankments of river Indus.</li><li>3. It is highly recommended to identify and reinforce sections of vulnerable embankments before flooding season to avoid breaches in embankments and consequential damages.</li><li>4. As far as Riverine Flood are concerned, the Sindh province has sufficient time for preparation and reaction. Close monitoring of river discharge</li></ol>
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	<p>level in coordination with irrigation department, the government of Punjab, Federal Flood Commission and Pakistan Meteorological Department (PMD) be conducted.</p> <ol style="list-style-type: none"> <li>Timely alerts be issued to people living in low lying areas within flood plain.</li> <li>In case of high anticipated flows evacuation of people and livestock be carried out.</li> <li>Soaking and compacting of embankments before arrival of flood water.</li> <li>Reinforcement and stone pitching of high-risk embankments.</li> <li>Use alternative eco-friendly options like use of bamboo wood etc. to minimize erosion impact on high-risk embankments.</li> <li>Where necessary and possible, erection of guide embankments and spur before arrival of high flood water.</li> <li>24/7 vigilance of high-risk embankments by Sindh Irrigation Department.</li> <li>Readily availability of breach filling stock and machinery at high risk embankments.</li> <li>Restoration of natural eco-system within flood plain such as revival of braided/Yazoo channels and natural lakes within flood plain to disperse and distribute flood water across the plain.</li> <li>Removal of possible congestion factors within the flood plain.</li> <li>Public participation comprising local people be encouraged in pre and during flood periods.</li> </ol>
<b>Earthquake</b>	<ol style="list-style-type: none"> <li>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 Tando Muhammad Khan falls away from any major fault line and is unlikely to be affected by a massive earthquake.</li> <li>Some of prominent faults situated in Sindh are (a) Karachi-Jati, (b)</li> </ol>

	<p>Surjan-Jhimpir, (c) Pab Fault (d) Hub Fault and (e) Allah Bund-Rann of Kutch faults.</p> <ol style="list-style-type: none"> <li>3. Though risk of geophysical hazards in Tando Muhammad Khan district is low but still some actions must be taken to avoid losses in case of minor jolts. 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.</li> <li>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 Tando Muhammad Khan district is situated.</li> <li>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.</li> </ol>
<b>Heatwave</b>	<ol style="list-style-type: none"> <li>1. The district has witnessed rapidly increased severity of heatwave in the past five years. The district is moderately populated, which significantly increases the chances of heatwave impacts.</li> <li>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.</li> <li>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.</li> <li>4. Additionally, introduction of reduced Urban Heat Islands (UHI) through policies and implementation in infrastructure development will significantly reduce impacts of heatwaves.</li> </ol>
<b>Drought</b>	<ol style="list-style-type: none"> <li>1. Tando Muhammad Khan is a moderately populated district with closely</li> </ol>

	<p>spaced homes in major cities. Climatic condition of the district can be categorized as Hot and Semi-Arid (Climate Classification of Pakistan (Khan et al., 2010). Average annual rainfall received during a year across the district is 137.62mm. Agriculture is practiced in the district which is mainly dependent on canal irrigation.</p> <ol style="list-style-type: none"> <li>2. Drought is also forecastable hazard and can be predicted well in advance. Though drought does not bring any prominent or famine like conditions in the district, however, it causes reduction in agricultural production and some extent disturb food supply for the animals and livestock. The best practice to manage drought related impacts is storage of food supplies for both humans and animals.</li> <li>3. The situation of drought may vary in future due to climate change effects, therefore, introduction of drought resilient crops is need of the time. Additionally, efficient use of available water resources and introduction of efficient irrigation systems in agriculture sector is also required.</li> </ol>
<b>Cyclone</b>	<ol style="list-style-type: none"> <li>1. The cyclone hazard threat to district Tando Muhammad Khan is Cat-1 TC. However, 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.</li> <li>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.</li> </ol>
<b>Tsunami</b>	According to MHVRA Study 2022, there is no Tsunami Hazard in TMK district.

## STANDARD OPERATING PROCEDURES

## INTRODUCTION

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

## ACTION PLAN FOR FLOOD

The monsoon and flooding period is well defined and occur almost every year with different intensities and cause losses at different scales. The recommended action plan for monsoon and flooding is tabulated below:

**Table 5: Action Plan for Flood Hazard Management**

Action	Timelines	Responsibility
Letter to irrigation department for identification of vulnerable embankments and disaster mitigation measures	April-May	PDMA
Inspection, maintenance and ensure readiness of flood fighting equipment available with PDMA	May-June	PDMA
Inspection, maintenance and ensure readiness of flood fighting equipment available with line departments	May-June	Local Government, Irrigation, and other relevant functionaries
Letter to concerned departments for removal of congestions in water ways	May-June	PDMA
Conduct pre monsoon meetings/conference with concerned departments	June-July	PDMA



Organization and conduct of pre monsoon meetings headed by DDMA and chalking out of monsoon contingency and action plans	June-July	PDMA to write letter to concerned departments and organize such meetings through online or other feasible mechanism
Interaction and close liaison with Pakistan MD on weather forecast	June-July	PDMA
Dissemination of severe weather alerts to concerned DDMA and likely population to be affected	Based on forecast	PDMA
Daily monitoring of discharge data and flood inundation levels	During flooding	Sindh Irrigation Department
Deployment of man and material resources and soaking, inspection and monitoring of flood protecting infrastructure	Pre and during flooding	Sindh Irrigation Department

## ACTION PLAN FOR FORECASTABLE DISASTERS

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

**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	Based on forecast	PDMA

concerned DDMA and local community		
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

**Table 8: 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	Before forecasted landfall	PDMA and DDMA

be affected to safe places		
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

## ACTION PLAN FOR UNFORECASTABLE HAZARDS

### Earthquake

The earthquake is unforecastable hazard and does not provide reaction time to prevent damages. The recommended post disaster action plan are as follows

**Table 9: Action Plan for Earthquake 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 Tando Muhammad Khan 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 (3)	Janhan soomro, Mullan Katiar, Saeedpur
UCs not at Risk (14)	Allah Yar Turk, Bulri Shah Karim, Ghulam Shah Bagrani, Kario, Lakhat, Nazar Pur, Pharkara, Saeed Matto, Sh.Bhirkio, T.M.Khan 1, T.M.Khan 2, T.M.Khan 3, Tando Ghulam Hyder ,Tando Sain Dad
General Description	<ol style="list-style-type: none"> <li>1. District Tando Muhammad Khan has a well-established irrigation system. The names of main canals and branches are Phulili canal, Akram wah, Ginyari canal and Guni wah.</li> <li>2. The geographical location of this district makes it vulnerable to water inundation. It was hit by 2010 and 2011 floods. The relative severity of floods was ranked as medium in the district.</li> <li>3. In 2011 flood 2,835 villages/settlements of 16 union councils in 3 talukas were affected. A population of 585,411 persons was affected and there were 17 casualties and 24 injuries.</li> <li>4. The severity of flood 2012 was less as compared to the flood 2011. Nonetheless, a significant portion of crop area was damaged. One person died while another got injured in the 2012 flood.</li> <li>5. According to MHVRA study 2022, Flood hazard in the district is of intensity “Low to Very High”.</li> <li>6. According to MHVRA study 2022, Flood risk in the district is “Low to Extreme”.</li> </ol>
Disaster Management Measures	
Preparedness	
<ol style="list-style-type: none"> <li>1. Recording of daily river discharge at barrages in Sindh, and regular dissemination among stakeholders.</li> <li>2. In case of high discharge, dissemination of warnings and alerts to masses living in flood plain.</li> <li>3. Identification and inspection of vulnerable embankments likely to be affected due to flooding during pre-monsoon season, as per “Bund Manual” of irrigation department.</li> <li>4. Inspection and readiness of flood fighting equipment available with district government departments prior to flooding season.</li> <li>5. Classify and map bunds based on their origin (Mud, Brick, Stone, Concrete, Boulder, etc.)</li> <li>6. Readiness of flood camps in high riverine flood and breaching risk areas.</li> <li>7. Maintenance and strengthening of identified weak embankments.</li> <li>8. Awareness and motivation campaigns on construction of flood resilient buildings and infrastructures.</li> <li>9. Regular awareness campaigns on flood precautions and safe evacuations using various media platform.</li> <li>10. Inclusion and implementation of Disaster Risk Reduction (DRR) measures in development projects at planning stage for building flood resilient infrastructure.</li> <li>11. Conduct of satellite imagery based study for identification of vulnerable embankments before each</li> </ol>	

<p>monsoon and flooding period.</p> <p>12. Collection and management of contact information of area/village influential for alert and warning dissemination.</p> <p>13. Readiness of community-based volunteers and other related organizations / NGOs.</p> <p>14. Regular community-based flood fighting trainings through government departments or any other appropriate platforms.</p> <p>15. Installation of digital flood level gauges along embankments and dissemination of real-time flow level measurements to concerned authorities.</p> <p>16. Installation of surveillance cameras at safe places for consistent monitoring of structural integrity of vulnerable embankments.</p>
<b>Response</b>
<p>1. Mobilization of rescue services, relevant NGOs, scouts and volunteers.</p> <p>2. Evacuation of people and livestock to shelters/camps.</p> <p>3. Camp management as per standard practices.</p> <p>4. Relief distribution.</p> <p>5. Precautionary measures for communicable diseases.</p> <p>6. Activation of mobile health and education services for flood affectees.</p> <p>7. Arrangements for early recovery including flood de-watering and early restoration of communication and essential services.</p>
<b>Recovery and Rehabilitation</b>
<p>1. Damage assessment of flood affected areas.</p> <p>2. Conduct post flood repairs or refurbishment of embankments/barrages/canals</p> <p>3. Resettlement of population on build back better basis.</p> <p>4. Complete restoration of communication and essential services.</p>



Earthquake	
UCs at Risk	All UCs
General Description	<ol style="list-style-type: none"> <li>1. Geology of Tando Muhammad Khan district is very simple where the Holocene fine sediments cover the surface and Indus River flows on the western margin of the basin.</li> <li>2. District Tando Muhammad Khan falls away from any major fault line and is less likely to be affected by a massive earthquake.</li> <li>3. In the last hundred years, only one Earthquake of magnitude 6 Mw was reported in the area, whereas, couple of earthquake of magnitudes 4 and 5 were also recorded in the area.</li> <li>4. There is no recorded historical data available of the damages in the district due to previous earthquakes.</li> <li>5. Over the last sixty years, earthquakes of intensity lower than 5 on Richter Scale, including those in 1945 and 1985, have struck the region comprising the macro-environment and thus far they have been of minor significance.</li> <li>6. According to MHVRA study 2022, Earthquake hazard in the district is of intensity "Low".</li> <li>7. According to MHVRA study 2022, Earthquake risk in the district is "Low".</li> </ol>
Disaster Management Measures	
Preparedness	
<ol style="list-style-type: none"> <li>1. Identifying and inventorying weak buildings and structures especially in urban settings of the district and situation demanding action by concerned departments.</li> <li>2. Preparation of landuse plans, town plans and implementation of building codes in new residential schemes, schools, public and private offices.</li> <li>3. Implementation of DRR measures in public infrastructure development schemes.</li> <li>4. Establishment of search and rescue infrastructure and services which can be mobilized as first responder in post-earthquake situation.</li> <li>5. Mobilize NGOs, INGOs, community development organizations and volunteers, and conduct earthquake safety awareness campaigns and drills especially in main urban settings.</li> <li>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.</li> <li>7. Availability of alternative communication system in case if usual communication means are disturbed by earthquake.</li> <li>8. Preparation of medical emergency plan to manage mass casualties in case of any major earthquake event.</li> </ol>	
Response	
<ol style="list-style-type: none"> <li>1. Obtain firsthand information on intensity of earthquake and damages; prioritize areas for search and rescue operation.</li> <li>2. Mobilize community-based volunteers, scouts and other trained personnel to hard hit areas to assess situation and help victims.</li> <li>3. Establish emergency camps / shelters with necessary life support facilities.</li> <li>4. Establish medical camps for provision of first aid and possible medical assistance to injured.</li> <li>5. Evacuate people from damaged houses to safe places and shelters.</li> <li>6. Provide security in affected areas and maintain law and order situation to prevent incidents of thefts</li> </ol>	

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 build back better principle.

Heatwave	
UCs at Risk	All UCs
General Description	<ol style="list-style-type: none"> <li>1. Climatic condition of the district can be categorized as Hot and Semi-Arid (Climate Classification of Pakistan (Khan et al., 2010))</li> <li>2. The summer months - April, May and June - are very hot during the day. The mean minimum and maximum temperatures during this period are 27°C and 42°C, respectively.</li> <li>3. The climate is moderated by the west and south air breeze, which blows for eight months from March to October, making the hot weather tolerable.</li> <li>4. December and January are the coldest months with maximum and minimum temperatures of 27°C and 11°C, respectively.</li> <li>5. In April, 2016 searing heatwave, brought a sharp increase in diarrhea and sunstroke patients of Tando Muhammad Khan district.</li> <li>6. According to MHVRA study 2022, heatwave hazard in the district is of “<b>Extreme</b>” intensity.</li> <li>7. According to MHVRA study 2022, risk of heatwave in the district is of “<b>Low to Extreme</b>” intensity.</li> </ol>
Disaster Management Measures	
Preparedness	
<ol style="list-style-type: none"> <li>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.</li> <li>2. Monitoring for hot weather alerts through local and international sources and issuance of timely Hot Day Advisories, and Hot Day Warnings.</li> <li>3. Upgradation of major public health care facilities with necessary equipment and medicines to treat heatstroke patients.</li> <li>4. Heatstroke awareness campaigns and wide public coverage through media, social media, SMS, NGOs and social welfare organizations.</li> <li>5. Arrangements for uninterrupted supply of electricity and water in vulnerable areas.</li> </ol>	
Response	
<ol style="list-style-type: none"> <li>1. Mobilization of NGOs, social welfare organization and volunteers for arranging heatstroke facilitation camps and distribution of fresh drinking water in affected areas.</li> <li>2. Local radio FM broadcasts to disseminate heatstroke safety and precautions.</li> <li>3. Mobilize mobile medical teams for first-aid and other medical emergency support in affected area.</li> <li>4. Record keeping of heatwave patients and fatalities.</li> </ol>	
Recovery and Rehabilitation	
<ol style="list-style-type: none"> <li>1. Post event review of heatwave plan and modifications if required.</li> </ol>	

Cyclone	
UCs at Risk (12)	Allah Yar Turk, Bulri shah Karim, Ghulam shah Bagrani, Janhan soomro, Kario, Lakhat, Mullan katiar, Nazar Pur, Pharkara, Saeed Matto, Saeedpur, Tando Ghulam Hyder
UCs not at Risk (5)	Sh.Bhirkio, T.M.Khan 1, T.M.Khan 2, T.M.Khan 3, Tando Sain Dad
General Description	<ol style="list-style-type: none"> <li>1. Cyclones in the Arabian sea form mostly from May till June and then from September till October, monsoon season plays a vital role for the formation of cyclone in this basin.</li> <li>2. Tropical storms that hit Pakistan are mostly remnants by the time reach Pakistan or make landfall in south eastern Sindh which is not very much populated.</li> <li>3. Some of the major tropical cyclones 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.</li> <li>4. Very hot and dry weather with gusty winds continued for two days in Karachi, Hyderabad, Shaeed- Banzirabad, Badin, Mirpurkhas, Tando Muhammad Khan and Thatta districts due to tropical cyclone "TAUKTAE" in May-2021.</li> <li>5. According to MHVRA study 2022, cyclone hazard in the district is of <b>"Tropical Storm to Cat-1 TC"</b> intensity.</li> <li>6. According to MHVRA study 2022, risk of cyclone in the district is of <b>"Low"</b> intensity</li> </ol>
Disaster Management Measures	
Preparedness	
<ol style="list-style-type: none"> <li>1. Identify community based DRR measures and inclusion of disaster prone communities in disaster risk management.</li> <li>2. Establishment of multipurpose permanent shelters with all life support facilities to facilitate safe evacuation of people and livestock.</li> <li>3. DRR mainstreaming in development planning.</li> <li>4. Strengthening of cyclone detection, forecasting and warning dissemination centers.</li> <li>5. Launching a series of public awareness campaign throughout the coastal area by various means including Radio, TV and other media.</li> <li>6. Training of local administration in warning dissemination and evacuation techniques.</li> <li>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.</li> <li>8. Review/Update emergency response plans and disaster recovery plans.</li> <li>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.</li> <li>10. Design, practice and implementation of evacuation plans with emphasis on self-reliance.</li> <li>11. Cleaning of water channel, drainage and sewerage before cyclone season in Arabian Sea.</li> <li>12. Readiness of de-watering machines before start of monsoon and cyclone season.</li> <li>13. Ensure availability of real-time cyclone hazard map depicting the probable track and landfall impact on PDMA website</li> </ol>	

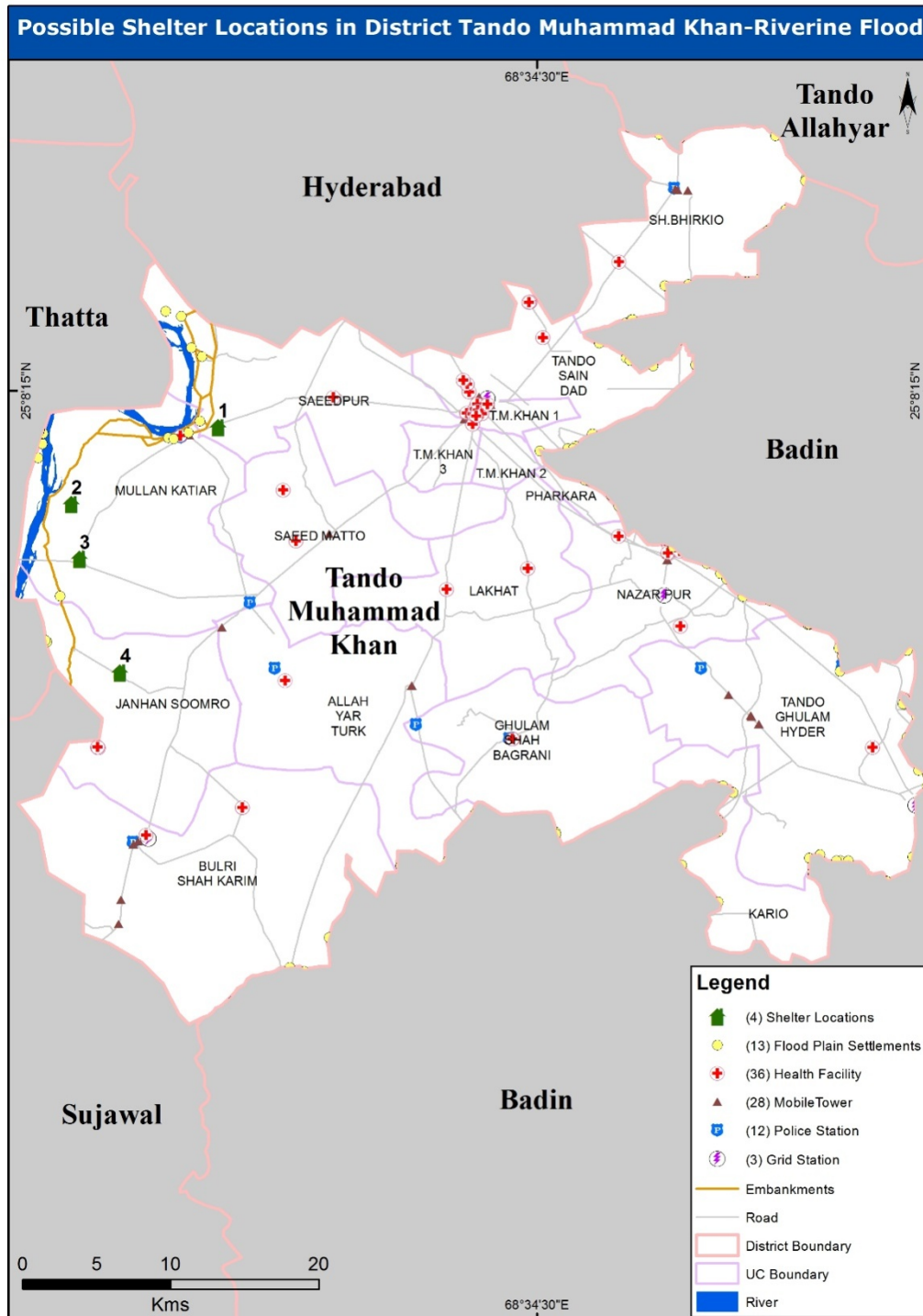
Response	
<ol style="list-style-type: none"> <li>1. Issue early reliable warning through siren or other relevant means to reduce the severity of the cyclone related disasters and save valuable human lives.</li> <li>2. Establish communications with isolated fishermen / coastal communities for furnishing cyclone early warning.</li> <li>3. Identify, involve and mobilize local NGOs which can assist in community awareness and mobilization for response.</li> <li>4. Identify and mobilize volunteers' / volunteer organizations which can assist various facets of response like provision of emergency healthcare and relief items.</li> <li>5. Initiate preliminary damage assessment and run search and rescue operations.</li> <li>6. Provision of immediate relief including provision of food and potable water to affectees.</li> <li>7. Deployment of emergency medical support.</li> <li>8. Provide emergency health care to the affected population, in order to cover risk of spread of epidemic diseases like acute watery diarrhea, typhoid fever, malaria and measles, relapsing of fever and acute respiratory illness.</li> </ol>	
Recovery and Rehabilitation	
<ol style="list-style-type: none"> <li>1. Assess damage to buildings across the impacted areas to gather information about the extent and severity of damage.</li> <li>2. Rehabilitation on build back better principle.</li> </ol>	

Tsunami	
UCs at Risk	Nil
General Description	According to MHVRA Study 2022, there is no risk of Tsunami in Tando Muhammad Khan district.

Drought	
UCs at Risk	All UCs
General Description	<ol style="list-style-type: none"> <li>1. Like other districts in Sindh, majority of the economy of Tando Muhammad Khan is based on agriculture and pastoral farming but it also has a well-established industrial base.</li> <li>2. Climatic condition of the district can be categorized as Hot and Semi-Arid (Climate Classification of Pakistan (Khan et al., 2010))</li> <li>3. Rainfall is meager, average annual rainfall received during a year across the district is 137.62 mm.</li> <li>4. Agricultural water needs are dependent upon canal irrigation system, besides, water from wells and tube-wells are also being used.</li> <li>5. 2004-05, 2014-15 and 2018-19 were the drought years in Tando Muhammad Khan of mild to moderate intensities.</li> <li>6. According to MHVRA study 2022. <ol style="list-style-type: none"> <li>a. Meteorological drought hazard for district Tando Muhammad Khan is “<b>Extreme</b>”</li> <li>b. Meteorological drought risk for district Tando Muhammad Khan is “<b>Medium to Extreme</b>”</li> <li>c. Agricultural drought hazard for district Tando Muhammad Khan is “<b>Mild to Severe</b>”</li> <li>d. Agricultural drought risk for district Tando Muhammad Khan is “<b>Low to High</b>”</li> </ol> </li> </ol>
Disaster Management Measures	
Preparedness	
<ol style="list-style-type: none"> <li>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.</li> <li>2. Implementation of water supply and demand management and encouragement of efficient irrigation systems in agriculture.</li> <li>3. Research and promote drought resistant agriculture crops.</li> <li>4. Resilience and improvement of adaptive capacity of farmers.</li> <li>5. Monitoring of temperature, precipitation, potential evapotranspiration, soil moisture, stream flow, groundwater levels, lakes, and reservoirs for drought forecasting.</li> <li>6. Control ground water extraction from upper and lower aquifers to be within the sustainable yield limits.</li> </ol>	
Response	
<ol style="list-style-type: none"> <li>1. Assess data about the nature of drought conditions and their impact.</li> <li>2. Provision and installation of solar water pumps for availability of clean drinking water.</li> <li>3. Public information campaign for water management and saving.</li> </ol>	
Recovery and Rehabilitation	
<ol style="list-style-type: none"> <li>1. Cash and in-kind support to farmers for next cropping.</li> <li>2. Awareness and encouragement of farmers on best irrigation practices and water saving.</li> </ol>	

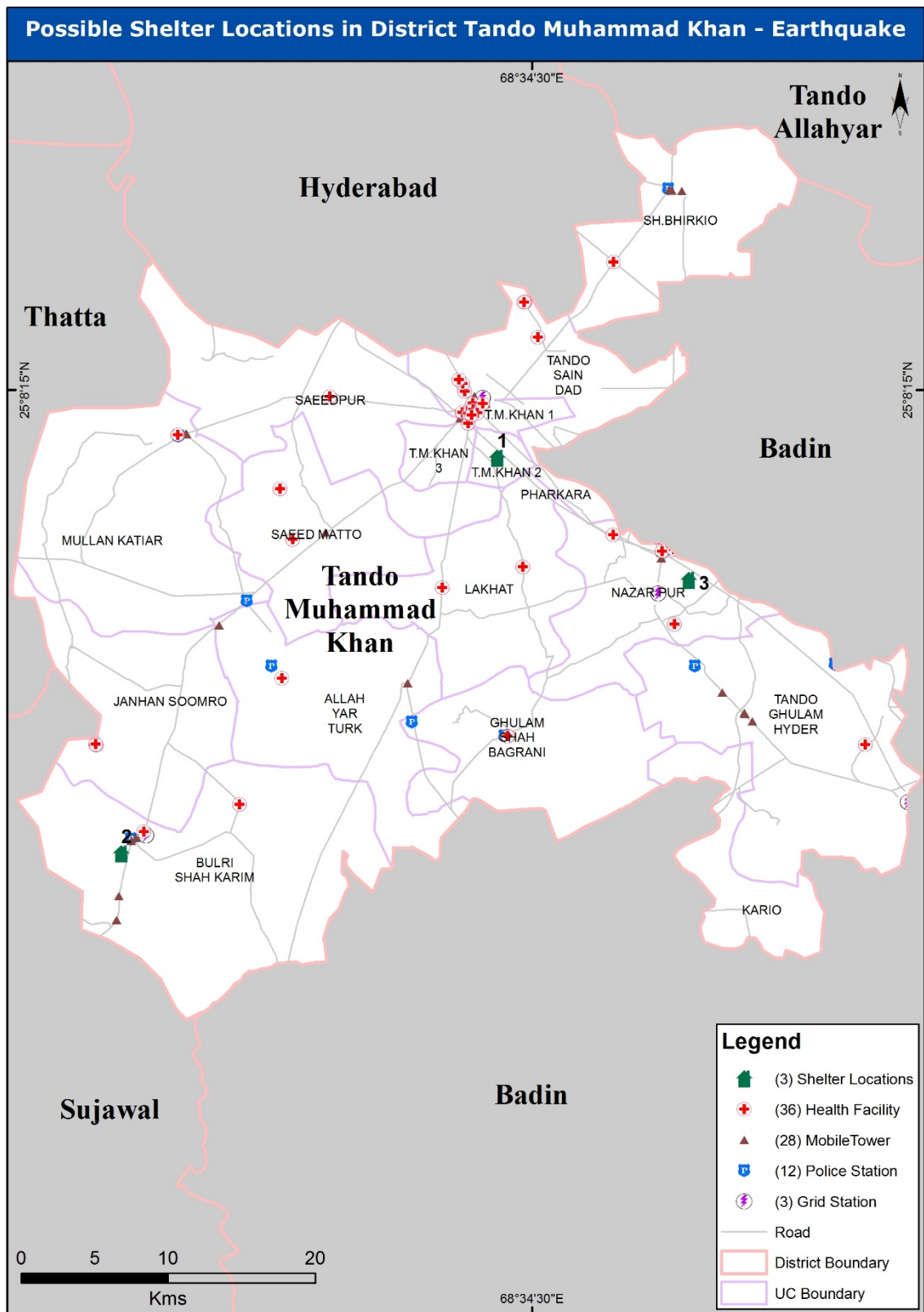
## SHELTER LOCATION MAP

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.



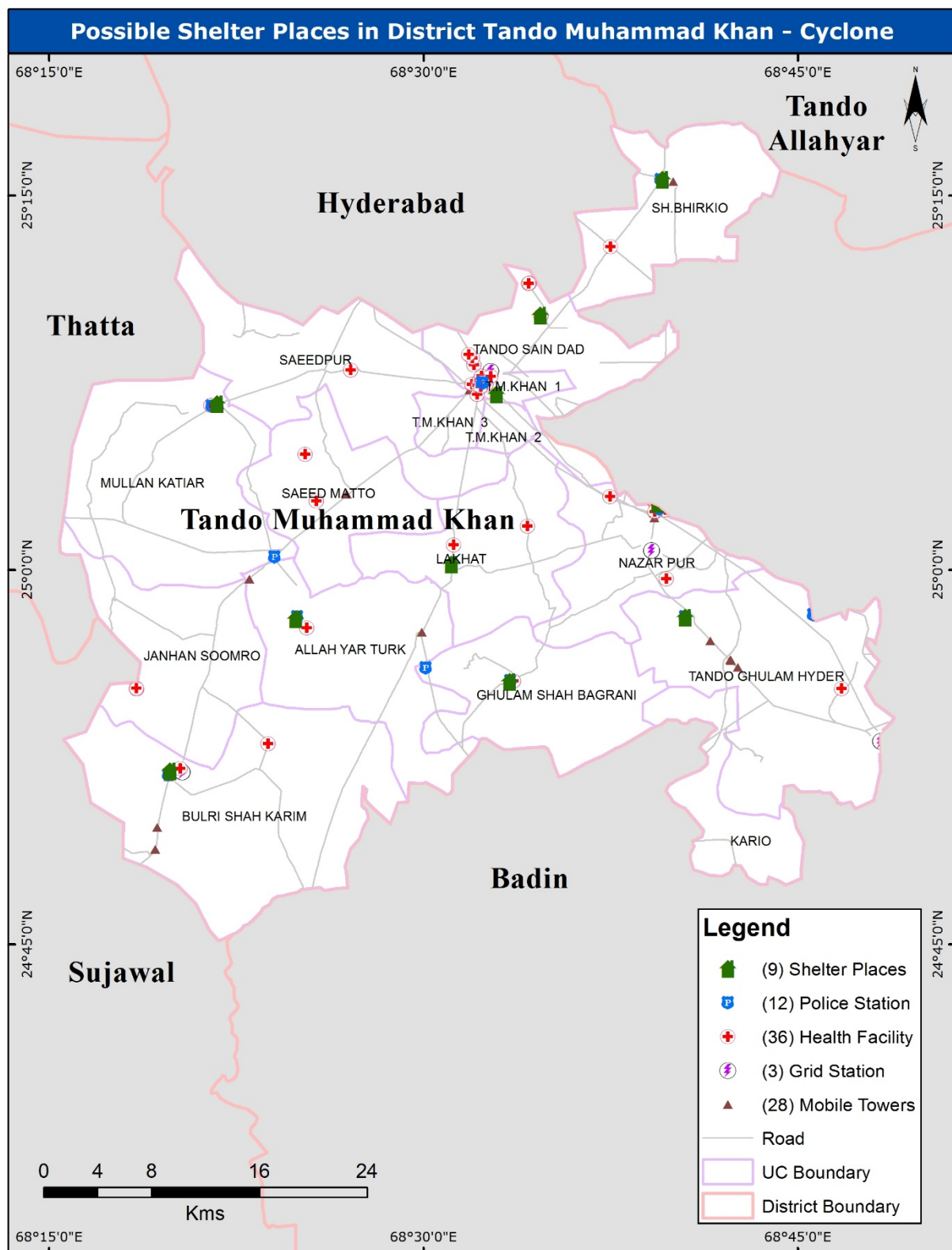
\* Annex-A details the list of vulnerable settlements within flood plains prone to riverine flooding

\* Annex-B details the list of flood shelter locations



\*Annex-C 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 Tando Muhammad Khan. 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
<b>Riverine Flood</b>	
1. Geomorphological study of flood plain & river course modelling	Conduct flood plain study for identification of bottlenecks, including elevated islands ( <b>Annex – D</b> ) impeding the flow of (super) flood water, and Indus River course modeling (historic and predictive) for simulating catchment processes and river flow, etc.
2. Installation of river/flood flow digital gauges at suitable locations for real time monitoring of water level, water discharge rates, wave height and flow speed.	Digital water gauges may be installed to collect water flow characteristics. Digital water gauge is an electronic device, which uses an advance processor chip as a controller, records the water flow characteristics through measuring electrodes and transmit it using wired/wireless communication channel after digital processing.
3. Monitoring of vulnerable bunds using IP Camera systems and Drones for surveillance during floods.	Image camera sensors and drones have relatively low procurement cost, portability, high efficiency, durability, maintenance and power consumption. Camera networks can effectively be used at remote 'Landhis' for real-time monitoring of flood level.
4. Capacity building of vulnerable communities	Create Community based disaster risk management (CBDRM) associations and equip them with training and equipment for early response, including rope rescue, sand bags, bamboo and others.
5. Develop emergency operation center.	Establish and equip emergency operation center with modern tools and techniques for management and operation activities in pre, during and post disaster events.
6. Establish a database of resources and equipment for emergency response in relevant agencies.	Create a well-maintained data repository for all available resources with operational status, quantity, location, and maintenance authority in the district.
<b>Earthquake</b>	
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.
<b>Drought</b>	
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

	<p>for drinking, and irrigation purposes.</p> <p>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.)</p>
<b>Cyclone</b>	
1. Establishment of 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 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 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. 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.
5. 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 – TANDO MUHAMMAD KHAN DISTRICT

The existing nature of disasters in Tando Muhammad Khan district can be categorized as low to Extreme. The prominent hazards in the district is heatwave, drought and flood. The meteorological drought risk in the district ranges from medium to extreme while agricultural drought is from low to high. There is no risk of storm surge, and tsunami in the district. The risk of earthquake is determined to be low. The cyclone risk in the district is determined to be low. As far as Heatwave is concerned Tando Muhammad Khan district is at low to extreme risk. As far as riverine flood is concerned the settled areas of UCs in the district are likely to be effected in breaching scenario of flood protection embankments of river Indus. As far as population living within the flood plain is concerned, they are well aware of flood risk and live on their own risk, therefore, government functionary is recommended to be mobilized for dissemination of warnings and alerts to population, safe evacuation and providing temporary shelters. 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 10: Cost Benefit Analysis of Disaster Risk Measures in District Tando Muhammad Khan**

S. no.	Soft resilience (Behavioral DRR)	Cost	Benefit
1.	Identification and management of shelters	Identification and management of shelter spaces is a cost-effective way to ensure rapid, and effective management of population in times of crisis. Government schools can serve as ideal cost-effective shelter spaces in district Tando Muhammad Khan, as these can accommodate large number of people. Gradually, permanent shelters can be established in future to avoid use of educational facilities.	Shelter places are highly beneficial at times of disaster as it offers a unified accommodation place for affected people. Shelter place also helps administration in effective management of affectees and provide them with required relief. Shelters serve as centralized facilities where government can concentrate relief efforts including distribution of relief goods and essential food supplies to affected people. Shelter spaces keep people off the highways during and after disaster. Shelters are often the only safe haven for those without the financial means to take other protective measures.
2.	Monitoring / Strengthening of flood protection embankments	Pre-emptive monitoring activity to check the wellness and structural integrity of flood protection embankments before the onset of monsoon season. This would allow identification of embankments that are in need of repairs and would help identify areas where new embankments are required. Following this activity, assets can be mobilized to enhance the flood protection embankments prior to the occurrence of high flow in rivers.	Timely identification of weak embankments and repairs would prevent flood water from breaching the river floodplains and thereby save millions of acres of crop land, settlements and infrastructure from inundation, possibly saving life and property. This would also reduce the burden on emergency services during hazard and the government can concentrate efforts on severely affected areas. Less damage to communication lines including roads and power lines would improve disaster response and outreach. This would also result in reduced number of internally displaced people (IDPs).
3.	Early warning system for heatwave	Dissemination of forecast of heatwaves from the meteorological department through public radio announcements, print and digital media increases the preparedness of local populace against the impending hazard.	Early warnings give people time to prepare in advance and postpone activities after daytime. Local authorities would get ample time to establish relief centers with provisions of shade and hydration. Hospitals would be prepared to receive more patients than usual. An overall reduction in emergency cases would reflect in less mortality and more savings in medical expenditure.

4.	Awareness campaigns	Public private partnership and use of electronic/print media for raising public awareness is a cost-effective approach to build society resilience and improved disaster risk management capabilities of vulnerable communities.	Public awareness and public education for disaster reduction helps to reduce disaster risks. It mobilizes people through clear messages, supported with detailed information. People who know how to react in case of a disaster, community leaders who have learned to warn their people in time, and whole social layers who have been taught how to prepare themselves for natural hazards can contribute to better mitigation strategies and dissemination of information on the consequences of hazards. Education and knowledge can provide people with tools for vulnerability reduction and life-improving self-help strategies.
5.	Early warning for Riverine Flood	Enhanced communication between the upstream and local Irrigation department allows ample time for emptying reservoirs and increase flows to downstream areas in advance of the arrival of flood waters.	Early warning system and streamlined communication between the upstream and local irrigation department help lowers the adverse impacts of floods in the shape of reduced damage to crops, settlements and infrastructure. This all results in a positive socio-economic impact.
6.	Strengthening of mobile health care facilities	Setup of temporary health facilities reduce difficulty in patients' transportation to permanent hospital facilities. Mobile health care units are already available with government of Sindh, their mobilization to disaster management will ensure lifesaving.	Mobile health facilities play a very significant role in the mitigation of disaster because of their particular function in providing essential first aid. Ease of access to basic health facilities will reduce burden on hospitals.  The systematic organization and easy mobilization of the staff, equipment and medical supplies in a safe environment are crucial if disaster response is to be prompt and effective.



## ANNEX – A – VULNERABLE SETTLEMENTS PRONE TO RIVERINE FLOOD

### List of Vulnerable Settlements (13) within flood Plains Prone to Riverine Flood

S. No.	Name	Latitude	Longitude	Area (acres)
1	Goth Ghambir	25.105	68.275	3.305
2	Goth Wasi Malook Shah	25.159	68.371	55.444
3	Mulla Katiar	25.112	68.363	138.499
4	Untitled Settlement	24.985	68.277	1.580
5	Untitled Settlement	25.112	68.275	1.558
6	Untitled Settlement	25.013	68.285	8.538
7	Untitled Settlement	25.119	68.370	7.006
8	Untitled Settlement	25.164	68.365	6.455
9	Untitled Settlement	25.183	68.359	20.784
10	Untitled Settlement	25.186	68.350	22.678
11	Untitled Settlement	25.109	68.351	3.103
12	Untitled Settlement	25.108	68.354	8.463
13	Untitled Settlement	25.097	68.272	3.003

## ANNEX – B – SHELTER LOCATIONS DESCRIPTION – RIVERINE FLOOD

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

Shelter location	Co-ordinates	Area (acres)	Estimated Tents (numbers)	Avg. elevation (ft)
1	Upper right corner: 25° 6'59.61"N 68°23'5.29"E Upper left corner: 25° 6'52.59"N 68°22'38.82"E Lower right corner: 25° 6'52.07"N 68°23'5.67"E Lower left corner: 25° 6'48.60"N 68°22'42.84"E	35	~2000	53
2	Upper right corner: 25° 4'4.29"N 68°17'52.23"E Upper left corner: 25° 4'23.68"N 68°17'31.47"E Lower right corner: 25° 3'53.87"N 68°17'30.95"E Lower left corner: 25° 3'52.05"N 68°17'11.83"E	148	~7000	52
3	Upper right corner: 25° 2'13.79"N 68°17'56.13"E Upper left corner: 25° 2'14.99"N 68°17'43.70"E Lower right corner: 25° 1'56.02"N 68°17'57.15"E Lower left corner: 25° 2'0.16"N 68°17'42.77"E	46.9	~2200	48
4	Upper right corner: 24°57'58.70"N 68°19'28.34"E Upper left corner: 24°58'6.45"N 68°19'10.73"E Lower right corner: 24°57'49.12"N 68°19'23.69"E Lower left corner: 24°57'58.44"N 68°19'7.53"E	40.3	~1800	46

A total of 4 shelter locations have been selected as Flood shelter places across district Tando Muhammad Khan. The shelter locations are selected based on their proximity to the population vulnerable to flood, distance from area under high flood risk, elevation from the nearby areas, and accessibility to roads and other basic facilities (healthcare, education, police station, etc.) A total of approximately 13,000 tents (tent with size of 45 sq. m each) can be set up within the demarcated shelter places.

## ANNEX – C – SHELTER LOCATIONS DESCRIPTION – EARTHQUAKE

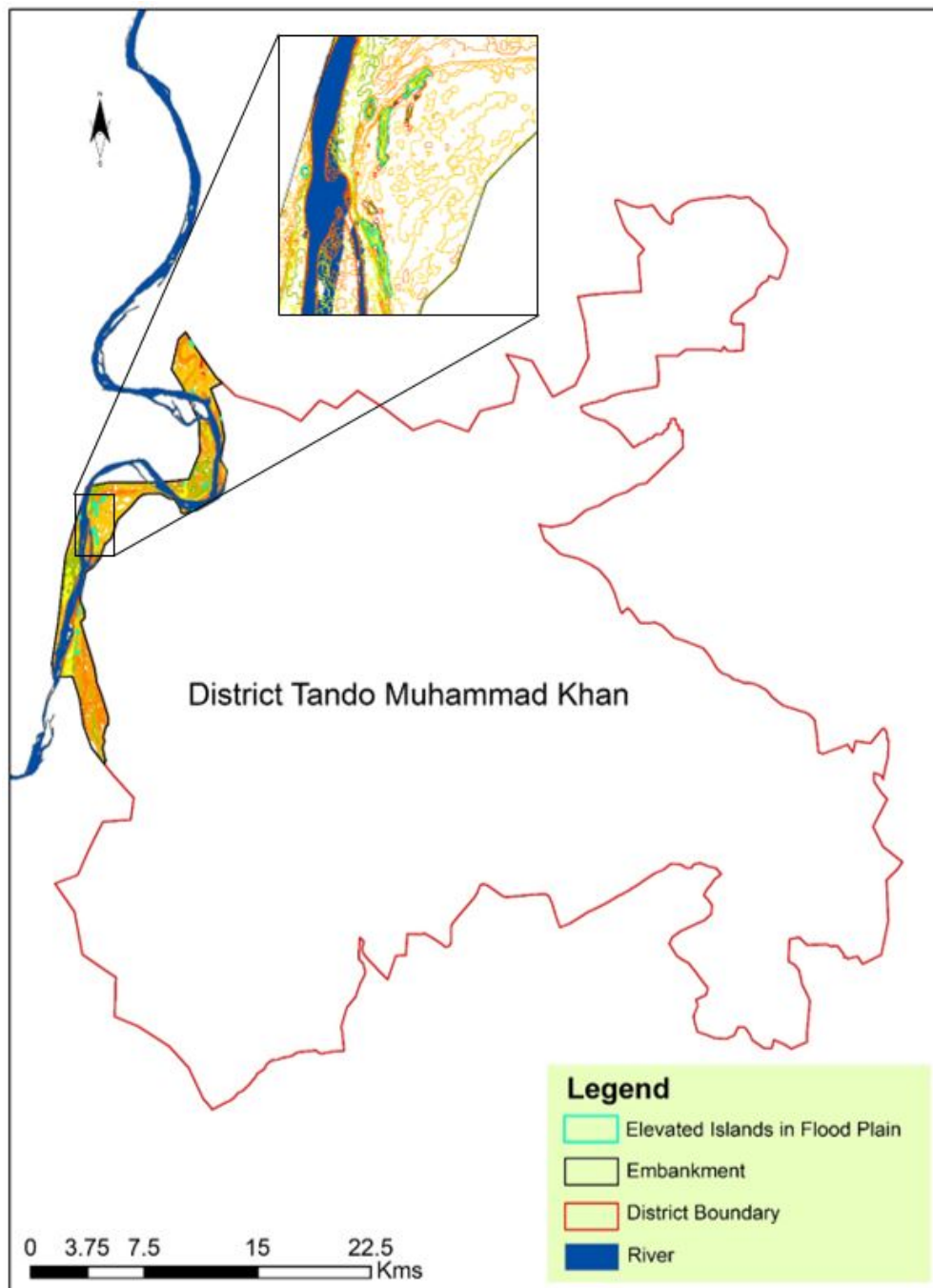
The given shelter locations for earthquake are proposed on the findings of the MHVRA 2022 study and information obtained through satellite technology and online verifiable sources. It is recommended to conduct on ground physical surveys to evaluate their suitability.

Shelter location	Co-ordinates	Area (acres)	Estimated Tents (numbers)	Avg. elevation (ft)
1	Upper right corner: 25° 6'9.78"N 68°33'3.92"E Upper left corner: 25° 5'51.27"N 68°32'48.58"E Lower right corner: 25° 5'30.31"N 68°33'47.39"E Lower left corner: 25° 5'28.57"N 68°33'14.81"E	239	~11000	62
2	Upper right corner: 24°51'20.58"N 68°19'40.53"E Upper left corner: 24°51'21.75"N 68°19'9.90"E Lower right corner: 24°51'4.89"N 68°19'37.67"E Lower left corner: 24°51'6.74"N 68°19'11.42"E	98.1	~4500	45
3	Upper right corner: 25° 1'39.40"N 68°40'10.87"E Upper left corner: 25° 1'22.25"N 68°39'39.00"E Lower right corner: 25° 1'15.50"N 68°40'53.18"E Lower left corner: 25° 0'50.26"N 68°40'15.02"E	411	~18500	50

A total of 3 shelter locations have been selected as Earthquake shelter places across district Tando Muhammad Khan. 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 34,000 tents approximately (tent with size of 45 sq. m each) can be set up within the demarcated shelter places.

## ANNEX – D – ELEVATED ISLANDS WITHIN EMBANKMENTS IN TANDO MUHAMMAD KHAN

Total 17 elevated islands have been identified within the embankments in district Tando Muhammad Khan, with a cumulative area of approximately 90 acres. These elevated islands obstruct the river flow and thereby may be demolished/removed to reinstate the normal river flow within the flood plain.



## ANNEX – E – RIVER TRAINING AND STRAIGHTENING

Since most of the time riverine flood are contained in between river embankments therefore only settlements lying in flood plain are prone to low to very high floods while settled areas of Tando Muhammad Khan district are safe from riverine flood. However, settled areas of the district may be endangered to severe flooding condition if any breaching occurs in river embankment.

### **Embankment breach due to Normal River flow meandering:**

Indus river continuously meander within flood plain area (3-5 miles). As river reached very close to embankments it starts eroding it hence making it vulnerable to any type of flood (low to very high flood). To avoid this situation irrigation department, make loop bund where river is close to main bund. This is a costly task and not a permanent solution because of the reason that river again change its path in 4-5 years and starts meandering to other part of bund. Therefore, there is need to stop the river to come close to the main bunds. It is, thereby, suggested to straight the path of river where it is currently meandering inside the flood plain away from the both sides of main bunds.

**Below figure illustrate the concept:**



Once path A to B has been developed, then river in normal condition will flow in this path. However annual or bi-annual cleaning of this path will be required by removing the sediments/clay deposit in this path. Special boats will be required to carry out this task by excavating the sand/clay beneath the river and put it on its sides. The feasibility study may be carried out to estimate the cost of digging of A-to-B path and its bi-annual maintenance and to compare it with the cost of making and maintenance of loop bunds to avoid meandering of the river. If the proposed conceptual model is financially and technically viable than it can be taken as project. If this conceptual model is implemented than damaged loses (life and material) due to breaching scenarios may be minimized or even reduced to zero.

## ANNEX – F – LIST OF EQUIPMENT AVAILABLE IN DISTRICT TANDO MUHAMMAD KHAN

Equipment	Quantity
De-watering Machine	41
Ambulances	12

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