

DELIVERABLE - 04
DRAFT LANDUSE PLAN

REVISION - 2

2025-45

PROVINCIAL LANDUSE PLAN OF KHYBER PAKHTUNKHWA

DISTRICT ORAKZAI

Table of Contents

1 PROLOGUE 1-1

1.1 Introduction 1-1

1.1.1 Background 1-1

1.1.2 Objective 1-2

1.1.3 Land Use Planning Process 1-2

1.1.4 Project Methodology 1-4

1.1.6 Project Area 1-6

1.2 Vision Development 1-8

1.2.1 SWOT Analysis 1-16

1.2.2 Key Finding 1-18

1.2.3 Vision Statement of District Orakzai 1-18

1.2.3.1 Vision Statement Resulting from Consultations with The General Public in Neighborhood and Village Councils 1-18

1.2.3.2 Vision Statement Developed Through Consultations with Civil Society Organizations 1-18

1.2.3.3 Vision Statement Developed by Group-A During the Consultative Workshop 1-18

1.2.3.4 Vision Statement by Group-B During the Consultative Workshop 1-19

1.2.3.5 Vision Statement of Group-C During the Consultative Workshop 1-19

1.2.3.6 Vision Statement of Group-D During the Consultative Workshop 1-19

1.2.3.7 Vision 2045 for Orakzai District: 1-19

1.3 Physical Characteristic of the District 1-19

1.3.1 Hydrology and Water Resources 1-19

1.3.1.1 Water Table 1-22

1.3.2 Climate of Project Area 1-24

1.3.2.1 Precipitation 1-24

1.3.2.2 Temperature 1-27

1.3.2.3 Relative Humidity 1-28

1.3.2.4 Wind Speed 1-30

1.3.3 Elevation 1-32

1.3.4 Seismic Condition 1-34

1.4 Soil and Land use Properties of Project District 1-36

1.4.1 Land Cover of Project District 1-38

1.5 Socio Economic Profile 1-40

1.5.1 Historical Growth Trend in District Orakzai 1-40
1.5.2 Population Growth of District Orakzai 1-40
1.5.3 Tehsil Level Analysis 1-41
1.5.4 Population Distribution 1-41
1.5.4.1 Age and Sex-Wise Population Distribution 1-42
1.5.5 Population Density 1-43
1.5.6 In Migration 1-43
1.5.7 Out Migration 1-45
1.5.8 Population Projection of 20 Year 1-47
1.5.9 Household Size 1-52
1.5.10 Literacy Analysis of Orakzai District 1-52
1.5.11 Education Attainment 1-54
1.5.11.1 Education Attainment (LFS 2021-22) 1-54
1.5.11.2 Education Attainment (2023 Census) 1-56
1.5.11.3 Education Attainment (HIS Survey) 1-57
1.5.11.4 Comparative Analysis of Educational Attainment (HIS, Census 2023 & LFS 2021-22) 1-58
1.5.13 Employment 1-59
1.5.13.1 Employment as Per Labour Force Survey 2021-22 1-59
1.5.13.2 Employment as Per Census 2023 1-60
1.5.13.3 Employment as Per HIS Survey 1-61
1.5.13.4 Comparative Analysis of Employment (HIS, Census 2023 and LFS) 1-62
1.6 Urbanization and Hierarchy of Human Settlement 1-63
1.6.1 Urbanization 1-63
1.6.2 Urbanization in District Orakzai 1-63
1.6.3 Urbanization Trend in Historical Perspective 1-64
1.6.4 Urban Growth Trend 1-64
1.6.4.1 Kalaya Urban Area 1-65
1.6.4.2 Ghiljo urban canter 1-71
1.6.4.3 Dabori Urban Area 1-77
1.6.5 Human Settlement 1-83
1.6.5.1 Settlement Wise Demography Analysis 1-83
1.6.5.1.1 District Level Overview 1-83
1.6.5.1.2 Tehsil Level 1-84
1.6.5.1.3 Section Level 1-84

1.6.5.1.4 Settlement Level 1-85
1.6.5.2 Population Growth Trend and Implication 1-85
1.6.6 Hierarchy of Human Settlement 1-88
1.6.6.1 Population-Based Hierarchical Classification: 1-88
1.6.6.2 Housing Stock-Based Classification: 1-88
1.6.6.3 Combined Population and Housing Stock Classification: 1-88
1.6.6.4 Central Place Theory (Centrality-Based Classification): 1-89
1.6.6.5 Fuzzy Analytic Hierarchy Process (FAHP): 1-89
1.6.6.6 Composite Characteristic Approach: 1-89
1.6.6.7 Density-Based Classification: 1-89
1.6.7 Defining Characteristics and Scores 1-89
1.6.8 Hierarchy of Human Settlement District Orakzai 1-90
1.6.9 Declaration of Human Settlement 1-94
1.6.9.1 Defining Urban Centers 1-95
1.6.9.2 Importance of Urban Centers in Land Use Planning 1-95
1.6.9.3 Key Components of a 20-Year Land Use Plan 1-95
1.6.9.4 The Role of Technology in Shaping Urban Centers 1-95
1.6.10 Settlements to be Urbanized up to 2045 1-95
1.6.10.1 Kalaya Proposed Urban Area 1-96
1.6.10.2 Ghiljo Proposed Uban Area 1-98
1.6.10.3 Dabori Proposed Urban Area 1-100
2 Existing Land Use Distribution 2-1
2.1 Project Location 2-1
2.2 Land Use Distribution in the District 2-1
2.3 Tehsil Wise Land Use Distribution 2-4
2.3.1 Tehsil Upper Orakzai 2-4
2.3.2 Tehsil Central Orakzai 2-7
2.3.3 Tehsil Lower Orakzai 2-10
2.3.4 Tehsil Ismail Zai 2-13
2.4 Land use Distribution in Urban Center 2-15
2.4.1 Existing Land Use Distribution of Kalaya Urban Center 2-15
2.4.2 Existing Land Use Distribution of Ghilijo Urban Center 2-18
2.4.3 Existing Land Use Distribution of Dabori Urban Center 2-21
3 Sectoral Studies 3-1
3.1 Housing 3-1

3.1.1 Current Housing Stock by Type 3-1
3.1.1.1 Housing Stock Projection of District Orakzai (2025) 3-2
3.1.1.2 Distribution of Housing Types in 2025 3-2
3.1.2 Housing Stock Verification and Shortfall in 2025 3-3
3.1.2.1 Average Household Size 3-3
3.1.2.2 Ownership Pattern 3-3
3.1.2.3 Housing Current Backlog 3-4
3.1.2.4 Plan Period Requirement 3-4
3.1.2.5 Housing Affordability and Adequacy Relative to Income Level 3-5
3.1.3 Constraints and Recommendations for Housing in Kurram District 3-7
3.1.3.1 Constraints 3-7
3.1.3.2 Recommendations 3-7
3.2 Communication 3-10
3.2.1 Major Road Network of Orakzai 3-10
3.2.1.1 Public transport in Orakzai District 3-15
3.2.1.1.1 Railways 3-15
3.2.1.1.2 Airport: 3-15
3.2.1.1.3 Traffic Management in Orakzai District 3-15
3.2.2 Traffic and Transportation Surveys 3-16
3.2.2.1 Manual Classified Traffic Count Survey 3-16
3.2.2.2 Traffic Split 3-18
3.2.2.3 Headquarter Chowk 3-18
3.2.2.4 Mirai Chowk 3-20
3.2.2.5 Khuzdara Chowk 3-22
3.2.2.6 Shohada Chowk 3-24
3.2.3 MCC Surveys at Cordon Points 3-27
3.2.3.1 Daboori Checkpost 3-29
3.2.3.2 Zera Check Post 3-30
3.2.4 Summary of Traffic on Major Roads 3-32
3.2.5 Origin-Destination Survey at Cordon Points 3-35
3.2.6 Annual Development Programme Projects in Orakzai 3-38
3.2.7 National Highway Authority Projects in Orakzai 3-39
3.2.8 Rail Network 3-39
3.2.8.1 Implications of No Railway Connectivity 3-39
3.2.8.2 Potential for Future Development 3-39

3.2.9 Air Network 3-39
3.2.10 Telecommunication, Postal Services & Telegraphs 3-40
3.2.10.1 Telecommunication Services 3-40
3.2.10.2 Postal Services 3-40
3.2.11 Major transport elements requiring upgradation in Orakzai: 3-41
3.2.12 Proposed Bus Terminals 3-42
3.2.13 Communication Network Proposals 3-45
3.2.13.1 Summary 3-45
3.2.13.2 Major Transport Elements Requiring Upgradation in Orakzai: 3-45
3.2.13.2.1 Road's Proposals: 3-45
3.3 Social Infrastructure 3-51
3.3.1 Education 3-51
3.3.1.1 Schools 3-51
3.3.1.2 Literacy Ratio 3-51
3.3.1.2.1 Literacy Ratio from Population Census-2023 for Orakzai 3-52
3.3.1.2.2 Literacy Ratio from Household Information Survey 3-53
3.3.1.3 Existing Educational Institutes 3-54
3.3.1.4 Summary of Findings 3-55
3.3.1.4.1 Government Primary Schools 3-55
3.3.1.4.2 Degree Colleges in District Orakzai 3-55
3.3.1.4.3 Private Schools in District Orakzai 3-58
3.3.1.5 Gross and Net Enrollment Rates 3-59
3.3.1.5.1 Gross Enrollment Ratios (GER) at the Primary Level 3-59
3.3.1.5.1.1 Observations: 3-59
3.3.1.5.2 Gross Enrolment Ratios (GER) at the Secondary Level 3-59
3.3.1.5.2.1 Observations: 3-60
3.3.1.6 Gender Parity Index (GPI) 3-60
3.3.1.6.1 Observations: 3-60
3.3.1.7 Dropout Rate, Promotion Rate, and Repetition Rate 3-61
3.3.1.7.1 Student Flow Analysis in Orakzai at Primary Level (Boys): 3-61
3.3.1.7.2 Key Observations: 3-61
3.3.1.7.3 Key Observations: 3-62
3.3.1.7.4 Key Observations: 3-62
3.3.1.7.5 Key Observations: 3-63
3.3.1.7.6 Student Flow Analysis in Orakzai at Secondary Level (Girls) 3-63

3.3.1.7.7 Key Observations: 3-64
3.3.1.8 Teacher-Student Ratio 3-64
3.3.1.9 Education Facilities Satisfaction – Tehsil-Wise Analysis (HIS Orakzai) 3-64
3.3.1.10 Planning Standards for Establishing New Educational Institutions 3-67
3.3.1.11 Need for New Educational facilities in District Orakzai 3-69
3.3.1.11.1 Methodology and Analytical Approach 3-69
3.3.1.11.2 Tehsil-Wise Analysis & Requirements 3-71
3.3.1.11.3 Proposed Urban Areas Analysis & Requirements 3-72
3.3.1.11.4 Area requirements for Education institutes 3-73
3.3.1.11.4.1 Tehsil Wise Area Requirements 2045 3-73
3.3.1.11.4.2 Urban Areas Requirements 3-74
3.3.1.11.5 District-Level Synthesis 3-75
3.3.1.11.6 Planning Implications and Recommendations 3-76
3.3.1.11.7 Conclusion 3-76
3.3.1.12 Constraints 3-77
3.3.1.13 Recommendation 3-77
3.3.2 Health 3-79
3.3.2.1 Existing Health Facilities 3-79
3.3.2.2 Government Health Facilities 3-79
3.3.2.2.1 Community Satisfaction Survey 3-81
3.3.2.2.2 Reason Dissatisfaction 3-81
3.3.2.3 Planning Standards for Establishing New Health Facilities 3-84
3.3.2.4 Need for New Health Facilities in District Orakzai 3-85
3.3.2.4.1 Tehsil Wise Health Facilities Gap and Demand as per the NRM (National Reference manual) 3-85
3.3.2.4.2 Urban Area Wise Health Facilities Gap and Demand as per the NRM (National Reference manual) 3-87
3.3.2.5 Area Requirements for Health Facilities 3-87
3.3.2.5.1 Tehsil Wise Area Requirements 3-87
3.3.2.5.2 Urban Area Requirements 3-89
3.3.2.6 Constraints and Challenges in Healthcare for District Orakzai 3-91
3.3.2.7 Recommendations for Improvement 3-92
3.3.3 Recreation 3-94
3.3.3.1 Sports Facilities 3-94
3.3.3.1.1 Sport Facilities in District Orakzai 3-94

3.3.3.2 Entertainment and Tourism 3-98
3.3.3.3 Recommendations 3-100
3.3.3.4 Historical and Cultural Heritage 3-100
3.3.3.5 Parks and Zoos in Orakzai 3-102
3.3.3.5.1 Parks 3-102
3.3.3.5.2 Zoos 3-102
3.3.3.6 Existing Recreational Facility Satisfaction Tehsil-Wise 3-103
3.3.3.6.1 Satisfaction Levels 3-103
3.3.3.6.2 Reasons for Dissatisfaction 3-103
3.3.3.7 Planning Standards for Establishing New Park and Playgrounds 3-105
3.3.3.8 Area Requirements and Proposal for Reactional Facilities 3-106
3.3.4 Security Facilities 3-110
3.3.4.1 Standards for Establishing New Police Stations 3-110
3.3.5 Religious Facilities 3-113
3.3.6 Graveyards 3-115
3.3.6.1 Existing Graveyards 3-115
3.4 Agriculture 3-117
3.4.1 Agriculture Land Utilization 3-117
3.4.2 Production Profile 3-119
3.4.3 Type of Irrigation and Water Management Issues 3-119
3.4.4 Agriculture Employment 3-120
3.4.5 Constraints 3-120
3.4.6 Recommendations 3-122
3.4.7 Proposed Interventions for Agriculture Sector 3-122
3.5 Livestock 3-128
3.5.1 Available Livestock 3-128
3.5.1.1 Assessment of Poultry and Fisheries 3-128
3.5.1.1.1 Fisheries 3-128
3.5.1.1.2 Poultry 3-129
3.5.2 Livestock Facilities 3-130
3.5.2.1 Veterinary Facilities 3-130
3.5.3 Economic Potential of Livestock 3-130
3.5.4 Plans existing/ ongoing and New Schemes 3-131
3.5.5 Constraints 3-131
3.5.6 Recommendations 3-131

3.5.7 Future Livestock Development Proposals 3-132
3.5.7.1 Component 1: Animal Health & Disease Prevention System 3-133
3.5.7.2 Component 2: Fodder Security & Range Management 3-133
3.5.7.3 Component 3: Breed Improvement & Productivity 3-133
3.5.7.4 Component 4: Women-Led Dairy & Poultry Micro-Enterprises 3-133
3.5.7.5 Component 5: Meat, Dairy & Wool Value Chain Development 3-133
3.5.7.6 Component 6: Disaster Preparedness & Climate Resilience 3-133
3.5.7.7 Expected Outcomes/Benefits: 3-133
3.5.7.8 Implementing Strategy: 3-133
3.5.8 Proposal: Sustainable Rangelands Development 3-133
3.5.8.1 Major Components: 3-134
3.5.8.1.1 Component 1: Participatory Rangeland Restoration 3-134
3.5.8.1.2 Component 2: Fodder Security and Improved Water Access 3-134
3.5.8.1.3 Component 3: Sustainable Grazing Management and Land Tenure 3-135
3.5.8.1.4 Component 4: Livestock Health, Nutrition and Value Chain Support 3-135
3.5.8.1.5 Component 5: Institutional Strengthening, Capacity Building & Knowledge Management 3-135
3.5.8.1.6 Component 6: Climate Adaptation & Disaster Risk Reduction 3-135
3.6 FUELS, MINERALS, AND ENERGY OF ORAKZAI DISTRICT 3-136
3.6.1 Fuels and Minerals 3-136
3.6.1.1 Existing and Potential Fuel and Mineral Resources 3-136
3.6.1.1.1 Existing Resources: 3-136
3.6.1.1.2 Potential Resources: 3-136
3.6.1.2 Economic Impact Assessment 3-137
3.6.1.2.1 Positive Impacts: 3-137
3.6.1.2.2 Negative Impacts: 3-137
3.6.1.2.3 Recommendations: 3-137
3.6.2 Constraints and Recommendations 3-139
3.6.2.1 Constraints: 3-139
3.6.2.2 Recommendations: 3-139
3.6.3 Energy and Power Development 3-139
3.6.3.1 Identification of Energy Sources 3-139
3.6.3.1.1 Renewable: 3-139
3.6.3.1.2 Non-Renewable: 3-140
3.6.4 Constraints and Recommendations 3-141

3.6.4.1 Constraints: 3-141
3.6.4.2 Recommendations: 3-141
3.6.4.3 Orakzai District: Challenges and Opportunities in Fuel, Mineral, and Energy Resource Development 3-141
3.6.5 Future Proposed Intervention 3-141
3.6.5.1 Institutional and Regulatory Strengthening 3-141
3.6.5.2 Technology Upgradation and Value Addition 3-142
3.6.5.3 Energy Sector Development 3-142
3.7 Industry 3-143
3.7.1 Categorization of Industrial Establishments 3-143
3.7.1.1 Categorization by Size 3-143
3.7.1.1.1 Light Industries 3-143
3.7.1.1.2 Medium Industries 3-143
3.7.1.1.3 Heavy Industries 3-143
3.7.1.2 Categorization by Type 3-145
3.7.2 Industrial Growth Pattern 3-145
3.7.3 Ownership Pattern 3-145
3.7.4 Industrial Employment 3-146
3.7.5 Raw Material Availability 3-146
3.7.5.1 Raw Material for Crush Plants 3-146
3.7.5.2 Raw Material for Coal Industry 3-147
3.7.6 Industrial Workforce 3-147
3.7.7 Employment Distribution by Sector 3-147
3.7.8 Workforce Distribution by Area 3-147
3.7.9 Formal and Informal Workforce 3-147
3.7.10 Future Industrial Development Proposals 3-148
3.7.11 Propose Future Demand 3-151
3.7.11.1 District Industrial Requirements 3-151
3.7.11.2 Urban Area Industrial Requirements 3-151
3.7.12 Constraints 3-152
3.7.13 Recommendations 3-153
3.8 Trade and Commerce 3-156
3.8.1 Distribution of Commerce and Trade Centers 3-156
3.8.2 International Commerce and Trade Center in Khyber Pakhtunkhwa 3-156
3.8.3 National Commerce and Trade Centers in Khyber Pakhtunkhwa 3-156

3.8.4 Regional Commerce and Trade Centers....3-157
3.8.5 Sub-Regional Commerce and Trade Center....3-157
3.8.5.1 Major Trade Sectors....3-157
3.8.6 Commercial Activities in District Orakzai....3-159
3.8.6.1 Various Types of Markets....3-159
3.8.6.2 Wholesale Markets....3-159
3.8.6.3 Retail Markets....3-159
3.8.6.4 Specialized Markets....3-160
3.8.6.5 Sunday Bazaar and Occasional Markets....3-160
3.8.6.6 Highway-Oriented Ribbons....3-160
3.8.7 Propose Future Demand....3-160
3.8.7.1 District Commercial Requirements....3-160
3.8.7.2 Urban Areas Commercial Demand....3-161
3.8.8 Future Proposed Interventions....3-162
3.8.8.1 Future Trade & Commerce Development Proposals....3-162
3.8.9 Constraints....3-166
3.8.10 Recommendation....3-167
3.9 Solid Waste Management....3-168
3.9.1 Solid Waste Management in Orakzai District....3-168
3.9.1.1 Current and Projected Solid Waste Generation in Rural Centers....3-168
3.9.1.2 Current and Projected Solid Waste Generation in Urban Centers....3-169
3.9.2 Proposed Solid Waste Management Strategies....3-170
3.9.3 Proposed Waste Collection and Transportation System in District Orakzai....3-171
3.9.4 Proposed Waste Collection and Transportation System in Kalaya....3-171
3.9.5 Proposed Waste Collection and Transportation System in Ghiljo....3-172
3.9.6 Proposed Waste Collection and Transportation System in Dabori....3-172
3.9.7 Constraints....3-174
3.9.8 Recommendations....3-175
3.10 DRINKING WATER SUPPLY....3-177
3.10.1 Analysis and Background Studies....3-177
3.10.2 Project Area....3-177
3.10.3 Drinking Water....3-177
3.10.3.1 Sources of Drinking Water Supply....3-177
3.10.4 Existing Water Supply Scheme....3-180
3.10.5 Components of Water Supply Scheme....3-188

3.10.5.1 Tube well....3-188
3.10.5.2 Quality and Quantity of Water....3-190
3.10.5.3 Water Demand/Quantity....3-190
3.10.5.3.1 Water Quality....3-191
3.10.5.3.2 Coverage of Existing Water Supply....3-191
3.10.6 Proposed Water Supply System in Rural Settlements....3-192
3.10.7 Proposed Water Supply System in Urban Settlements....3-193
3.10.7.1 Proposed Water Supply in Kalaya....3-194
3.10.7.2 Proposed Water Supply in Ghiljo....3-194
3.10.7.3 Proposed Water Supply in Daboori....3-194
3.11 Sewerage and Storm water Drainage....3-205
3.11.1 Existing Situation of Sanitation and Drainage System....3-205
3.11.1.1 Sewage Flow in Urban and Rural Centers....3-205
3.11.1.2 Available and Proposed Treatment Facilities....3-206
3.11.2 Ongoing Projects....3-207
3.11.3 Proposed Sewerage system in Urban centers....3-207
3.12 Environment....3-212
3.12.1 Introduction....3-212
3.12.2 Environmental Objectives during Planning Stages....3-212
3.12.3 Environmental Baseline Analysis Outcome....3-212
3.12.4 Key Environmental Issues and Mitigation Strategies....3-212
3.12.4.1 Environmental Management and Sustainability....3-212
3.12.4.2 Water and Sanitation....3-212
3.12.4.3 Solid Waste Management....3-213
3.12.4.4 Forestry, Ecology, and Biodiversity....3-214
3.12.4.5 Air and Noise Pollution Control....3-215
3.12.4.6 Climate Resilience and Disaster Risk....3-216
3.12.4.7 Renewable Energy and Sustainable Infrastructure....3-216
3.12.5 Environmental Baseline Analysis Outcome....3-216
3.13 Natural Hazard....3-218
3.13.1 General....3-218
3.13.2 Disaster Resilience....3-220
3.13.2.1 Safer Land use Planning....3-220
3.13.2.2 Exposure....3-220
3.13.2.2.1 Disaster Preparedness and Response....3-220

3.13.2.3 Disaster Profile of District Orakzai 3-221
3.13.3 Earthquake Hazard 3-224
3.13.3.1 Preamble 3-224
3.13.3.2 Regional Geologic Faults 3-226
3.13.3.3 Earthquake Vulnerability 3-231
3.13.3.4 Earthquake Preparedness and Response 3-232
3.13.3.5 Historical Preview of Instrumental Seismic Data of District Orakzai 3-234
3.13.3.6 Earthquake 2015 3-239
3.13.3.7 Earthquake Preparedness and Mitigation 3-239
3.13.4 Flood Hazard 3-240
3.13.4.1 Preamble 3-240
3.13.4.2 Surface Drainage System District Orakzai 3-241
3.13.4.3 Flood Hazard Vulnerability 3-245
3.13.4.4 Riverine Flood Hazard Susceptibility Zones of District Orakzai 3-246
3.13.4.5 Flood Hazard Management 3-249
3.13.5 Landslides 3-250
3.13.5.1 Preamble 3-250
3.13.5.2 Landslide Hazard Vulnerability 3-250
Landslide Susceptibility Zoning 3-253
3.13.5.3 Landslide Safety Guidelines 3-256
3.13.5.4 Conclusions 3-256
3.13.5.5 Hill Torrents 3-256
3.13.6 LOSS OF CULTIVATED AND ARABLE LAND 3-257
3.13.6.1 Mitigation and Prevention 3-257
3.13.7 Bank Collapse 3-258
3.14 District Economy 3-259
3.14.1 Agriculture Sector 3-259
3.14.1.1 GDP 3-259
3.14.1.2 Land Utilization 3-260
3.14.1.2.1 Crop Production Profile 3-260
3.14.1.2.2 Challenges and Potential 3-261
3.14.1.2.3 Livestock Population and Opportunities for Growth 3-261
3.14.1.2.4 Livestock Infrastructure 3-261
3.14.1.2.5 Challenges and Potential 3-262

3.14.2 Industries 3-262
3.14.2.1 Type of Industries 3-263
3.14.2.2 Trade and Commerce 3-263
3.14.2.3 Mining 3-263
3.14.2.4 Tourism 3-263
3.14.2.5 Challenges and Potential 3-264
3.14.3 Key Economic Drivers 3-264
3.14.3.1 Primary Economic Drivers 3-264
3.14.3.1.1 Agriculture 3-264
3.14.3.1.2 Livestock 3-265
3.14.3.1.3 Mining 3-265
3.14.3.2 Secondary Economic Drivers 3-265
3.14.3.2.1 Tourism 3-265
3.14.4 Current and Projected Employment Generation 3-265
3.14.5 Employment 3-265
3.14.5.1 Future Employment Generation 3-267
3.14.5.2 Agriculture Sector 3-267
3.14.5.3 Industry Sector 3-267
3.14.5.4 Services Sector 3-267
3.14.6 Constraints 3-267
3.14.7 Recommendation 3-268
3.14.8 Future Proposals for District Economy 3-269
3.15 Land Management System 3-274
3.15.1 Land Management 3-274
3.15.2 Land Management in Khyber Pakhtunkhwa 3-274
3.15.2.1 Administrative Setup 3-274
3.15.2.2 Legislative Framework 3-274
3.15.2.3 Land Administration Processes 3-275
3.15.2.3.1 Types of Land Records 3-275
3.15.3 Challenges in the Land Management System 3-275
3.15.3.1 Institutional Issues 3-275
3.15.3.2 Technical Issues 3-275
3.15.4 Kurram Land Management 3-275
3.15.4.1 Land Ownership 3-275
3.15.4.2 Land Transfer 3-276

3.15.4.3 Land Entitlement 3-276
3.15.4.4 Government Land Entitlement 3-276
3.15.4.5 Compensation Mechanisms 3-276
3.15.5 Range Land Future Proposed Intervention 3-276
3.15.5.1 Rangeland Rehabilitation and Reseeding 3-276
3.15.5.2 Community-Based Rangeland Management Committees (CRMCs) 3-277
3.15.5.3 Silvo-Pastoral System Development 3-277
3.15.5.4 Community Fodder Banks and Drought Resilience Zones 3-277
3.15.5.5 Capacity Building and Awareness Programs 3-278
3.15.5.6 GIS-Based Rangeland Mapping and Monitoring 3-278
3.16 Potential Tourism Strategies 3-279
3.16.1 Vision Statement 3-279
3.16.2 Strategic Objectives 3-279
3.16.3 Potential Tourist Sites in Orakzai 3-279
3.16.4 Tourism Potential and Key Destinations 3-282
3.16.5 Tourism Zoning and Land Use Framework 3-282
3.16.5.1 Eco-Tourism and Recreation Zone 3-282
3.16.5.2 4.2. Heritage and Cultural Zone 3-282
3.16.5.3 Religious and Pilgrimage Zone 3-282
3.16.5.4 Urban Recreation Zone 3-283
3.16.6 Policy Framework 3-283
3.16.6.1 Sustainable Tourism Development 3-283
3.16.6.2 Cultural Heritage Conservation 3-283
3.16.6.3 Community-Based Tourism 3-283
3.16.6.4 Infrastructure and Connectivity 3-283
3.16.6.5 Investment and Promotion 3-283
3.16.6.6 Environmental and Social Safeguards 3-283
3.16.7 6. Proposed Action Plan (2025–2045) 3-284
3.16.8 Implementation and Monitoring Mechanism 3-284
3.16.9 Expected Long-Term Outcomes (by 2045) 3-285
3.16.10 Development Guidelines Summary 3-285
4 Proposed Land Use Planning and Zoning 4-1
4.1 Proposed Zoning in Urban Area 4-1
4.1.1 Residential Zone 4-2
4.1.2 Commercial Zone 4-4

4.1.3 Industrial Zone 4-5
4.1.4 Institutional Zone 4-7
4.1.4.1 Educational Zone 4-7
4.1.4.2 Health Zone 4-8
4.1.4.3 Institutional Zone 4-9
4.1.5 Recreational Zone 4-10
4.1.6 Forestation Zone 4-10
4.1.7 Agricultural Zone 4-11
4.2 Recommended Zoning for Urban Area 4-12
4.2.1 Kalaya Urban Center 4-14
4.2.1.1 Residential 4-14
4.2.1.2 Commercial and Economic Activity 4-14
4.2.1.3 Institutional and Public Facilities 4-14
4.2.1.4 Industrial 4-15
4.2.1.5 Recreational and Open Space 4-15
4.2.1.6 Arterial Circulation and Transport Terminals 4-15
4.2.1.7 Other Uses 4-15
4.2.2 Dabori Proposed Urban 4-18
4.2.2.1 Residential 4-18
4.2.2.2 Commercial 4-18
4.2.2.3 Institutional and Public Buildings 4-18
4.2.2.4 Industrial 4-18
4.2.2.5 Recreational and Open Space 4-18
4.2.2.6 Arterial Circulation and Transport Terminals 4-19
4.2.2.7 Other Uses 4-19
4.2.3 Ghiljo Proposed Urban 4-22
4.2.3.1 Residential 4-22
4.2.3.2 Commercial 4-22
4.2.3.3 Institutional and Public Buildings 4-22
4.2.3.4 Industrial 4-22
4.2.3.5 Recreational and Open Space 4-22
4.2.3.6 Arterial Circulation and Transport Terminals 4-22
4.2.3.7 Other Uses 4-23
4.3 Review of Kalaya City Master Plan (2024–2042) 4-26
4.3.1 Kalaya urban center 4-26

4.3.2 Master Plan Review 4-27
4.3.2.1 Residential 4-27
4.3.2.2 Commercial 4-27
4.3.2.3 Industry 4-28
4.3.2.4 Green Space/Recreational 4-28
4.3.2.5 Education: 4-28
4.3.2.6 Health 4-29
4.4 District Land Use Zoning Plan 4-29
4.4.1 Agriculture Zone 4-34
4.4.2 Forest Zone 4-35
4.4.3 Range Zone 4-36
4.5 Tehsil Wise Land Use Zoning 4-38
4.5.1 Tehsil Upper Orakzai 4-38
4.5.2 Tehsil Central Orakzai 4-41
4.5.3 Tehsil Lower Orakzai 4-44
4.5.4 Tehsil Ismail Zai 4-47
4.6 Rural Development Framework 4-50
4.6.1 Introduction and Planning Rationale 4-50
4.6.2 Rural Settlement Hierarchy and Functional Classification 4-50
4.6.2.1 Rural Growth Centers (RGCs) 4-50
4.6.2.2 Rural Service Villages (RSVs) 4-50
4.6.2.3 Villages and Hamlets 4-51
4.6.3 Rural Land-Use Zoning Framework 4-52
4.6.3.1 Agriculture Zone (AZ) 4-52
4.6.3.2 Forest Zone (FZ) 4-52
4.6.3.3 Range Zone (RZ) 4-53
4.6.4 Rural Housing Policy 4-53
4.6.5 Rural Development Design and Infrastructure Standards 4-53
4.6.5.1 Road and Street Network 4-53
4.6.5.2 Setbacks, Plot Coverage, and Built Form 4-53
4.6.5.3 Essential Rural Services 4-54
4.6.5.4 Community Facilities and Open Spaces 4-54
4.6.5.5 Development Control Regulations (DCR) – Rural Areas 4-54
4.6.6 Commercial Regularization and Roadside Services Control in Rural Areas 4-54
4.6.6.1 Policy Rationale 4-54

4.6.6.2 Settlement-Based Commercial Permissions 4-55
4.6.6.3 Regularization of Existing Commercial Uses 4-55
4.6.6.4 Petrol Pump (Fuel Station) Approval Standards 4-56
4.6.6.5 Roadside Tuck-shop and Small Commercial Control 4-57
4.6.6.6 Corridor-Based Commercial Management 4-57
4.6.6.7 Environmental and Infrastructure Compliance 4-57
4.6.7 Phased Wise Service Provision and Implementation Strategy 4-58
4.6.8 Layout Framework for Rural Development (Indicative Planning Structure) 4-58
4.6.8.1 District-Level Structure 4-58
4.6.8.2 Settlement-Level Layout (Growth Centers and Service Villages) 4-59
4.6.8.2.1 Population Thresholds and Service Triggers 4-59
4.6.8.2.2 Residential Density and Housing Typology 4-60
4.6.8.2.3 Infrastructure Coordination and Phasing 4-60
4.6.8.2.4 Environmental and Agricultural Safeguards 4-60
4.6.8.2.5 Implementation and Control Measures 4-60
4.6.8.3 Village and Hamlet Layout 4-60
4.6.9 Conceptual Rural Development Layout 4-61
4.6.10 Rural Livelihood Diversification and Local Economic Development 4-61
4.6.11 Gender, Social Inclusion, and Vulnerable Groups 4-61
4.6.12 Disaster Risk Reduction and Climate Resilience 4-61
4.6.13 Rural Mobility, Accessibility, and Connectivity 4-62
4.6.14 Governance, Community Participation, and Ex Tribal Context 4-62
4.6.15 Flexibility and Context-Sensitive Application 4-62
4.6.16 Monitoring, Review, and Performance Indicators 4-62
4.6.17 Integration with District and Sectoral Planning 4-63
4.7 Conclusion and Policy Recommendations 4-63
4.7.1 Summary of Key Findings 4-63
4.7.2 Policy Recommendations 4-64
4.7.3 Conclusion 4-64
4.8 Land Use Regulations and Guidelines 4-65
4.8.1 Residential Zone 4-67
4.8.3 Commercial Zone (CBD) 4-68
4.8.5 Industrial Zone 4-69
4.8.6 Agriculture Zone 4-70
4.8.7 Mining Zone 4-71

4.8.9 Forest Zone 4-72
4.8.10 Institutional Zone 4-73
4.8.11 Mixed Land Use Zone 4-75
4.8.12 Recreation Zone 4-76
4.9 Implementation and Regulatory Framework 4-77
4.9.1 Institutional Responsibility 4-77
4.9.2 Approval and Monitoring 4-77
4.9.3 Environmental and Safety Compliance 4-77
4.9.4 Zoning Amendments 4-77
4.9.5 Enforcement and Penalties 4-78
4.9.6 Policy Statement 4-78
5 LEGAL & INSTITUTIONAL FRAMEWORK 5-1
5.1 Legal Framework for Implementation of District Land Use Plans 5-1
5.1.1 Constitution and Functions of the Council 5-1
5.1.2 Provincial Land-Use and Building Control Authority 5-1
5.1.3 District Local Enforcement Unit 5-2
5.1.4 District Land-Use Planning and Management Committee 5-2
5.1.5 Planning Control Permissions 5-3
5.1.6 Land Use Permission 5-3
5.1.7 Development Permissions 5-3
5.1.8 Certificates and Renewal of Building Stock 5-4
5.1.9 Improvement of Urban Design 5-4
5.1.10 Enforcement and Penalties 5-4
5.1.11 Inspection 5-5
5.1.12 Inclusion of Technical Experts in District Planning framework 5-5
5.2 Institutional Gaps and Implementation Strategy 5-5
5.2.1 Institutional Gap Analysis and Actionable Mechanisms 5-5
5.2.2 Strengthened District Institutional Framework and Human Resource Structure (Proposed for District Kurram) 5-7
5.2.2.1 Establishment of District Technical Planning Sub-Committee 5-7
5.2.2.2 Strengthening of Local Planning and Enforcement Unit 5-7
5.2.2.3 Digital Monitoring and Data Systems 5-8
5.2.2.4 Institutional Coordination Mechanism 5-8
5.2.2.5 Organizational Hierarchy 5-8

List of Tables

Table 1-1 List of Participated Stakeholders 1-9
Table 1-2 Stakeholder Consulted in the Project Area 1-9
Table 1-3 SWOT Analysis 1-17
Table 1-4: Mean Monthly Precipitation in Cherat 1-24
Table 1-5: Mean Monthly Temperature 1-27
Table 1-6: Mean Relative Humidity 1-29
Table 1-7: Mean Wind at Synoptic Hours in Cherat 1-30
Table 1-8: Mean Wind Direction at Synoptic Hours in Cherat 1-31
Table 1-9: Population Distribution by Administrative Unit (1951–2023) 1-40
Table 1-10: Population Growth Rates in District Orakzai (1972–2023) 1-40
Table 1-11: Intercensal Population Statistics at Tehsil Level in District Orakzai 1-41
Table 1-12: Tehsil Wise Population Density and Sex Ratio 1-42
Table 1-13 Orakzai District Age and Sex Wise Population Distribution 1-43
Table 1-14: District Orakzai District Wise in Migration from Labour Force Survey 2021-2022 1-44
Table 1-15: District Orakzai Occupation Wise In-Migration from Labour Force Survey 2021-2022 1-45
Table 1-16 District Orakzai District Wise Out-Migration from Labour Force Survey 2021-2022 1-46
Table 1-17 District Orakzai Occupation Wise Out-Migration from Labour Force Survey 2021-2022 ... 1-47
Table 1-18 Orakzai District Population Projection for Plan Period (2025-2045), Using Geometric Growth Model 1-49
Table 1-19 Orakzai District Population Projection for Plan Period (2025-2045), Using Exponential Growth Model 1-50
Table 1-20 Orakzai District Population Projection for Plan Period (2025-2045), Using Linear Growth Model 1-51
Table 1-21 Orakzai District Population Projection for Plan Period (2025-2045), Taking Average of the 3 Models 1-52
Table 1-22 Literacy Analysis of Orakzai District by Age and Sex 1-53
Table 1-23 Educational Attainment as per Labour Force Survey 1-55
Table 1-24 Educational Attainment as per Census 2023 1-56
Table 1-25 Education of Respondents (HIS-Orakzai) 1-58
Table 1-26 Occupation of District Orakzai as per LFS 2021-2022 1-59
Table 1-27 Occupation of District Orakzai from Census 2023 1-61
Table 1-28 Occupation of Respondent Tehsil-Wise from HIS 1-62
Table 1-29 Kalaya Urban Area landcover from 2003 to 2023 1-65
Table 1-30 Ghiljo Urban Area landcover from 2003 to 2023 1-71
Table 1-31 Dabori Urban Area landcover from 2003 to 2023 1-77
Table 1-32 Settlement Wise Population Projections 1-85
Table 1-33 Scoring for Population Size 1-89
Table 1-34 Hierarchy of Settlements 1-90
Table 2-1: Land use Distribution in District Orakzai 2-1
Table 2-2 Tehsil Upper Orakzai Land Use Stats 2-5
Table 2-3 Tehsil Central Orakzai Land Use Stats 2-8
Table 2-4 Tehsil Lower Orakzai Land Use Stats 2-11
Table 2-5 Tehsil Ismail Zai Land Use Stats 2-13
Table 2-6: Land use Distribution in Urban Center Kalaya 2-16
Table 2-7: Land use Distribution in Urban Center Ghilijo 2-19

Table 2-8 Land use Distribution in Urban Center Dabori 2-22
Table 3-1 District Orakzai Previous Housing Stock 3-2
Table 3-2 Projected Housing Stock by Type (2025) 3-3
Table 3-3 House Ownership Tehsil-Wise Analysis 3-3
Table 3-4 Current Housing Backlog 3-4
Table 3-5 Housing Projection 3-5
Table 3-6: Physical Criteria for Affordable Housing (District Orakzai) 3-6
Table 3-7: Availability of Basic Facilities (District Orakzai) 3-6
Table 3-8 District Orakzai Existing Road Network 3-12
Table 3-9 Details of Intersections MCC surveys 3-16
Table 3-10 Traffic categories recorded PCUs conversion factor 3-18
Table 3-11 ADT on Headquarter Chowk 3-20
Table 3-12 Traffic summary and LOS for Headquarter Chowk 3-20
Table 3-13 ADT on Mirai Chowk 3-22
Table 3-14: Traffic summary and LOS for Mirai Chowk 3-22
Table 3-15 ADT on Khuzdara Chowk 3-24
Table 3-16 Traffic summary and LOS for Khuzdara Chowk 3-24
Table 3-17 ADT on Shohada Chowk 3-26
Table 3-18 Traffic summary and LOS for Shohada Chowk 3-26
Table 3-19 Summary of Results of Intersections 3-26
Table 3-20 Traffic survey schedule at cordon points 3-29
Table 3-21 Traffic Volume at Daboori Check post for three days 3-29
Table 3-22 ADT multiplying factors obtained from Daboori Check post 3-30
Table 3-23 Traffic Volume at Zera Check post for three days 3-31
Table 3-24 ADT multiplying factors obtained from Zera Check post 3-32
Table 3-25 Summary of ADTs of all Cordon points 3-32
Table 3-26 Traffic (ADT) on major Road Sections 3-33
Table 3-27 Consolidated Origin-Destination Matrix of Orakzai 3-37
Table 3-28 Annual Development Programme Projects in Orakzai 3-38
Table 3-29 Literacy Ratio from Population Census-2023 for Orakzai 3-53
Table 3-30 Orakzai Literacy Ratio by Age and Sex Group from Population Census 2023 3-53
Table 3-31 Education of Respondents (HIS-Orakzai) 3-54
Table 3-32 Government Schools in District Orakzai 3-55
Table 3-33 Private Schools in District Orakzai 3-58
Table 3-34 Gross Enrollment Ratios (GER) at the Primary Level 3-59
Table 3-35 Gross Enrolment Ratios (GER) at the Secondary Level 3-60
Table 3-36 GPI quantifies gender equality in education. 3-60
Table 3-37 Net Enrollment Ratios (NER) in Orakzai (2023-24) 3-60
Table 3-38 Student Flow Analysis in Orakzai at Primary Level (Boys) 3-61
Table 3-39 Student Flow Analysis in Orakzai at Primary Level (Girls) 3-62
Table 3-40 Student Flow Analysis in Orakzai at Secondary Level (Boys and Girls from class 6 - 9) 3-62
Table 3-41 Student Flow Analysis in Orakzai at Secondary Level for Boys (Class 6 - 9) 3-63
Table 3-42 Student Flow Analysis in Orakzai at Secondary Level for Girls (Class 6 - 9) 3-63
Table 3-43 Teacher-Student Ratio in Primary Schools 3-64
Table 3-44 Teacher-Student Ratio in Middle, High and Higher Secondary Schools 3-64
Table 3-45 Education Facilities Satisfaction HIS Orakzai 3-65
Table 3-46 Reasons of Dissatisfaction- Tehsil-Wise 3-66

Table 3-47 Education Facility Affordability- Tehsil-Wise 3-66
Table 3-48 Suggestion to Improve Current Education System- Tehsil-Wise 3-66
Table 3-49 Location Guidelines for New Educational Institutes 3-67
Table 3-50 Planning Standards for Establishing New Education Institutes 3-68
Table 3-51 District Orakzai Primary School Backlog & Requirement 3-71
Table 3-52 District Orakzai Middle/Secondary School Backlog & Requirement 3-71
Table 3-53 District Orakzai Urban Areas Primary School Backlog 3-72
Table 3-54 District Orakzai Urban Areas Middle and Secondary Schools Backlog 3-72
Table 3-55 Tehsil Wise Educational Facilities Area Requirements 3-74
Table 3-56 Urban Area Wise Educational Facilities Area Requirements 3-75
Table 3-57 Existing Government Health Institutions and Bed Strength in Orakzai 3-80
Table 3-58 District Wise Population per Government Hospital/Dispensary Bed in Orakzai 3-80
Table 3-59 Healthcare Professionals in Orakzai District 3-80
Table 3-60 Town/Tehsil wise Health Satisfactory Survey 3-81
Table 3-61 Reasons for Dissatisfaction of Health Facilities - Tehsil-Wise 3-82
Table 3-62 Planning Standards for Establishing New Health Facilities 3-84
Table 3-63 Tehsil Upper Orakzai Health Facilities Backload and Requirements 2045 3-86
Table 3-64 Tehsil Central Orakzai Health Facilities Backload and Requirements 2045 3-86
Table 3-65 Tehsil Lower Orakzai Health Facilities Backload and Requirements 2045 3-86
Table 3-66 Tehsil Ismail Zai Health Facilities Backload and Requirements 2045 3-86
Table 3-67 Kalaya Urban Canter Health Facilities Backload and Requirements 2045 3-87
Table 3-68 Dabori Urban Canter Health Facilities Backload and Requirements 2045 3-87
Table 3-69 Ghiljo Urban Canter Health Facilities Backload and Requirements 2045 3-87
Table 3-70 Tehsil Wise Health Facilities Area Requirements 3-89
Table 3-71 Urban Centers Health Facilities Area Requirements 3-91
Table 3-72: Tehsil wise Recreation Satisfaction Level 3-103
Table 3-73:Tehsil wise Recreation Dissatisfaction Level 3-103
Table 3-74 Passive Recreation Facilities Allocation Criteria 3-105
Table 3-75 kalaya Reactional Area Requirements and Proposals 3-106
Table 3-76 Ghiljo Reactional Area Requirements and Proposals 3-107
Table 3-77 Dabori Reactional Area Requirements and Proposals 3-108
Table 3-78 Existing Religious Facilities 3-113
Table 3-79 Availability of Graveyard Facility 3-115
Table 3-80: District Orakzai Agriculture Land Utilization From 2020-21 till 2022-23 (In Hectares) 3-117
Table 3-81: District Orakzai Agricultural Production Profile From 2020-21 till 2021-23 3-119
Table 3-82: District Orakzai Irrigated Area by Different Types of Irrigation From 2020-21 till 2022-23 3-119
Table 3-83: District Orakzai Livestock Population Comparison with Khyber Pakhtunkhwa 3-128
Table 3-84: District Orakzai Fisheries Production Comparison with District Kohat and Khyber Pakhtunkhwa 3-129
Table 3-85 Existing Micro Hydle Power Units Orakzai 3-139
Table 3-86 Installation of Solar Mini-Grids in Orakzai 3-140
Table 3-87: Proposed Institutional and Regulatory Strengthening 3-142
Table 3-88: Proposed Technology Upgradation 3-142
Table 3-89: Proposed Energy Sector Development 3-142
Table 3-90: District Orakzai Industries Categorization by Size 3-143

Table 3-91: District Orakzai Industries Categorization by Type 3-145
Table 3-92: District Orakzai Industrial Growth Pattern.....3-145
Table 3-93: District Orakzai Industries Ownership Pattern 3-146
Table 3-94: Proposed Industrial Development 3-148
Table 3-95 District Orakzai Required & Proposed Industrial Areas.....3-151
Table 3-96 District Orakzai Urban Areas Required & Proposed Industrial Areas 3-152
Table 3-97: Cross Border Vehicular Movement from Khurlachi 3-158
Table 3-98: Trade Volume at land Border Crossing KP (Rs.Million) 3-158
Table 3-99 District Orakzai Commercial Requirements 3-161
Table 3-100 District Orakzai Proposed Urban Commercial Requirements.....3-162
Table 3-101: Future Trade and Commerce Development Short Term Proposals 3-162
Table 3-102: Future Trade and Commerce Development Medium Term Proposals.....3-163
Table 3-103: Future Trade and Commerce Development Long Term Proposals 3-163
Table 3-104: Current and Future Solid Waste Generation in Rural Settlements 3-169
Table 3-105: Current and Future Solid Waste Generation in Kalaya 3-169
Table 3-106: Current and Future Solid Waste Generation in Ghiljo.....3-170
Table 3-107: Current and Future Solid Waste Generation in Dabori 3-170
Table 3-108: Resource Evaluation for Waste Collection and Transportation in Rural Settlements (2025-2045).....3-171
Table 3-109: Resource Evaluation for Waste Collection and Transportation in Kalaya (2025-2045) .3-172
Table 3-110:Resource Evaluation for Waste Collection and Transportation in Ghiljo (2025-2045) 3-172
Table 3-111:Resource Evaluation for Waste Collection and Transportation in Daboori (2025-2045).3-172
Table 3-112: Details of Project Area Population.....3-177
Table 3-113: Existing Scheme Data in Orakzai.....3-181
Table 3-114: Average per Capita Water Consumption 3-190
Table 3-115: Current and Future Need of Water.....3-191
Table 3-116: Phase-wise Tube well Requirement in Rural Settlements 3-193
Table 3-117: Required Number of tube wells in Urban Center 3-194
Table 3-118: Required OHRs in Urban Centers 3-194
Table 3-119: Sewage flow (2025-2045) in Rural Settlements.....3-206
Table 3-120: Sewage Flow in Urban Settlements.....3-206
Table 3-121: Development schemes in District Orakzai.....3-207
Table 3-122 Strategy and Intervention for Water & Sanitation 3-213
Table 3-123 Strategy and Intervention for Solid Waste Management.....3-214
Table 3-124 Strategy and Intervention for Forestry, Ecology & Biodiversity.....3-214
Table 3-125 Strategy and Intervention for Air and Water Pollution Control 3-216
Table 3-126 Strategy and Intervention for Climate Resilience and Disaster Risk 3-216
Table 3-127 Strategy and Intervention Renewable and Sustainable Infrastructure.....3-216
Table 3-128 Environmental Proposal.....3-217
Table 3-129: Showing Seismic Hazard Zones of KP alongwith Peak Horizontal Ground Acceleration BCP, SP 2007.....3-234
Table 3-130 Composite Earthquake Catalogue Showing Instrumental Seismic Events Magnitudes (Mw) Ranging from (6.0 to 6.9) of District Orakzai, KP 3-236

Table 3-131 Composite Earthquake Catalogue Showing Instrumental Seismic Events Magnitudes (Mw) Ranging from (7.0 to 8.5) of District Orakzai, KP 3-239
Table 3-132 GDP Estimates of Khyber Pakhtunkhwa (2015-22 - Rs. Million) 3-259
Table 3-133: Land Utilization in District Orakzai 3-260
Table 3-134: Crops, Area, Production and Yield in District Orakzai 3-260
Table 3-135 : Vegetable and Fruits Cultivation in District Orakzai 3-260
Table 3-136: Livestock Population in District Orakzai 3-261
Table 3-137 Number of Hospital, Veterinary, Dispensaries, and centers 3-262
Table 3-138 Number of Industries in Orakzai District 3-262
Table 3-139: Godowns in District Orakzai 3-263
Table 3-140: Mining in District Orakzai (Tonnes) 3-263
Table 3-141 : Labour Force Data Orakzai District 3-266
Table 3-142: Major Interventions for the District Economy 3-269
Table 3-143 Potential Tourism and key Destination Sites 3-282
Table 3-144 Proposed Tourism Action Plans 3-284
Table 4-1 Urban Area Housing Area Requirements 4-3
Table 4-2 District Orakzai Commercial Requirements 4-5
Table 4-3 District Orakzai Proposed Urban Commercial Requirements 4-5
Table 4-4 District Orakzai Required & Proposed Industrial Areas 4-6
Table 4-5 District Orakzai Urban Areas Required & Proposed Industrial Areas 4-7
Table 4-6 Urban Areas Projected Populations 4-14
Table 4-7 Kalaya Urban Center Existing and Proposed Land use Stats 4-16
Table 4-8 Dabori Urban Center Existing and Proposed Land use Stats 4-20
Table 4-9 Dabori Urban Center Existing and Proposed Land use Stats 4-24
Table 4-10 Population Projections 4-31
Table 4-11 District Proposed Zones Stats 4-32
Table 4-12: Tehsil Upper Orakzai Proposed Zones Stats 4-39
Table 4-13 Tehsil Ismail Zai Proposed Zones Stats 4-48

List of Figures

Figure 1-1: Objective of the Study 1-2
Figure 1-2 Project Process Mind Map 1-3
Figure 1-3: Stepwise Project Process 1-4
Figure 1-4: Stepwise Project Process 1-5
Figure 1-5 Focus Group Discussions (FGDs) in Upper Orakzai (Ghiljo) 1-10
Figure 1-6 Focus Group Discussions (FGD) in Upper Orakzai (Khadizai) 1-10
Figure 1-7 Focus Group Discussions (FGD) in Central Orakzai (Taghasam) 1-11
Figure 1-8 Focus Group Discussions (FGD) in Central Orakzai (Rangeen Khel) 1-11
Figure 1-9 Focus Group Discussions (FGD) in Lower Orakzai (Kalaya) 1-12
Figure 1-10 Focus Group Discussions (FGD) in Lower Orakzai (Khwa Dara) 1-12
Figure 1-11 Focus Group Discussions (FGD) in Lower Orakzai (Khwadara) 1-13
Figure 1-12 Focus Group Discussions (FGD) in Ismail Zai Orakzai (Ghuzghar) 1-13
Figure 1-13 Focus Group Discussions (FGD) in Ismail Zai Orakzai (Chany Kaly) 1-14
Figure 1-14 Focus Group Discussion (FGDs) with Civil Societies Organization (Trade Union), Orakzai 1-14
Figure 1-15 Focus Group Discussion (FGD) with Political Union, Orakzai 1-15
Figure 1-16 Focus Group Discussion (FGD) with Press Club, Orakzai 1-15
Figure 1-17 Focus Group Discussion (FGD) with District Bar Association, Orakzai 1-16
Figure 1-18: Monthly Distribution of Rainfall in Cherat 1-25
Figure 1-19: Total Number of Rainy Days 1-25
Figure 1-20: Mean Monthly Temperatures in Cherat 1-28
Figure 1-21: Mean Monthly Relative Humidity in Cherat 1-29
Figure 1-22: Mean Monthly Wind Speed in Cherat 1-30
Figure 1-23: Prevailing Wind Directions 1-32
Figure 1-24: District Orakzai Occupation Wise In-Migration from Labour Force Survey 2021-2022 ...1-45
Figure 1-25: District Orakzai Literacy Ration by Age and Sex 1-54
Figure 1-26 Educational Attainment of District Orakzai as per LFS 2021 2022 1-55
Figure 1-27 Educational Attainment of District Orakzai as per Census 2023 1-57
Figure 1-28 Occupation of District Orakzai from LFS 2021-2022 1-60
Figure 1-29 Occupation of District Orakzai from Census 2023 1-61
Figure 3-1: Typical Cross-section of Hilly Terrain 3-48
Figure 3-2: Typical Cross-section of Rolling Terrain 3-49
Figure 3-3 Stadium pavilion at sports complex Kalaya 3-95
Figure 3-4 Construction of Sports Complex at Ghundaki Orakzai District 3-96
Figure 3-5: Served and Unserved Population in Orakzai District 3-192
Figure 3-6: The Modified Mercalli (MMI) Scale 3-224
Figure 3-7: Generalized Geotectonic Map of Northern Pakistan showing Major geologic faults and features. (After Ahmad et al., Pakistan Journal of Hydrocarbon Research, 2005.) 3-228
Figure 3-8 Showing Seismic Hazard Zoning of KP, BCP, SP 2007 3-234
Figure 4-1: Suggested Settlement Hierarchy 4-52

List of Maps

Map 1-1 Location Map of the Project Area 1-7
Map 1-2: Available Water Resources in District Orakzai 1-21
Map 1-3: Available Water Resources (Streams) in District Orakzai 1-23
Map 1-4: Orakzai District Overlayed on Annual Normal Isohyetal Map 1-26
Map 1-5: Elevation Map of the Project Area 1-33
Map 1-6: Seismic Zoning Map of District Orakzai 1-35
Map 1-7: Soil Properties Map of Orakzai District 1-37
Map 1-8: Land Cover Map of Orakzai District 1-39
Map 1-9 Kalaya Land Cover Map 2003 1-66
Map 1-10 Kalaya Land Cover Map 2008 1-67
Map 1-11 Kalaya Land Cover Map 2013 1-68
Map 1-12 Kalaya Land Cover Map 2018 1-69
Map 1-13 Kalaya Land Cover Map 2023 1-70
Map 1-14 Ghiljo Urban Area Land Cover Map 2003 1-72
Map 1-15 Ghiljo Urban Area Land Cover Map 2008 1-73
Map 1-16 Ghiljo Urban Area Land Cover Map 2013 1-74
Map 1-17 Ghiljo Urban Area Land Cover Map 2018 1-75
Map 1-18 Ghiljo Urban Area Land Cover Map 2023 1-76
Map 1-19 Dabori Urban Area Land Cover Map 2003 1-78
Map 1-20 Dabori Urban Area Land Cover Map 2008 1-79
Map 1-21 Dabori Urban Area Land Cover Map 2013 1-80
Map 1-22 Dabori Urban Area Land Cover Map 2018 1-81
Map 1-23 Dabori Urban Area Land Cover Map 2023 1-82
Map 1-24: Kalaya Proposed Urban Center Map 1-97
Map 1-25 Ghiljo Proposed Urban Center Map 1-99
Map 1-26 Dabori Proposed Urban Center Map 1-101
Map 2-1: Location Map of District Orakzai 2-2
Map 2-2 Location Index Map 2-3
Map 2-3 Tehsil Upper Orakzai Land Use Map 2-6
Map 2-4 Tehsil Central Orakzai Land Use Map 2-9
Map 2-5 Tehsil Lower Orakzai Land Use Map 2-12
Map 2-6 Tehsil Ismail Zai Land Use Map 2-14
Map 2-7: Land use Index Map (Urban Center: Kalaya) 2-17
Map 2-8: Land use Index Map (Urban Center: Ghilijo) 2-20
Map 2-9: Land use Index Map (Urban Center: Dabori) 2-23
Map 3-1 Proposed Residential Zones 3-9
Map 3-2 The Hierarchy of Roads in Orakzai 3-11
Map 3-3 Intersections' MCC locations 3-17
Map 3-4 : Satellite image and orientation of Headquarter Chowk 3-19
Map 3-5 Satellite image and orientation of Mirai Chowk 3-21
Map 3-6 Satellite image and orientation of Khuzdara ChowkThe following Graph 3-3 shows the average traffic split at the intersection with a summary of traffic and Table 3.14 shows ADT in all directions of the intersection. 3-23
Map 3-7 Satellite image and orientation of Shohada Chowk shows average traffic split on the intersection whereas a summary of traffic and table 3.14 shows ADT in all directions of the intersection 3-25

Map 3-8 Details of Cordon MCC and OD surveys 3-28
Map 3-9 Traffic (ADT) on major road network 3-34
Map 3-10 Zone distribution of Orakzai 3-36
Map 3-11 Proposed Bus Terminals Map 3-44
Map 3-12 District Orakzai Proposed Roads Map 3-50
Map 3-13 Existing Education Facilities in District Orakzai 3-57
Map 3-14 Proposed Educational Zones Map 3-78
Map 3-15 Existing Health Facilities, District Orakzai 3-83
Map 3-16 District Orakzai Proposed Health Zones 3-93
Map 3-17 Existing Sports Facilities Map 3-97
Map 3-18 Existing Sports Facilities in District Orakzai 3-99
Map 3-19 Proposed Reactional Zones 3-104
Map 3-20 District Orakzai Proposed Reactional Zones 3-109
Map 3-21 Social Security Points in District Orakzai 3-112
Map 3-22 Religious Points Map 3-114
Map 3-23 Existing Graveyards in District Orakzai 3-116
Map 3-24: District Orakzai Agriculture Land Us 3-118
Map 3-25 District Orakzai Proposed Agriculture Zones 3-127
Map 3-26: Coal Mines in District Orakzai 3-138
Map 3-27: Industries in Orakzai District 3-144
Map 3-28 Proposed Industrial/Light Manufacturing Sites for District Orakzai 3-150
Map 3-29: District Orakzai Proposed SIDE Site and Light Manufacturing Zones 3-155
Map 3-30 Proposed Commercial Zones of District Orakzai 3-164
Map 3-31 Proposed Commercial Zones of District Orakzai 3-165
Map 3-32: Proposed Landfill Sites in Urban Center 3-173
Map 3-33: Available Water Resources in District Orakzai 3-179
Map 3-34: Location of Existing Tube Wells in District Orakzai 3-189
Map 3-35:Location of proposed OHR in Dabori 3-196
Map 3-36: Dabori Proposed Water Supply Network Map 3-197
Map 3-37:Location of Proposed TW in Dabori 3-198
Map 3-38:Location of Proposed OHR in Ghiljo 3-199
Map 3-39: Ghiljo Proposed Water Supply Network Map 3-200
Map 3-40:Proposed Tube well Location in Ghiljo 3-201
Map 3-41:Proposed OHR in Kalaya 3-202
Map 3-42: Kalaya Proposed Water Supply Network Map 3-203
Map 3-43:Proposed Tube well in Kalaya 3-204
Map 3-44:Proposed Sewerage system in Kalaya 3-208
Map 3-45:Proposed Sewerage System in Ghiljo 3-209
Map 3-46:Proposed Sewerage System in Dabori 3-210
Map 3-47:Proposed WWTP in Urban centers 3-211
Map 3-48 Physiographic Map of District Orakzai 3-219
Map 3-49 Elevation Map of District Orakzai 3-223
Map 3-50 Sub Regional Geological Map of District Orakzai 3-225
Map 3-51 Geotectonic Map of District Orakzai 3-227
Map 3-52: A part of Geological Map of Pakistan by GSP showing the geology and structural features of District Orakzai 3-230
Map 3-53: Seismic Zoning Amp of District Kurram 3-233

Map 3-54 Earthquake Focal Depth Map of District Orakzai 3-238
Map 3-55 Drainage Map of District Orakzai 3-242
Map 3-56: Drainage Basin Map of District Orakzai 3-243
Map 3-57 Flood Hazard Zoning Map of District Orakzai 3-247
Map 3-58 Slope Map of District Orakzai 3-252
Map 3-59 Landslide Hazard Susceptibility Zones Map of District Orakzai 3-254
Map 3-60: Protentional Tourism Sites in District Orakzai 3-281
Map 3-61: District Orakzai Proposed Tourist Sites Map 3-286
Map 4-1: Kalaya Urban Center Proposed Zonings 4-17
Map 4-2 Dabori Urban Center Proposed Zonings 4-21
Map 4-3 Ghiljo Urban Center Proposed Zonings 4-25
Map 4-4 District Orakzai Proposed Zones Map 4-33
Map 4-5 Tehsil Upper Orakzai Proposed Zones Map 4-40
Map 4-6 Tehsil Central Orakzai Proposed Zones Stats 4-42
Map 4-7 Tehsil Central Orakzai Proposed Zones Map 4-43
Map 4-8 Tehsil Lower Orakzai Proposed Zones Stats 4-45
Map 4-9 Tehsil Lower Orakzai Proposed Zones Map 4-46
Map 4-10 Tehsil Ismail Zai Proposed Zones Map 4-49

List of Graphs

Graph 3-1 Average traffic split at Headquarter Chowk 3-19
Graph 3-2 Average traffic split at Mirai Chowk 3-21
Graph 3-3 Average traffic split at Khuzdara Chowk 3-23
Graph 3-4 Average traffic split at Shohada Chowk 3-25
Graph 3-5 Weekly traffic variation at Daboori Check post cordon point 3-30
Graph 3-6 Weekly traffic variation at Zera Check post cordon point 3-31
Graph 3-7 Summary of ADTs of both Cordon points 3-32
Graph 3-8 Consolidated Origin-Destination matrix of Orakzai 3-37

1 PROLOGUE

1.1 Introduction

1.1.1 Background

Khyber Pakhtunkhwa's population is growing at an annual rate of 2.89%[1], and at this pace, it is projected to double by 2045. This rapid growth will place significant pressure on the province's natural resources and public infrastructure, leading to challenges such as inefficient land use, the conversion of agricultural land for commercial and residential purposes, water scarcity, deforestation, and environmental degradation. To address these issues, comprehensive district-level land use planning is essential to ensure the sustainable and efficient management of resources for present and future generations. Land use planning plays a pivotal role in shaping settlements' social and economic landscape by assessing future population size, structure, and distribution. It also serves as a strategic tool for guiding agricultural and industrial development. Recognizing its importance, the Government of Khyber Pakhtunkhwa has initiated the preparation of District Land Use Plans (DLUPs) for all districts of the province. To implement this initiative, the Provincial Land Use Plan Project (PLUP) and the Urban Policy and Planning Unit (UPPU) have awarded a consultancy contract through a competitive bidding process to the National Engineering Services of Pakistan (Pvt) Limited for the preparation of land use plans of 2 districts. The Land Use Plan for District Orakzai is a comprehensive and evidence-based planning document. This plan is a strategic framework to guide future growth by developing a comprehensive approach to land use and spatial planning in response to rapid population growth, urban expansion, and unregulated land conversion. Utilizing both primary and secondary data sources, the planning process involved household surveys, transportation and land use surveys, and stakeholder consultations. The plan proposes land use zoning, new urban areas to optimize land use, and minimize conflicts between residential, commercial, agricultural, and industrial land use. It emphasizes protecting ecologically sensitive areas through evidence-based planning. The plan incorporates legal mechanisms, institutional roles, and regulatory guidelines to support its execution at the district level. Furthermore, The Land Use Plan will help to induce a sustainable development, optimize exploitation of land and physical resources, enhancing provincial income, increase overall activity and balanced distribution of infrastructure and services. The Land Use Plan will be a tool to provide guidance to Provincial Government, Urban Policy Unit and TMAs for undertaking integrated and coherent development programs. Based on many studies, District Land Use Plan deals with efficient placement of broad, District-level Land Use and zoning for the sustainable growth of a District as a whole. It differs from the urban structure plans in many ways. A District can have more than one urban area and hundreds of villages and the District Plan have to consider these all. Besides, the nature of Land Uses at District level is not commonly found in an urban area, such as large-scale agriculture, rangeland, forestry, livestock, fishery etc. As against District Plan, the focus in urban plans is identification of issues and solutions for Central Business District, neighborhood planning, urban municipal services etc.

[1] 6th Population Census & Housing Census 2017, Pakistan Bureau of Statistics, Govt of Pakistan.

1.1.2 Objective

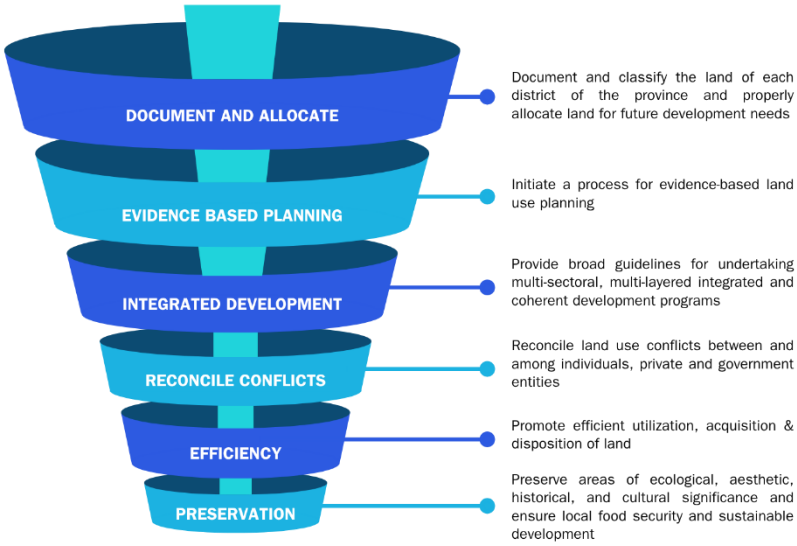


Figure 1-1: Objective of the Study

1.1.3 Land Use Planning Process

Land use planning is believed to be holistic and relies on a detailed study of the project area and a thorough and critical analysis of data, as well as being responsive to the growing needs of the diversifying population. The consultant maintains that effective land use planning promotes sustainable development by simultaneously transforming the physical landscape and strengthening economic foundations. The balance between economic growth and environmental protection may not be achieved solely through the land use plans prepared by technical expertise of consultants, only rather requires participation of Government entities and all relevant stakeholders in the process. The preparation process of the District Land Use Plan is classified into 09 steps presented.

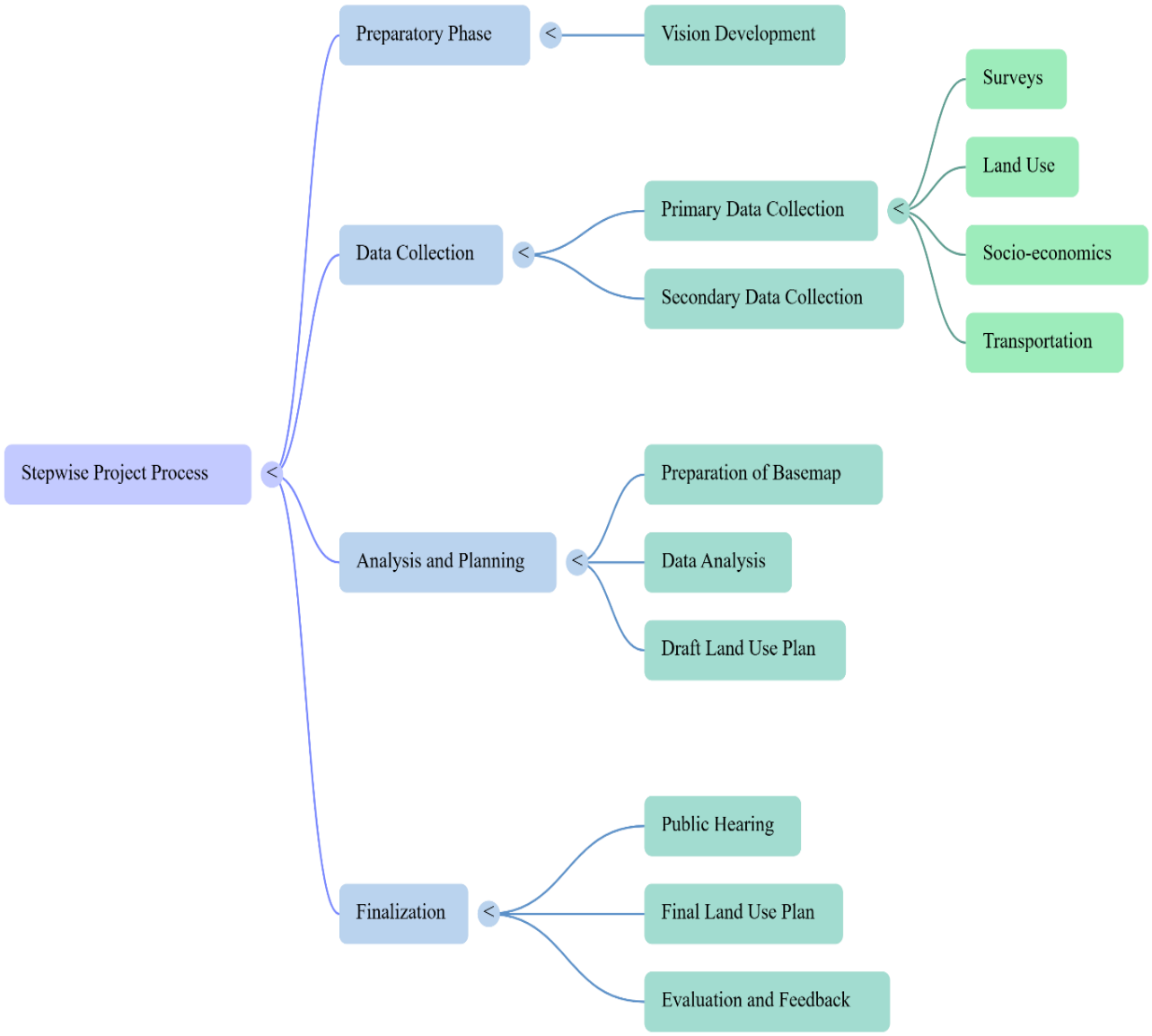


Figure 1-2 Project Process Mind Map



Figure 1-3: Stepwise Project Process

1.1.4 Project Methodology

The planning process for the District Land Use Plan follows a structured and phased approach. It begins with the Preparatory Phase, where the consultant reviews the Terms of Reference (TORs), finalizes the methodology, and Key stakeholders were identified, and reviews their involvement at different stages of the project. This was followed by Vision Development, in which a collective vision for the district was formulated through focus group discussions and (FG), stakeholder workshops. The next step, Data Collection, involved gathering both primary and secondary data across multiple sectors, including housing, transport, environment, and Land use surveys. Using this data, the team proceeded with the Preparation of Base Maps and GIS-based spatial classification to visualize existing land use patterns. These components fed into a comprehensive Data Analysis phase, where socioeconomic trends, land utilization patterns, and urbanization dynamics were evaluated. Based on these insights, the Draft Land Use Plan was prepared, outlining zoning proposals, infrastructure distribution, and regulatory frameworks. The consultant will conduct a public hearing immediately after the draft land use plan is prepared to solicit feedback from stakeholders and the general public. The input gathered during the hearing will be carefully reviewed and incorporated where necessary to refine the final land use plan. The final land use plan will be approved by the Land Use and Building Control Council and will be handed over to the district administration for implementation and execution.

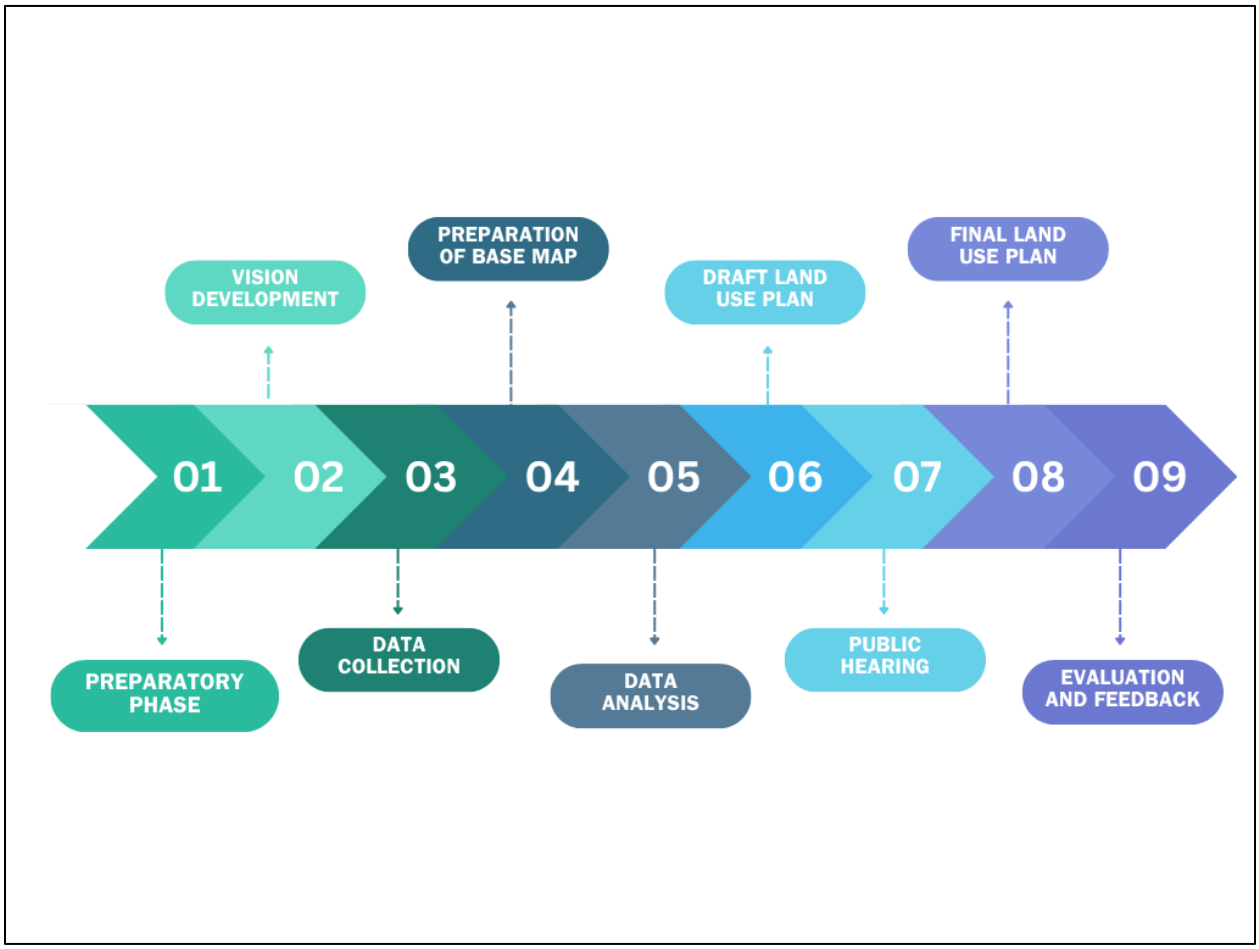
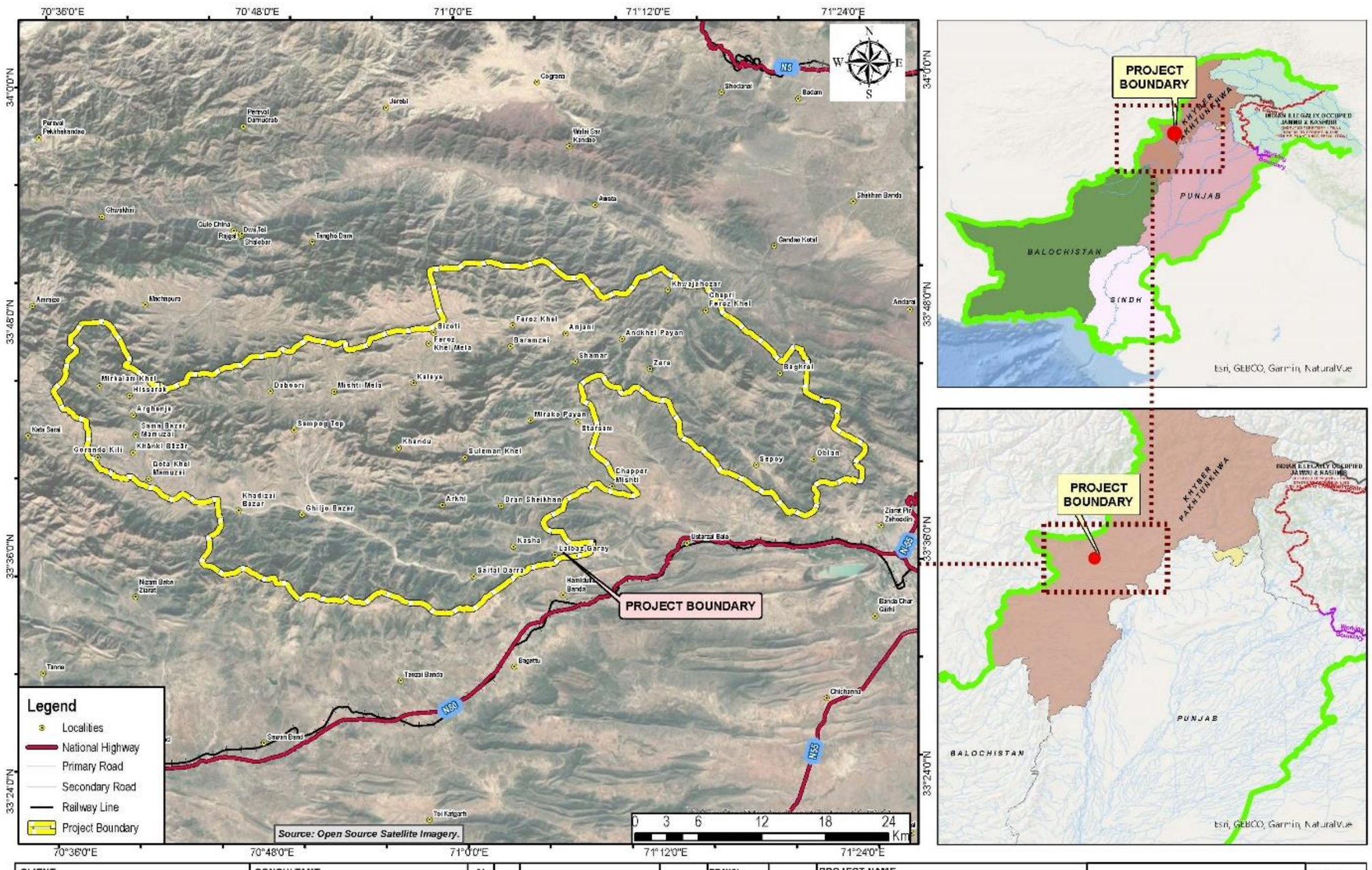


Figure 1-4: Stepwise Project Process

1.1.6 Project Area

District Orakzai is located in the Western part of Khyber Pakhtunkhwa with its geometric centroid at 33.684°N, 70.942°E. The district is bordered by the Khyber district in the North. Towards its East, it is bordered by District Kohat and in the South, by District Hangu. Kurram district lies to the West of District Orakzai. The total area of the district is 1538 sq. km. The district is divided into 04 Tehsils with a total population of 403,751. Among them, Upper Orakzai has a population of 136,796, Centre Orakzai 96,784, Lower Orakzai 130,015, and Ismail Zai 40,156. The locational map of the District Orakzai concerning Khyber Pakhtunkhwa and the Western region is represented in Map Below.



CLIENT: PROVINCIAL LANDUSE PLAN, URBAN POLICY & PLANNING UNIT P&D DEPARTMENT KHYBER PAKHTUNKHWA	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04			DRAWN	PROJECT NAME: PROVINCIAL LANDUSE PLAN, URBAN POLICY & PLANNING UNIT P&D DEPARTMENT KHYBER PAKHTUNKHWA	PROJECT LOCATION MAP
		03			SUBMITTED		
		02			RECOMMENDED		
		01			CHD/VER.		
		REV.	DATE	DESCRIPTION	APPROVED / APPROVED		DATE: MARCH- 2025 / FIG. NO. / REV.: 0 / SCALE: 1:325,000

Map 1-1 Location Map of the Project Area

1.2 Vision Development

Vision formulation is a crucial process that involves defining the collective desires of a community through active stakeholder engagement. During this undertaking, community members come together to align their shared values and objectives, ultimately crafting a unified vision for their community's future. This vision serves as a blueprint, outlining the physical, social, and environmental aspects that the community aspires to achieve over the next two decades.

Stakeholder Consultation is a process of systematically gathering and analyzing qualitative information to determine whose interests should be taken into account when developing and/or implementing a plan, policy or program.

Stakeholders in a process are actors (persons or organizations) with a vested interest in the plan/ policy being implemented and promoted. These stakeholders are usually grouped into different categories Government Departments/ Agencies, Local Political (legislators, governors), civil society organizations like Bar council, traders' associations, press club, political party local level leaders etc.

Timely and broad-based stakeholder involvement is an essential element for an effective Project planning and implementations. Public involvement during Land Use Planning of the Districts has a tendency to improve project design, environmental soundness and social acceptability.

Table 1-1 List of Participated Stakeholders

Sr. No.	Departments
1.	Deputy Commissioner Office Orakzai
2.	Provincial Land Use Plan Urban Policy & Planning Unit (UPU) P & D Department KP
3.	Communication & Works Department
4.	Planning and Development Department
5.	Local Government
6.	Tehsil Municipal Administration (TMA)
7.	Agriculture Department
8.	Public Health Engineering (PHE)
9.	Irrigation Department
10.	Education Department
11.	Health Department
12.	BOR
13.	Wildlife Department
14.	Forest Department
15.	Police Department

Table 1-2 Stakeholder Consulted in the Project Area

Sr.	NC/VC
1	Ghiljo NC
2	Kalaya NC
3	Khadizai VC
4	Rangeen Khel VC
5	Taghasam VC
6	Khwadara VC
7	Ghuzghar VC
8	Chaney Kaly VC



Figure 1-5 Focus Group Discussions (FGDs) in Upper Orakzai (Ghiljo)



Figure 1-6 Focus Group Discussions (FGD) in Upper Orakzai (Khadizai)



Figure 1-7 Focus Group Discussions (FGD) in Central Orakzai (Taghasam)



Figure 1-8 Focus Group Discussions (FGD) in Central Orakzai (Rangeen Khel)



Figure 1-9 Focus Group Discussions (FGD) in Lower Orakzai (Kalaya)



Figure 1-10 Focus Group Discussions (FGD) in Lower Orakzai (Khwa Dara)



Figure 1-11 Focus Group Discussions (FGD) in Lower Orakzai (Khwadara)



Figure 1-12 Focus Group Discussions (FGD) in Ismail Zai Orakzai (Ghuzghar)



Figure 1-13 Focus Group Discussions (FGD) in Ismail Zai Orakzai (Chany Kaly)



Figure 1-14 Focus Group Discussion (FGDs) with Civil Societies Organization (Trade Union), Orakzai



Figure 1-15 Focus Group Discussion (FGD) with Political Union, Orakzai



Figure 1-16 Focus Group Discussion (FGD) with Press Club, Orakzai



Figure 1-17 Focus Group Discussion (FGD) with District Bar Association, Orakzai

1.2.1 SWOT Analysis

District Orakzai, boasts a diverse array of strengths and opportunities, alongside inherent weaknesses and potential threats. As a region rich in natural resources and cultural heritage, Orakzai holds significant potential for economic development and prosperity. However, it also faces challenges typical of many developing areas, including infrastructure limitations and socio-political instability. In this SWOT analysis, we explore the key factors influencing the current state and future prospects of District Orakzai, shedding light on its strengths, weaknesses, opportunities, and threats.

Table 1-3 SWOT Analysis

Strength:	Weaknesses:
➢ Rich in hospitality, with native residents known for their welcoming nature. ➢ Abundance of stunning and perfect spots for tourism, attracting visitors. ➢ Availability of a rich variety of fruits, contributing to the local economy. ➢ Favorable climate supporting agriculture and other outdoor activities. ➢ Extensive forest cover providing ecological benefits and recreational opportunities. ➢ Spectacular natural scenery, attracting tourists and nature enthusiasts. ➢ Accessibility to the district, facilitating travel and connectivity. ➢ Abundance of walnut trees, a valuable natural resource for the local economy.	➢ Limited infrastructure development, hindering overall progress. ➢ Lack of comprehensive healthcare facilities, impacting public well-being. ➢ Insufficient educational resources, affecting the quality of education. ➢ Inadequate road networks, hampering transportation and connectivity. ➢ Limited access to modern amenities, leading to a lower standard of living.
Opportunities:	**Threats:**
➢ **Untapped tourism potential, providing avenues for economic growth.** ➢ **Potential for mining activities, exploiting mineral deposits for economic gain.** ➢ **Possibilities for hydro and wind energy projects, harnessing renewable energy sources.** ➢ **Agricultural prospects, including saffron cultivation and olive production.** ➢ **Development opportunities for coal deposits, contributing to energy security.** ➢ **Potential for dam construction for power generation and water management.**	➢ Environmental degradation due to unsustainable practices. ➢ Socio-political instability affecting peace and security. ➢ Vulnerability to natural disasters such as floods or landslides. ➢ Economic challenges curtailing from global or national economic downturns. ➢ External factors like changes in government policies or regulations impacting development projects.

1.2.2 Key Finding

The vision development exercise for District Orakzai highlighted a mix of opportunities and challenges. The district possesses immense tourism potential due to its scenic valleys, cultural heritage, and natural resources, while also offering prospects for small-scale industries and diverse employment avenues. However, access to essential facilities such as healthcare, education, transportation, electricity, banking, and telecommunication services remains limited, hampering quality of life and economic development. Recreational and sports facilities are also inadequate, restricting opportunities for youth engagement and community well-being.

Unplanned development, weak infrastructure, and the lingering impacts of militancy have slowed Orakzai's progress compared to other settled districts. Inadequate road connectivity, limited higher education opportunities, and a weak healthcare system further constrain growth. Moreover, the absence of comprehensive development regulations risks unorganized expansion and environmental degradation, potentially threatening the district's natural beauty and tourism potential.

The people of Orakzai aspire to elevate the district into a peaceful, modern, and thriving region by 2045. They seek to enhance healthcare, education, and social services, while fostering economic activities through tourism and small-scale industries. Sustainable development is a priority, ensuring the preservation of natural resources while fostering economic and social growth.

To achieve this vision, tourism promotion and small business expansion must be supported through government-backed incentives and infrastructure investment. The district has strong prospects for growth in hospitality, cultural tourism, and local industries, which can be realized by improving connectivity, providing essential services, and creating a favorable environment for investment. Additionally, upgrading road infrastructure and transport systems was identified as a key step in linking Orakzai with regional markets and stimulating economic prosperity. By addressing these critical areas, Orakzai could transition into a well-planned, modern, and economically vibrant district.

1.2.3 Vision Statement of District Orakzai

The vision statement aims to articulate the envisioned future of District Orakzai in 2045, assuming the implementation of the Land Use plan and associated policies. The following visions have been formulated based on the outcomes of focus group discussions and the consultative workshop.

1.2.3.1 Vision Statement Resulting from Consultations with The General Public in Neighborhood and Village Councils

"A peaceful and thriving living area, equipped with essential facilities, diverse employment opportunities, and heightened government focus. It fosters sustainable growth, community well-being, and guarantees a high quality of life for all residents."

1.2.3.2 Vision Statement Developed Through Consultations with Civil Society Organizations

"A living where residents thrive in a well-developed environment, enjoying comprehensive sports facilities, abundant job opportunities, and seamless access to essential facilities for daily life. We aim for a green and lush district, equipped with all basic services, including banking, mobile signals, and a reliable transportation system, ensuring a high quality of life for all."

1.2.3.3 Vision Statement Developed by Group-A During the Consultative Workshop

"To transform District Orakzai into a modern and thriving region, mirroring the development standards of KPK, characterized by pervasive peace and emerging as a prime tourist destination. Our goal is to prioritize

infrastructure enhancement, education, and recreational facilities while ensuring the availability of essential services. We envision the establishment of a university, comprehensive road networks akin to Murree, and a robust healthcare system to meet public needs."

1.2.3.4 Vision Statement by Group-B During the Consultative Workshop

""To elevate District Orakzai to the status of a fully developed District, on par with major Districts like Peshawar and Lahore. We aspire for comprehensive progress across all sectors, with a particular focus on enhancing education, healthcare, and social services. Furthermore, we envision Orakzai emerging as a distinctive tourism hotspot within KPK, driving economic growth and prosperity through tourism revenue."

1.2.3.5 Vision Statement of Group-C During the Consultative Workshop

"District Orakzai to become economically and politically proactive, with an enhanced provision of social services. Despite challenges posed by militancy, we aim for gradual development, drawing inspiration from the scenic valleys of Swat, Shangla, Kohistan, and international destinations like Nepal. We envision Orakzai evolving into a modern and beautiful district, offering prosperity and tranquility to its residents and visitors alike."

1.2.3.6 Vision Statement of Group-D During the Consultative Workshop

"With a focused government intervention, we envision preventing Orakzai from lagging behind. Sustaining or improving the current state of peace is crucial for progress. Our vision entails a transformation into a beautiful district with small-scale economic development, ultimately achieving the status of a developed area akin to settled regions."

1.2.3.7 Vision 2045 for Orakzai District:

"A PROSPEROUS HUB WITH TOURISM EXCELLENCE"

"A prosperous hub, committed to providing essential facilities and fostering diverse job opportunities. The vision entails holistic progress across sectors, with a dedicated focus on enhancing education, healthcare, and social services. Orakzai aspires to emerge as a premier tourism destination, harnessing its abundant natural resources to drive economic growth and transform into a modern, thriving district, offering tranquility and prosperity to all its residents by 2045".

1.3 Physical Characteristic of the District

1.3.1 Hydrology and Water Resources

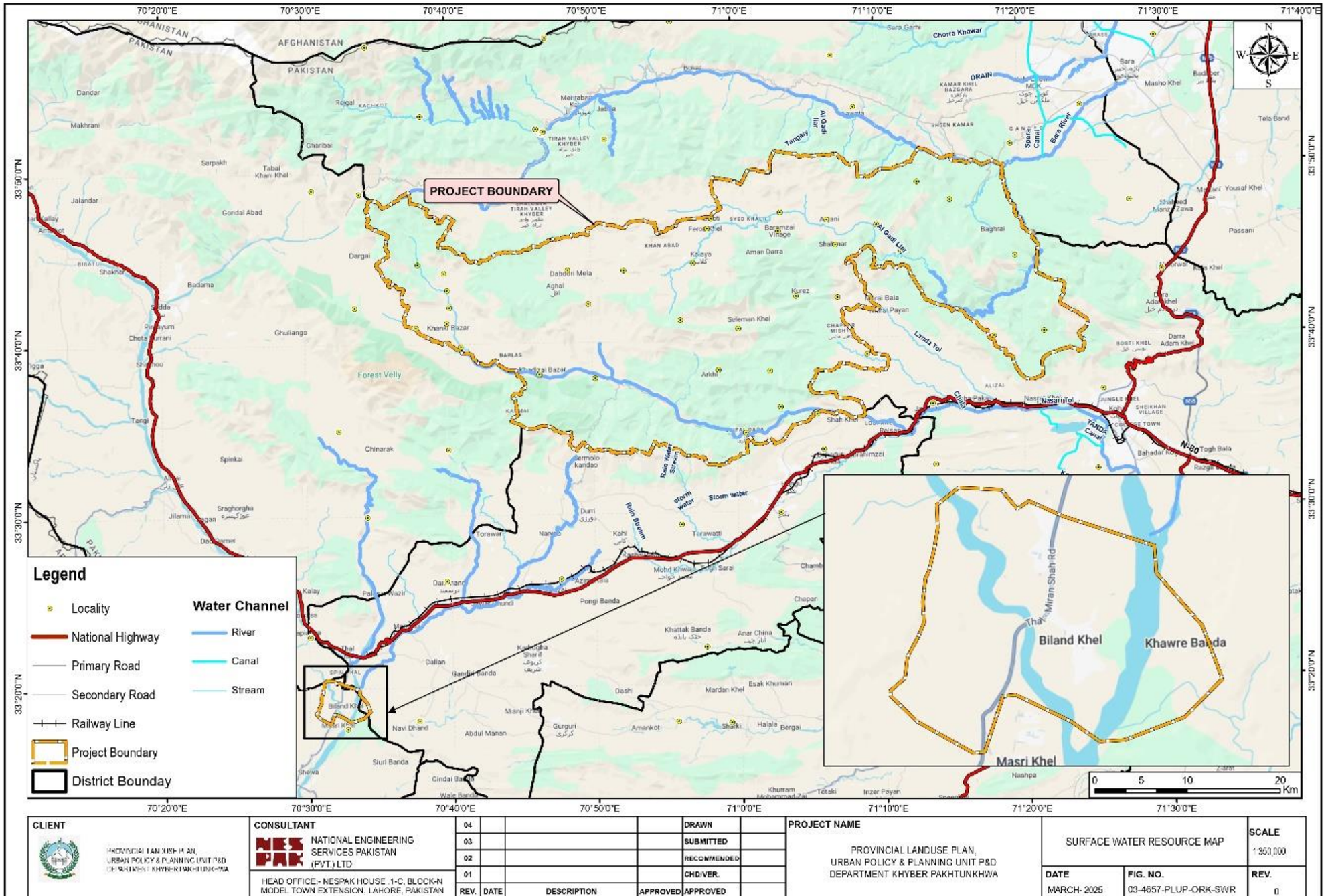
The hydrology of Orakzai District is shaped by its arid to semi-arid climate, where water remains a scarce yet strategic resource. Developing a land use map is therefore critical to ensuring sustainable water management, with an emphasis on cataloging rivers, streams, aquifers, and wetlands. Integrating hydrological data into planning enables watershed delineation, floodplain management, groundwater recharge, and rainwater harvesting strategies, all of which are essential to address the challenges of over-extraction, seasonal shortages, and contamination risks.

Given the district's rugged topography, hydrological studies are vital for assessing the availability, quality, and distribution of water resources while supporting flood risk mitigation, erosion control, and infrastructure resilience. These insights provide a foundation for reliable water supply planning to meet agricultural,

domestic, and industrial demands, ensuring that future development in Orakzai remains both environmentally sustainable and economically viable.

Ground Water

Groundwater in Orakzai District is mainly tapped through tube wells. A total of 11 successful tube wells are operational, of which 9 are located in Upper Orakzai and 2 in Lower Orakzai. In Upper Orakzai, tube wells are concentrated in Kalaya, Aiim Khan Khel, Kadda, and Feroz Khel, while in Lower Orakzai, they e Mishti area. These wells provide essential water for domestic and agricultural needs, though overall availability remains limited due to the district's semi-arid conditions. Surface Water

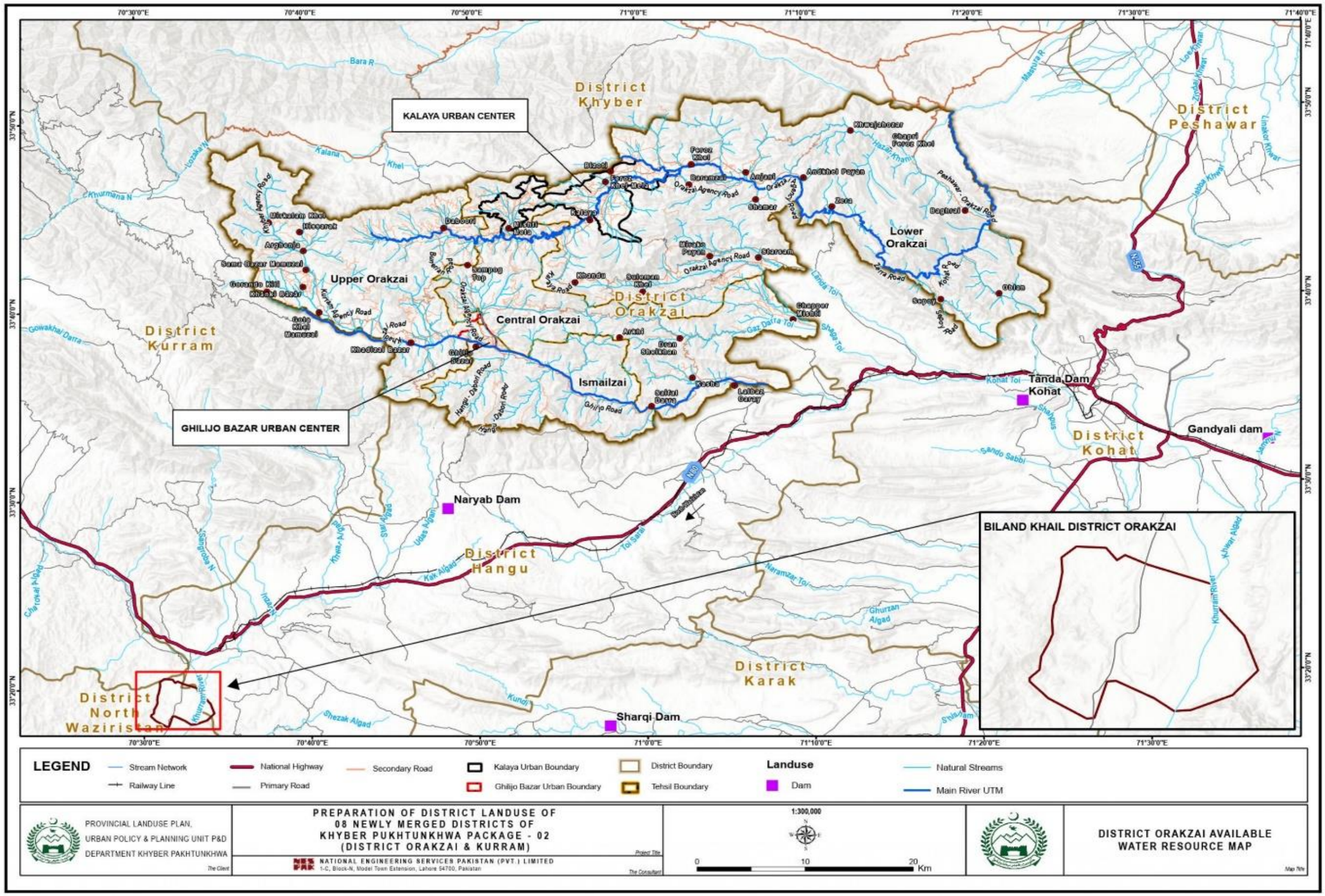


Map 1-2: Available Water Resources in District Orakzai

Surface water resources in Orakzai have been identified through topographic mapping and satellite imagery. Key sources include rivers, nullahs, and small dams that capture seasonal flows, primarily during the monsoon and winter rains. However, these resources are highly variable and dependent on seasonal precipitation, restricting year-round reliability for irrigation and household supply.

1.3.1.1 Water Table

Groundwater levels in Orakzai District vary considerably across different subregions due to its uneven terrain and semi-arid climate. In comparatively fertile plains such as Kalaya and Feroz Khel, water depths are relatively moderate, allowing for successful tube well operation. However, in hilly and rugged areas, the water table tends to be much deeper and less reliable, often requiring greater drilling depths and higher extraction costs. Seasonal rainfall further influences recharge rates, making the water table highly variable. This highlights the importance of developing artificial recharge zones, small dams, and improved irrigation practices to ensure sustainable groundwater use across the district.



Map 1-3: Available Water Resources (Streams) in District Orakzai

1.3.2 Climate of Project Area

The climate of Orakzai District is mainly arid to semi-arid, with marked seasonal variations. Winters are cold, often dropping below freezing in higher areas, while summers are mild to moderately warm. Rainfall is modest, concentrated in winter and monsoon months, leaving the region prone to drought and water scarcity. Climatic conditions are represented by the Pakistan Meteorological Department (PMD) station at Cherat, located about 50 km northeast of Orakzai, which provides reliable data on temperature, precipitation, and other parameters.

1.3.2.1 Precipitation

The Cherat Meteorological Station records an average annual rainfall of 662.6 mm, with maximum monthly rainfall of 103.2 mm in July and minimum of 17.6 mm in November. About 58% of the total rainfall occurs in February, March, July, and August, while November is typically the driest month. Isohyetal data (1991–2020) from PMD indicates that Orakzai District generally receives between 500 and 700 mm of rainfall annually.

Table 1-4: Mean Monthly Precipitation in Cherat[2]

Month	Mean Monthly Precipitation (millimeters)	Rainy Days (No.)
January	43.6	3.6
February	82.4	5.4
March	98.6	6.9
April	69.2	5.4
May	33.2	4.1
June	31.2	3.0
July	103.2	6.7
August	98.1	7.6
September	45.0	4.1
October	21.6	2.1
November	17.6	2.0
December	18.9	1.6

[2] Pakistan Meteorological Department (1991-2020)

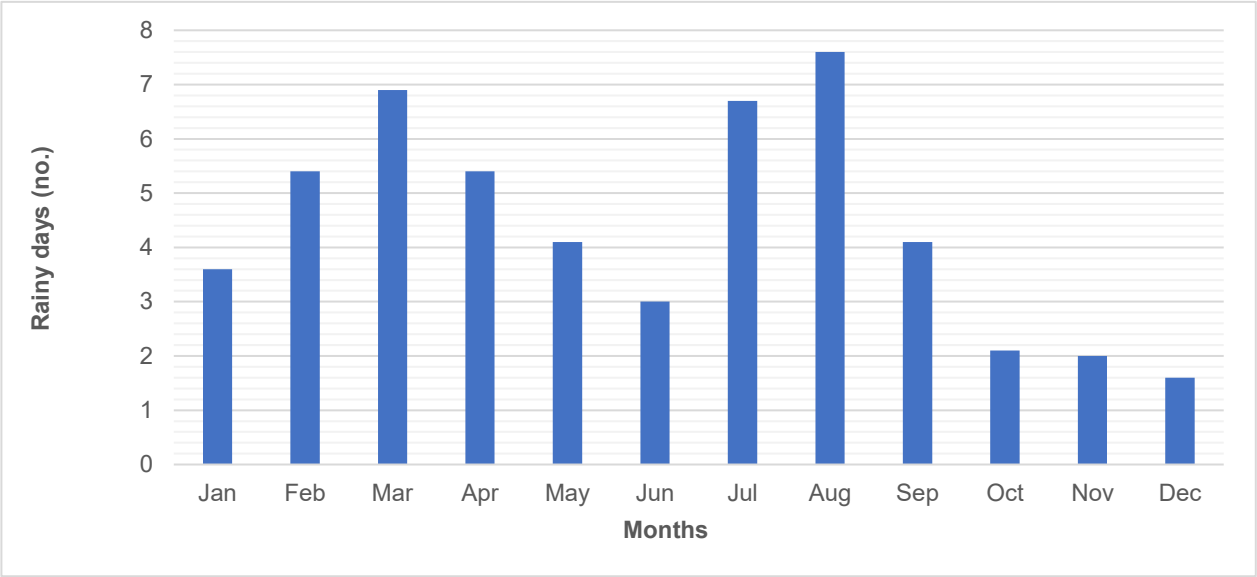


Figure 1-19: Total Number of Rainy Days

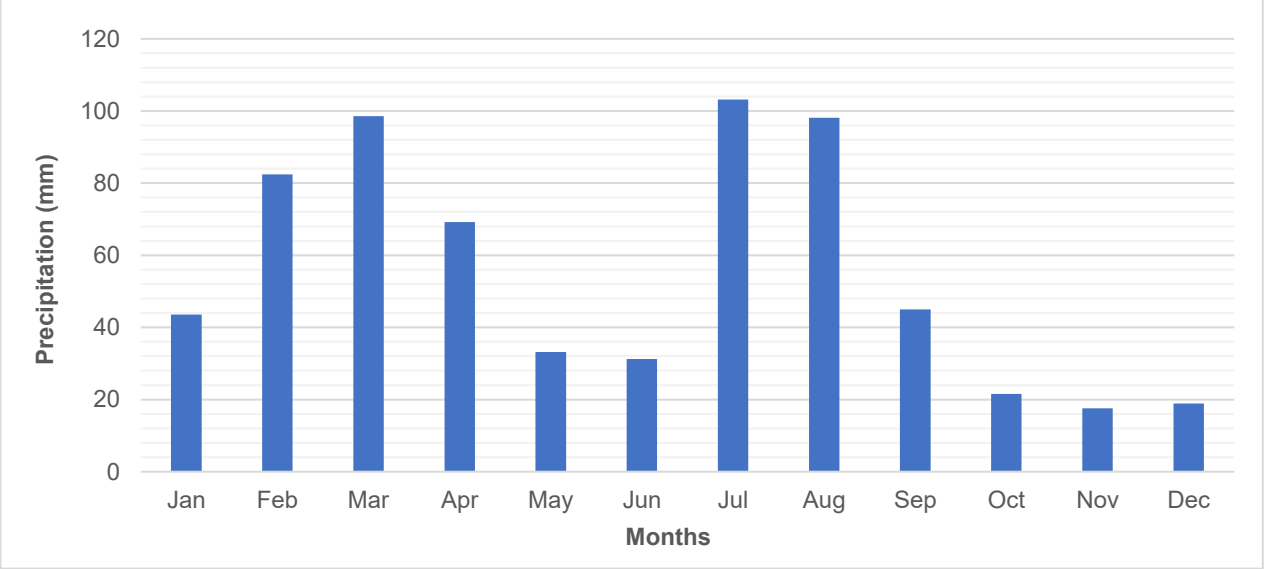
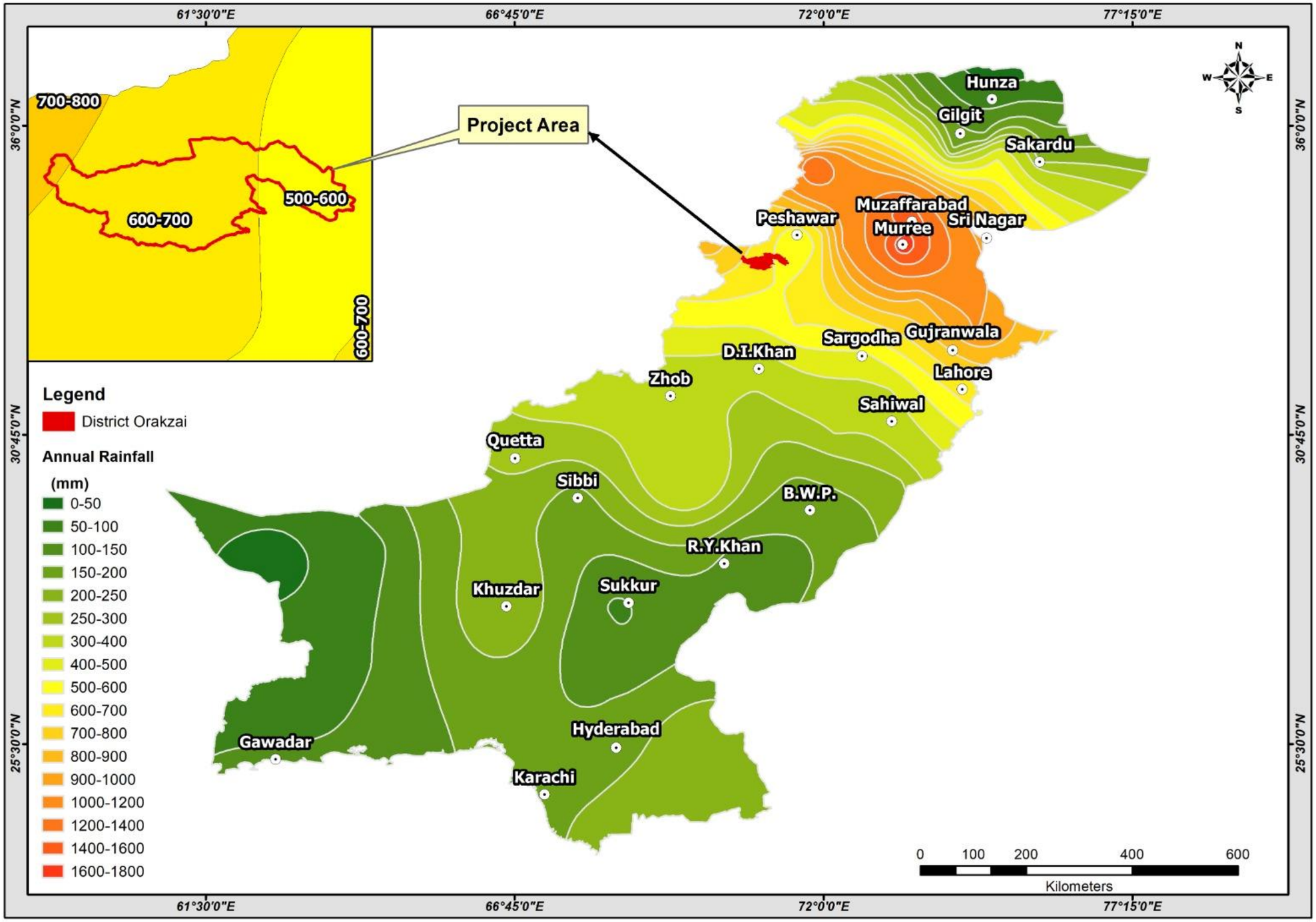


Figure 1-18: Monthly Distribution of Rainfall in Cherat



Map 1-4: Orakzai District Overlayed on Annual Normal Isohyetal Map

1.3.2.2 Temperature

Mean daily temperatures range from 22.0–26.4°C in summer (May–September) and 6.2–7.5°C in winter (December–February). The highest monthly average temperature is 32.5°C in June, while the lowest is 2.9°C in January. May–August are the hottest months, and December–February is the coldest.

Table 1-5: Mean Monthly Temperature[3]

Year	Temperature (°C)		
	Min	Max	Mean
January	2.9	9.4	6.2
February	3.9	11.1	7.5
March	7.7	16.3	12.2
April	12.9	22.7	17.8
May	17.4	28.8	23.1
June	20.4	32.5	26.4
July	19.2	29.8	24.5
August	18.4	27.5	23.0
September	17.3	26.6	22.0
October	14.1	22.9	18.5
November	9.4	17.0	13.2
December	5.6	12.5	9.1

[3] Pakistan Meteorological Department (1991-2020)

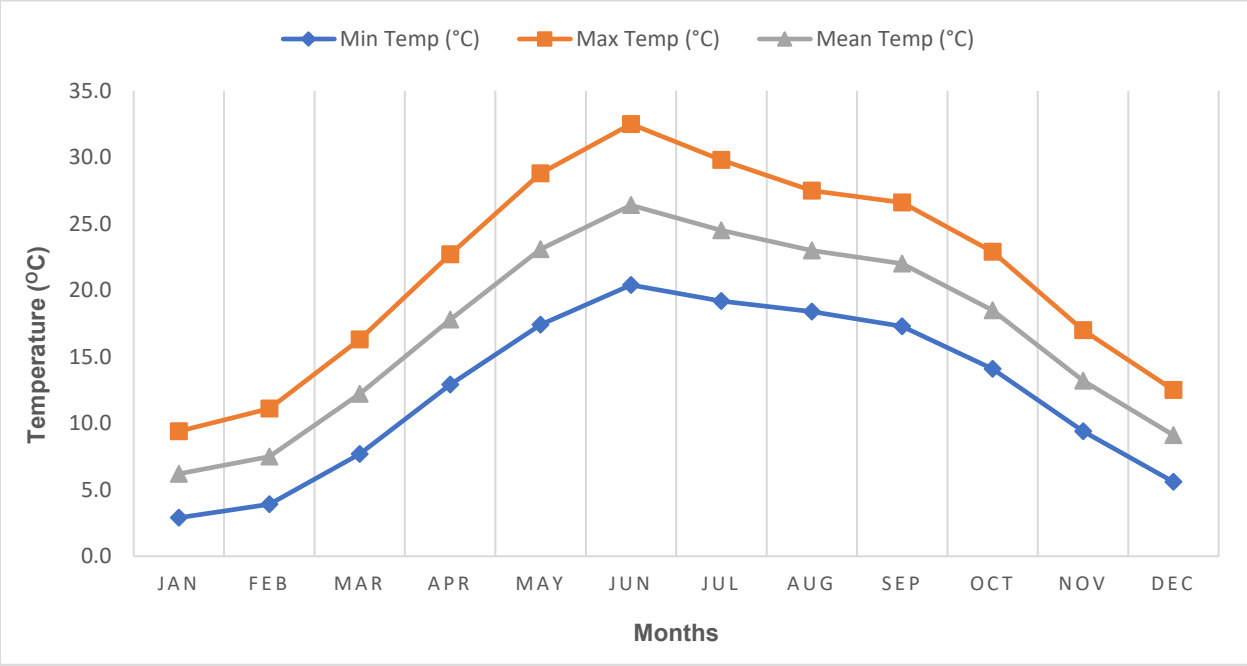


Figure 1-20: Mean Monthly Temperatures in Cherat

1.3.2.3 Relative Humidity

Relative humidity in Orakzai District varies with time and season. At 00:00 hours, it ranges from a minimum of 57.6% in June to a maximum of 81.7% in August. At 12:00 hours, values are lower, varying between 42.5% in May and 72.3% in August.

Table 1-6: Mean Relative Humidity[4]

Month	Relative Humidity (%)		
	00 UTC	03 UTC	12 UTC
January	75.8	57.5	52.8
February	69.4	61.8	56.0
March	72.8	61.8	55.6
April	65.2	56.8	51.2
May	59.2	49.5	42.5
June	57.6	51.2	43.3
July	75.0	72.4	63.5
August	81.7	79.4	72.3
September	73.7	70.0	64.8
October	62.8	59.2	54.3
November	67.6	56.0	53.2
December	68.6	53.6	49.5

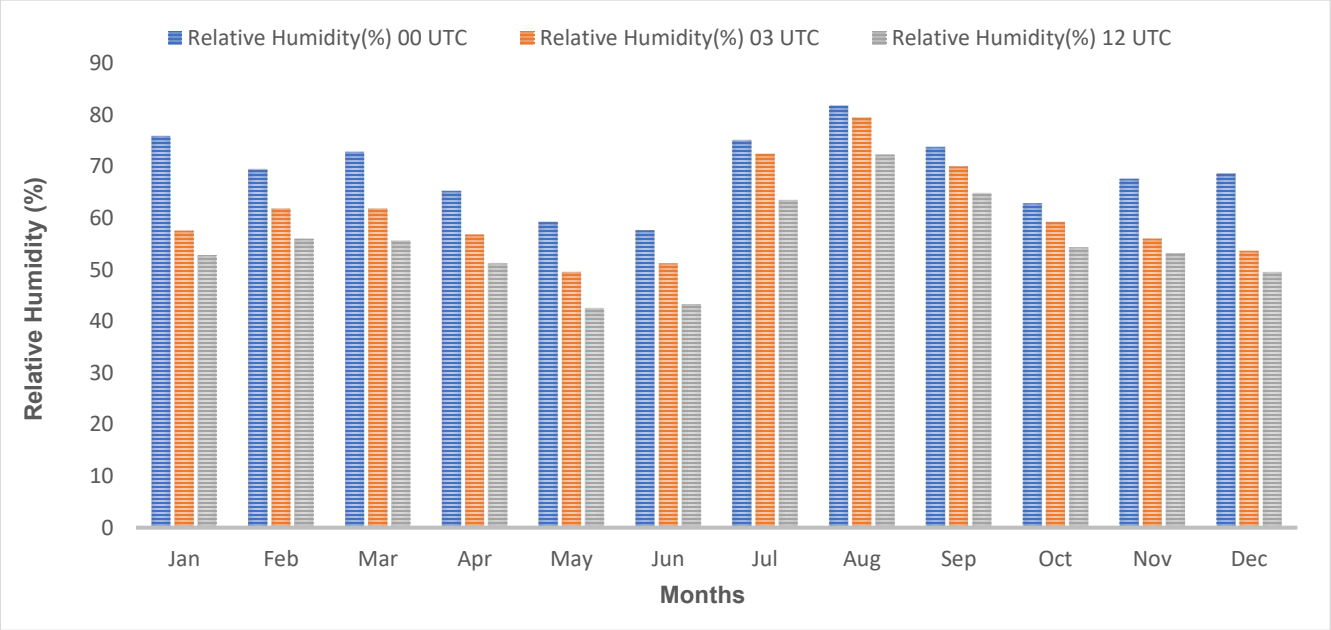


Figure 1-21: Mean Monthly Relative Humidity in Cherat

[4] Pakistan Meteorological Department (1991-2020)

1.3.2.4 Wind Speed

The mean monthly wind speed in knots is given in Table 1-7 and shown graphically in Figure 1-22. The data reveals that at 00:00 hours, the wind speeds are generally lower while higher wind speeds are recorded at 03:00 and 12:00 hours. During summers, wind speeds are generally higher than wind speeds in winters.

Table 1-7: Mean Wind at Synoptic Hours in Cherat[5]

Month	Wind Speed (Knots)		
	00 UTC	03 UTC	12 UTC
January	4.1	5.7	4.7
February	4.3	6.4	5.4
March	4.0	5.3	4.4
April	4.2	5.7	4.9
May	3.9	5.6	4.7
June	3.6	3.9	4.4
July	3.9	3.5	4.4
August	3.4	3.0	4.0
September	3.4	3.2	3.8
October	3.3	3.3	3.5
November	3.8	4.6	3.9
December	4.1	5.5	4.6

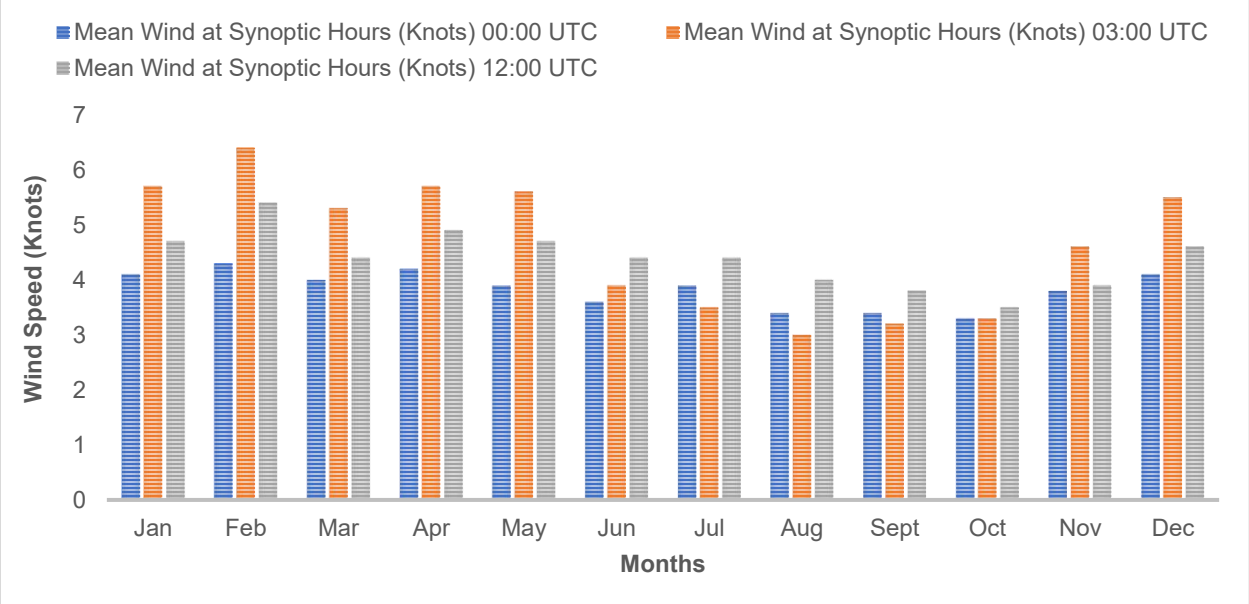


Figure 1-22: Mean Monthly Wind Speed in Cherat

Similarly, the wind direction is presented in tabular form in the accompanying with Table 1-8 and graphically illustrated in Figure 1-23, offering a comprehensive visual and numerical representation of the prevailing wind patterns in the region.

[5] Pakistan Meteorological Department (1991-2020)

Table 1-8: Mean Wind Direction at Synoptic Hours in Cherat

Month	Wind Direction at Synoptic Hours (Degree)		
	00:00 UTC	03:00 UTC	12:00 UTC
January	N45W	N45W	N45W
February	N45W	N45W	N45W
March	N45W	N45W	N45W
April	N45W	N45W	N45W
May	N45W	N45W	N45W
June	N45W	N44W	N44W
July	N45W	N44W	N42W
August	N45W	N44W	N45W
September	N45W	N45W	N44W
October	N45W	N45W	N44W
November	N45W	N45W	N44W
December	N44W	N45W	N46W
Annual	N45W	N45W	N45W

It is observed that the prevailing wind direction in the region predominantly flows from the northwest, shaping local climatic and environmental conditions.

1.3.3 Elevation

The elevation map of Orakzai District uses color gradients to highlight height variations, ranging from 629 meters in the valleys to 2072.2 meters in the highlands. Lower elevations are mainly concentrated in the central and southern areas, while darker shades in the north and west represent higher ridges and rugged terrain.

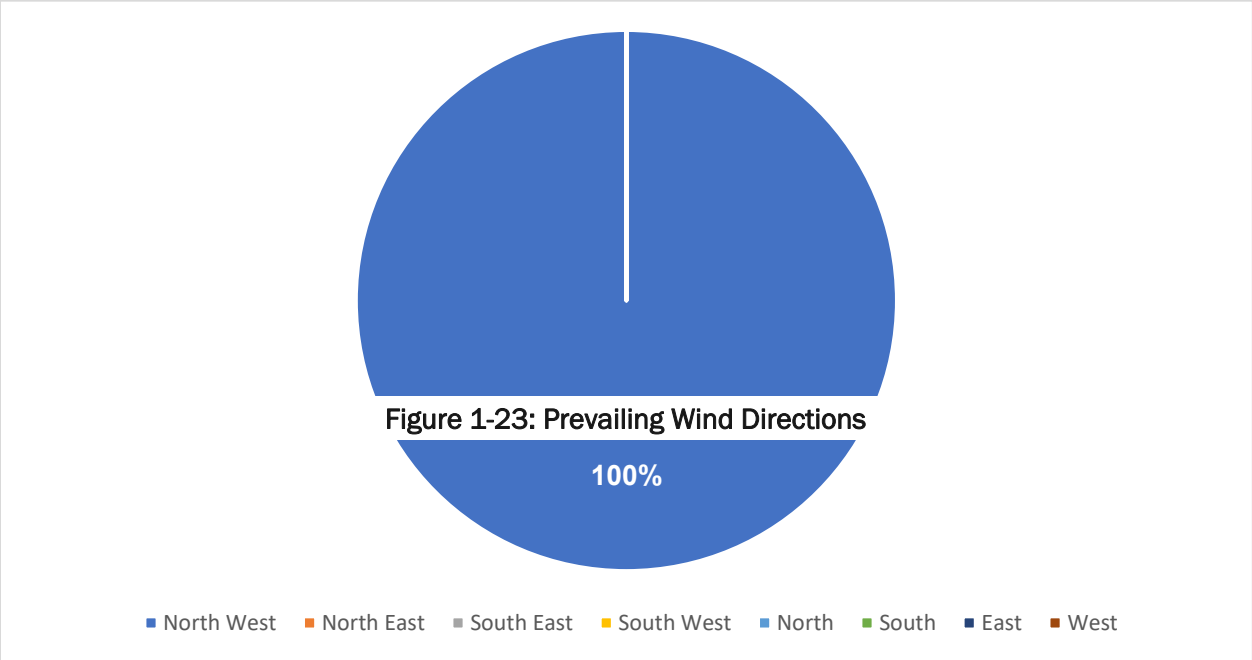
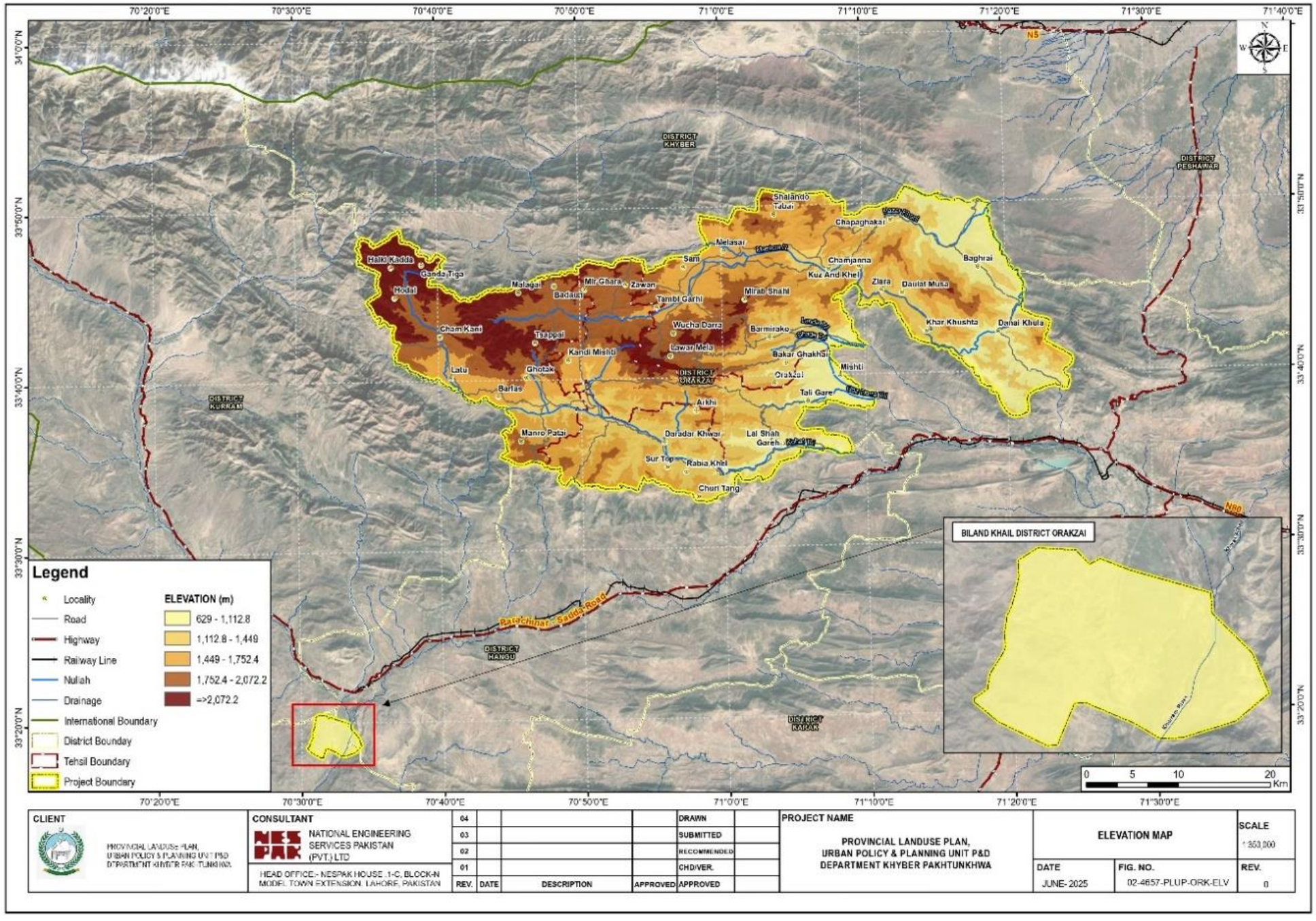


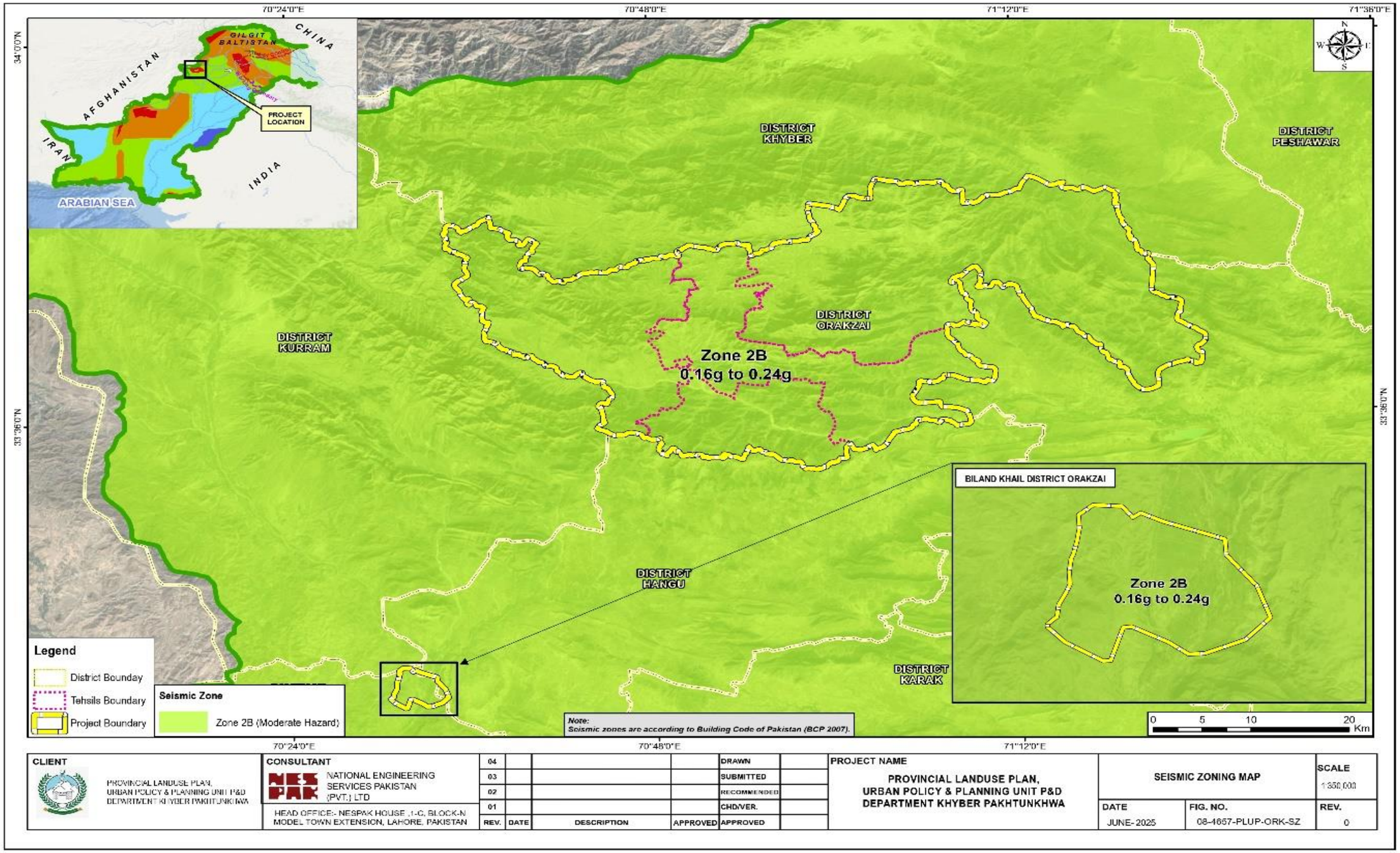
Figure 1-23: Prevailing Wind Directions



Map 1-5: Elevation Map of the Project Area

1.3.4 Seismic Condition

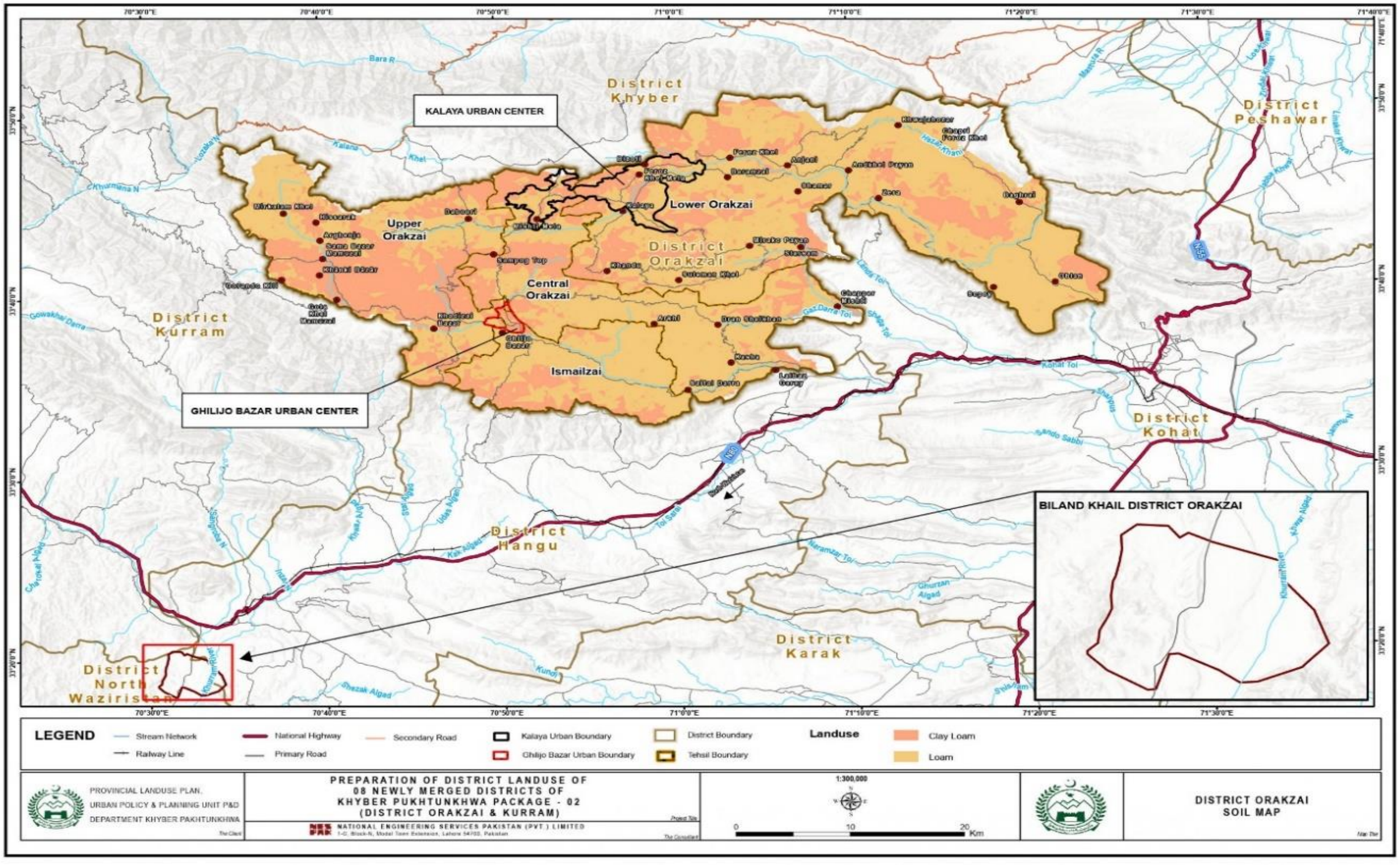
District Orakzai lies in Seismic Zone 2B, indicating a moderate earthquake risk. The district is influenced by the Hissartang Fault in the north and the Main Boundary Thrust (MBT) in the south, both significant tectonic features. Past seismic activity, with magnitudes between 3 and 5, reflects this vulnerability. Although not in the highest-risk zone, the area requires earthquake-resilient construction and preparedness measures.



Map 1-6: Seismic Zoning Map of District Orakzai

1.4 Soil and Land use Properties of Project District

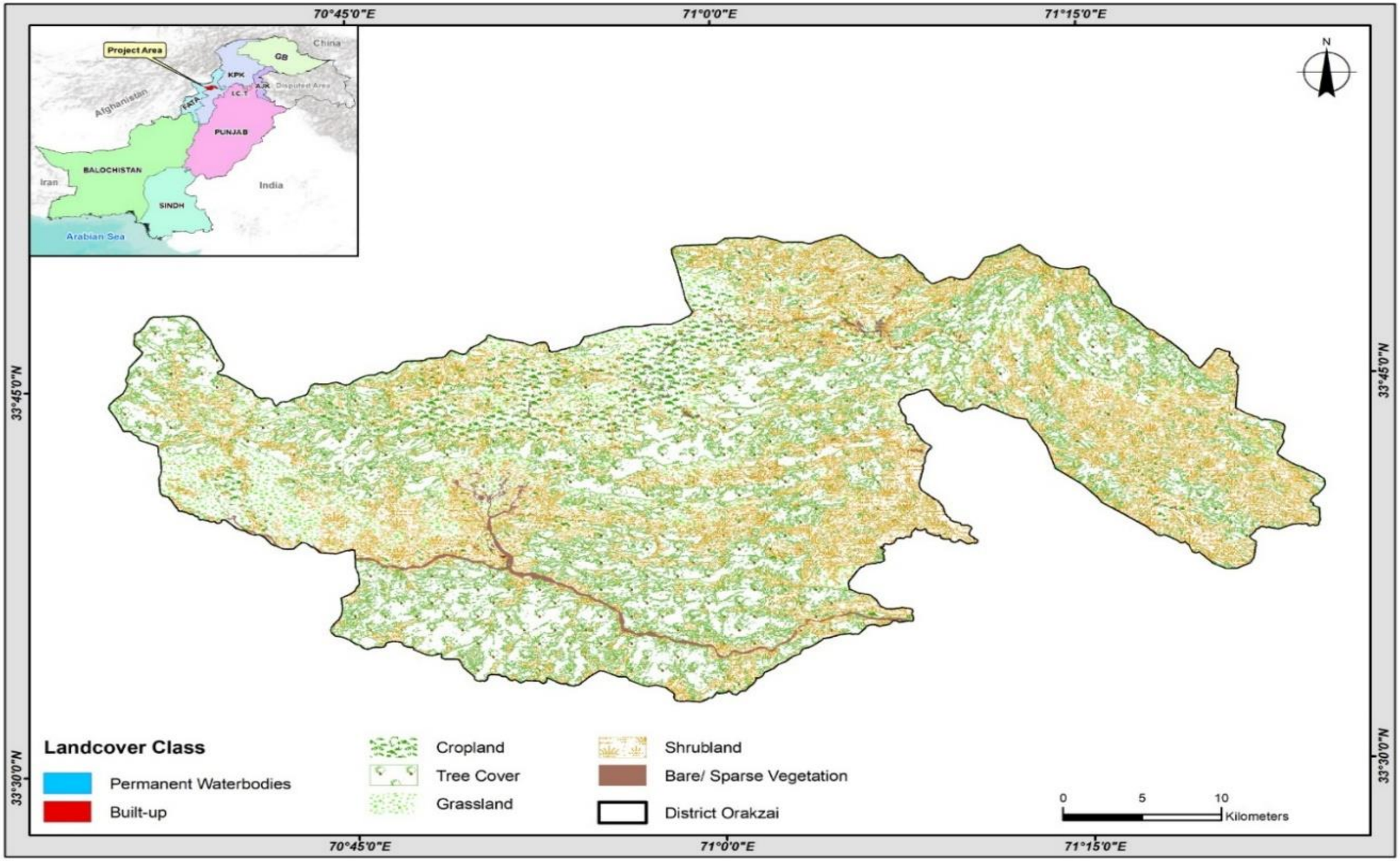
Orakzai District's varied topography and climate influence soil properties, which play a key role in rainfall–runoff dynamics, infiltration, erosion, and waterlogging. Surface runoff depends on rainfall intensity, soil type, moisture, vegetation, and land use, with vegetation enhancing infiltration while built-up and rocky areas increase runoff. For assessment, soil survey maps, land use datasets, satellite imagery, and field investigations are used. According to NRCS, soils are divided into four hydrologic groups: Group A (high infiltration, low runoff – sands, silts), Group B (moderate infiltration – sandy loams), Group C (slow infiltration – clay loams), and Group D (very slow infiltration, high runoff – clays and shallow soils).



Map 1-7: Soil Properties Map of Orakzai District

1.4.1 Land Cover of Project District

Land cover refers to the surface characteristics of an area, including vegetation, water bodies, barren lands, built-up areas, and other natural and human-modified features. It provides insights into ecosystems, agriculture, urbanization, and natural resources. These maps, derived from remote sensing data and the Soil Survey Map of Pakistan, also illustrate the Hydraulic Soil Type within the project area, which is important for hydraulic modeling and infrastructure planning. The Anderson Land Cover classification includes: waterbodies, bare areas, built-up areas, cropland, grassland, shrubland, and tree covers, shown in Map 1-8. In Orakzai District, sub-surface soil texture determines water-holding capacity and groundwater permeability. Fine-textured soils such as clay store more water but limit movement, while coarse soils such as sand allow rapid drainage but hold less water. Drainage density, defined as the total channel length per unit area, is divided into low (0–1 km), medium (1–2 km), and high (>2 km). Low density shows poor permeability and limited retention, medium indicates balance, while high density reflects efficient water movement and retention.



Map 1-8: Land Cover Map of Orakzai District

1.5 Socio Economic Profile

1.5.1 Historical Growth Trend in District Orakzai

Orakzai District, spanning 1,538 square kilometers, has shown steady population growth from 254,303 in the earliest records to 387,561 in the 2023[6] census. Though still predominantly rural, the notification of urban centers in 2020, including Kalaya, Mishti, Jalaka Mela Feroz Khai, and Ghiljo Bazar, has begun influencing its socio-economic landscape[7]. Rural areas, however, continue to dominate the district's demographic structure.

Table 1-9: Population Distribution by Administrative Unit (1951–2023)

District Name	Area in SQ KM	Census Year and Population						
		1951	1961	1972	1981	1998	2017	2023
Orakzai	1,538	-	209616	283557	358751	225441	254,303	387,561
Rural		-	209616	283557	358751	225441	254,303	387,561
Urban		-	-	-	-	-	-	

Table 1-10: Population Growth Rates in District Orakzai (1972–2023)

Census Year	Population	Intercensal Growth Rate (%)	Annual Growth Rate (%)	Years Between Censuses
1961	209616	-	--	-
1972	283,557	35.27%	2.78%	11
1981	358,751	26.52%	2.65%	9
1998	225,441	-37.16%	-2.70%	17
2017	254,303	12.80%	0.63%[8]	19
2023	387,561	52.39%	7.3%[9]	6

1.5.2 Population Growth of District Orakzai

The population growth trends of District Orakzai from 1972 to 2023 show distinct demographic shifts. From 1972–1981, the district recorded a 35.27% intercensal increase with a 2.78% annual growth rate. Growth continued in 1981–1998 but at a slower pace, with a 26.52% intercensal rise and 2.65% annual rate. However, during 1981–1998, the population sharply declined, showing -37.16% intercensal growth and an annual decrease of -2.70%, likely due to migration or socio-economic factors. Recovery followed in 1998–2017, with a 12.80% intercensal growth and 0.63% annual rate. Between 2017–2023, the population rose from 254,303 to 387,561, marking 52.39% intercensal and 7.3% annual growth. These shifts highlight the district's dynamic and fluctuating population patterns.

[6] https://www.pbs.gov.pk/sites/default/files/population/2023/tables/table_1_kp_districts.pdf
[7] https://www.citypopulation.de/en/pakistan/khyberpakhtunkhwa/406__orakzai/
[8] https://www.pbs.gov.pk/sites/default/files/population/2017/results/03001.pdf
[9] https://www.pbs.gov.pk/sites/default/files/population/2023/tables/table_1_kp_districts.pdf

1.5.3 Tehsil Level Analysis

A comparative analysis at the tehsil level provides further insight into demographic trends within Orakzai District. The district headquarters alternate between Upper Orakzai during the summer and Kalaya in Lower Orakzai during the winter. Among the tehsils, Upper Orakzai has shown a remarkable population increase over the years, emerging as the most populated tehsil.

Table 1-11: Intercensal Population Statistics at Tehsil Level in District Orakzai

Tehsils	Census Years and Population							
Upper Orakzai	-	-	-	135548	84060	63,885	129,470	136796
Centre Orakzai	-	-	-	103505	47122	59,132	92,819	96784
Lower Orakzai	-	-	-	71582	65416	107,323	125,944	130015
Ismail Zai	-	-	-	48116	28843	23,963	39,328	40156

1.5.4 Population Distribution

According to the 2023 Census, Orakzai District has a population of 387,561, comprising 204,870 males, 182,684 females, and 7 transgender individuals. Spread across 1,538 square kilometers, the district has a sex ratio of 112.14 males for every 100 females and a population density of about 252 persons per square kilometer. The entire population lives in rural areas, with no urban settlements recorded.

The distribution of people across tehsils varies noticeably. Upper Tehsil is the most populated, with 129,470 residents and the highest density at 433 persons per square kilometer. Lower Tehsil follows with 125,944 people and a density of 223. Central Tehsil has 92,819 residents and a density of 233, while Ismail Zai Tehsil has the smallest population of 39,328 and the lowest density of 143.

Overall, Orakzai is a fully rural district with uneven population distribution. Upper Tehsil stands out as the demographic hub with the most concentrated settlements, while Ismail Zai remains sparsely populated. Central and Lower Tehsils lie in between, reflecting moderate settlement patterns.

Table 1-12: Tehsil Wise Population Density and Sex Ratio

NAME OF ADMINISTRATIVE UNIT	ALL SEXES	MALE	FEMALE	TRANS GENDER	SEX RATIO	POPULATION DENSITY PER SQ.K.M
ORAKZAI DISTRICT	387561	204870	182684	7	112.14	251.99
RURAL	387561	204870	182684	7	112.14	
URBAN						
CENTRAL TEHSIL	92819	48853	43864	2	111.6	232.63
RURAL	92819	48853	43864	2	111.6	
URBAN	-	-	-	-	-	
ISMAIL ZAI TEHSIL	39328	20403	18925	0	107.81	143.01
RURAL	39328	20403	18925	0	107.81	
URBAN						
LOWER TEHSIL	125944	65308	60635	1	107.71	222.91
RURAL	125944	65308	60635	1	107.71	
URBAN						
UPPER TEHSIL	129470	70206	59206	4	118.47	433.01
RURAL	129470	70206	59206	4	118.47	
URBAN						

1.5.4.1 Age and Sex-Wise Population Distribution

The 2017 census of District Orakzai recorded a total population of 254,303, with 127,564 males, 126,728 females, and 11 transgender individuals, all residing in rural areas. The sex ratio stood at 112.14 males per 100 females, reflecting broader regional patterns.

Age-wise distribution shows a youthful demographic. The largest group is children aged 0–4 years (46,793; 18.4%), emphasizing the need for healthcare and early childhood education. The primary school-age group (5–9 years) numbers 45,905, while middle school-age (10–14 years) includes 34,384. The youth segment (15–24 years) totals 43,507, highlighting demand for education and employment opportunities.

The young adult group (25–39 years) accounts for 30,233, representing the core of the workforce and economic activity. Meanwhile, the senior population (60+ years) comprises 8,894, indicating a need for improved healthcare and social support.

Overall, Orakzai's demographic profile underscores the importance of policies that address the needs of children, youth, working-age adults, and the elderly alike. Effective planning in healthcare, education, and social services will be vital to ensure sustainable development and balanced support for all age groups.

Table 1-13 Orakzai District Age and Sex Wise Population Distribution[10]

Age (Years)	Male	Female	Transgender	Total
All Ages	204,870	182,684	7	387,561
00 - 04	40,794	33,722	-	74,516
05-09	34,297	29,452	-	63,749
10-14	29,447	24,561	1	54,009
15 - 19	23,143	19,775	3	42,921
20 - 24	13,936	13,558	1	27,495
25 - 29	12,210	12,146	-	24,356
30 - 34	11,401	11,826	-	23,227
35 - 39	10,390	9,942	-	20,332
40 - 44	7,417	7,242	1	14,660
45 - 49	5,614	5,453	1	11,068
50 - 54	4,437	4,766	-	9,203
55 - 59	3,423	3,427	-	6,850
60 -64	3,226	3,055	-	6,281
65-69	2,101	1,667	-	3,768
70-74	1,635	1,211	-	2,846
75 & above	1,399	881	-	2,280

1.5.5 Population Density

Orakzai District, covering an area of 1,538 square kilometers, has experienced notable population growth over the decades. The population has increased from 254,303 in earlier records to 387,561 in the 2023 census. The district remains predominantly rural, with most residents living in villages. However, the designation of urban centers in 2020, including Kalaya, Mishti, Jalaka Mela Feroz Khai, and Ghiljo Bazar, has begun to reshape the district's socio-economic landscape, indicating a gradual shift toward urbanization.

Population density, a key metric in urban and land use planning, refers to the number of people living per unit of land area. It is calculated using the formula:

Population Density = Total Population / Land Area (sq. km.)

In 2023, Orakzai District had a population density of 251.99 persons per square kilometer. This density provides valuable insight into the region's spatial distribution of resources, infrastructure, and services. While high-density areas often feature increased demands for housing, transportation, and utilities, Orakzai's primarily rural composition presents an opportunity for balanced development with fewer pressures typically associated with urban overcrowding.

As urban centers develop within the district, population density patterns are expected to shift, necessitating careful planning to allocate resources, design transportation networks, and ensure equitable service distribution. Balancing population density is crucial for fostering sustainable growth, addressing challenges like congestion and service strain, and enhancing the quality of life for residents.

1.5.6 In Migration

[10] https://www.pbs.gov.pk/sites/default/files/population/2023/tables/table_4_kp_districts.pdf

According to the Labor Force Survey (2020–21), 2,897 individuals were surveyed in District Orakzai, out of which 335, or 11.56 percent, reported having migrated into the district. This share represents an important component of the district's demographic profile and has direct implications for planning and development. The majority of these in-migrants, about 84.98 percent, came from rural areas, while only 15.02 percent originated from urban centers. This indicates that rural-to-rural migration is the dominant trend, reflecting strong village networks and traditional livelihood connections.

Most in-migrants arrived from the neighboring districts of Hangu and Kohat, which together accounted for over 80 percent of the total. A smaller proportion came from urban Kohat (4.79 percent) and from Peshawar (4.15 percent). These flows highlight the significance of regional ties and inter-district socio-economic linkages in shaping population movement into Orakzai.

Table 1-14: District Orakzai District Wise in Migration from Labour Force Survey 2021-2022[11]

District/ Country	Rural Percentage	Urban Percentage	Total Percentage
Peshawar	5.43%	4.15%	9.58%
Khyber	4.79%	0.00%	4.79%
Kohat	15.65%	4.79%	20.45%
Hangu	58.15%	3.51%	61.66%
Kurram	0.64%	0.00%	0.64%
Bannu	0.32%	0.00%	0.32%
Rawal Pindi	0.00%	2.24%	2.24%
Lahore	0.00%	0.32%	0.32%
Saudi Arabia	0.00%	0.00%	0.00%
United Arab Emirates	0.00%	0.00%	0.00%
Grand Total	84.98%	15.02%	100.00%

The reasons behind migration also vary across settlement types. For those moving into urban parts of the district, the most common reason was relocating with parents, which accounted for 36.12 percent of migrants. This shows the importance of family support and reunification in driving urban migration. Conversely, among those moving into rural areas, the leading factor was returning to their home or ancestral place, cited by 35.22 percent of respondents. This reflects the role of cultural traditions, property inheritance, and retirement in influencing rural migration.

[11] Pakistan Bureau of Statistics. (March, 2022). Pakistan Labor Force Survey 2020-2021. Micro Data

Overall, in-migration into Orakzai is shaped by both regional proximity and strong social and cultural drivers. These patterns are important for planners and policymakers, as they underline the need to design housing, infrastructure, and service delivery strategies that can effectively address the needs of diverse migrant groups across both rural and urban areas.

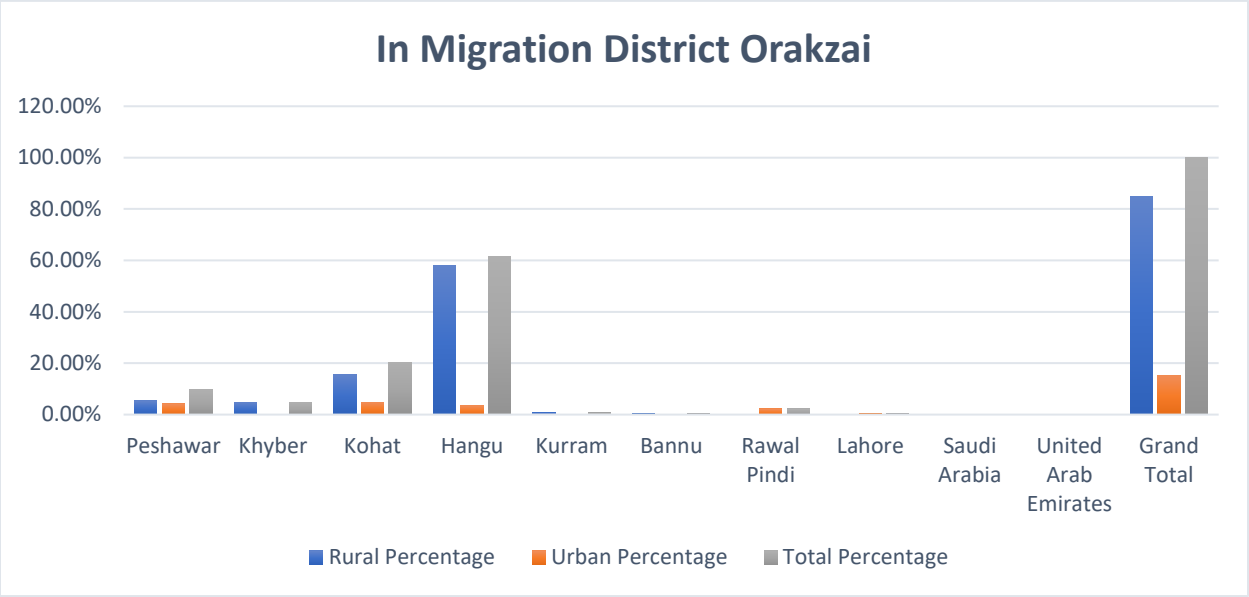


Table 1-15:

Figure 1-24: District Orakzai Occupation Wise In-Migration from Labour Force Survey 2021-2022

District Orakzai Occupation Wise In-Migration from Labour Force Survey 2021-2022[12]

Reason for Migration	No of Respondents	Percentages
Marriage	21	6.27%
With Parents	121	36.12%
With Spouse	39	11.64%
With son/daughter	3	0.90%
Change of Residence	1	0.30%
Returned to his Home	118	35.22%
Security/ Law & Order Situation	27	8.06%
Natural Disaster	2	0.60%
Other	3	0.90%
Grand Total	335	100.00%

1.5.7 Out Migration

According to the Labor Force Survey (2020–21), a total of 6,606 individuals migrated out of their respective districts across Khyber Pakhtunkhwa. Among them, 438 persons originated from District Orakzai, making up 6.64 percent of the province's total out-migrant population. Since Orakzai does not include any designated

[12] Pakistan Bureau of Statistics. (March, 2022). Pakistan Labor Force Survey 2020-2021. Micro Data

urban centers, all of these migrants came from rural areas, reflecting the district's entirely rural settlement structure.

A closer look at migration destinations shows that out-migrants from Orakzai largely moved to nearby districts. About 44.06 percent settled in Hangu, while 31.96 percent moved to Kohat. This concentration of movement towards adjacent areas highlights the strong socio-economic and cultural linkages between Orakzai and its neighboring districts, where people often rely on shared livelihoods, markets, and family networks.

Table 1-16 District Orakzai District Wise Out-Migration from Labour Force Survey 2021-2022

District/ Country	No of Respondents	Percentages
ATTOCK	1	0.23%
BANNU	1	0.23%
BATAGRAM	1	0.23%
CHARSADDA	13	2.97%
DERA ISMAIL KHAN	1	0.23%
HANGU	193	44.06%
HARIPUR	1	0.23%
ISLAMABAD	3	0.68%
KHYBER	7	1.60%
KOHAT	140	31.96%
KOHISTAN	1	0.23%
KURRAM	7	1.60%
MOHMAND	9	2.05%
NOWSHERA	30	6.85%
PESHAWAR	25	5.71%
RAWALPINDI	2	0.46%
SWABI	1	0.23%
SWAT	2	0.46%
Grand Total	438	100.00%

The reasons behind out-migration also present an important dimension of analysis. A large proportion, 43.38 percent, reported that they left to accompany their parents, pointing to the strong role of family ties and dependency in shaping mobility decisions. Another 29.45 percent cited security concerns, particularly law and order issues, as their main reason for migration, underlining the influence of socio-political stability on population flows. Additionally, 9.82 percent moved with their spouse, while 8.68 percent reported marriage as their motivation for migration.

These findings show that migration from Orakzai is influenced by a mix of social, cultural, and security-related factors. Family obligations remain the strongest driver, but concerns over stability and safety also play a critical role. Together, these trends emphasize the need for policymakers and planners to consider both the human and structural aspects of migration, ensuring that interventions address the root causes while also supporting those who move for personal and social reasons.

Table 1-17 District Orakzai Occupation Wise Out-Migration from Labour Force Survey 2021-2022[13]

Reason of Migration	No of Respondents	Percentages
Job Transfer	5	1.14%
Found a Job	1	0.23%
Searching for a Job	7	1.60%
Searching for a Better Agriculture Land	1	0.23%
Education	8	1.83%
Business	2	0.46%
Marriage	38	8.68%
With Parents	190	43.38%
With Spouse	43	9.82%
With Son/Daughter	4	0.91%
Change of Residence	6	1.37%
Returned to his Home	1	0.23%
Security/ Law & Order Situation	129	29.45%
Other	3	0.68%
Grand Total	438	100.00%

1.5.8 Population Projection of 20 Year

To project the population of District Orakzai over the next 20 years, three models have been applied: the exponential growth model, the geometric growth model, and the linear growth model. These methods allow for a more accurate understanding of future demographic trends.

The Exponential Growth Model is defined as:

$P(t)=P_0 \times e \wedge (r \times t)$

where:

$P(t)$ = population at time

P_0 = base year population

r = annual growth rate (decimal)

t = time in years

e = Euler's number (2.718)

Explanation: This model assumes that the population grows continuously at a constant rate over time. It's typically used in cases where growth is unrestricted, such as in an idealized, isolated population. However, it

[13] Pakistan Bureau of Statistics. (March, 2022). Pakistan Labor Force Survey 2020-2021. Micro Data

may not be realistic in the long run because it doesn't account for factors like resource limitations or changes in fertility or mortality rates.

The Geometric Growth Model is expressed as:

$P(t)=P_0(1+G_R/100)\ ^\wedge\ n$

Explanation: This model assumes that the population grows by a constant percentage over each time period. It's useful for understanding compounded growth over fixed intervals (e.g., annually).

The Linear Growth Model follows the formula:

$P(t)=P_0+(r\times t)$

Explanation: This model assumes that the population grows by a fixed number each time period, which is a simple linear increase. It's best suited for populations with steady growth rates over time.

Based on the assessment of multiple projection models, the average of 3 models was selected for population forecasting in District Kurram, as it provides a balanced and realistic estimate. This approach ensures reasonable, adaptable, and sustainable population projections aligned with anticipated growth trends.

Based on census data from 1998, 2017, and 2023, the average annual growth rate has been calculated at 2.64%, while the 2023 census alone recorded a much higher 7.3%[14]. Using these figures, Orakzai's population is projected to rise from 387,561 in 2023 to approximately 597,233 by 2045. At the tehsil level, Central Tehsil is expected to reach 143,590 residents, Upper Tehsil 228,432, Lower Tehsil 176,095, and Ismail Zai 49,115.

This projected growth will significantly increase the district's population density, creating both opportunities and challenges. On one hand, population expansion can stimulate economic growth and support the rise of emerging urban centers such as Kalaya, Mishti, Jalaka Mela Feroz Khai, and Ghiljo Bazar. On the other hand, rapid growth in largely rural areas may strain housing, transportation, education, healthcare, and natural resources.

These trends highlight the need for sustainable and inclusive development strategies. Policymakers must balance economic growth with environmental preservation, improve infrastructure and services, and plan for equitable resource distribution. Anticipating demographic expansion today will ensure that Orakzai's growth over the next two decades remains resilient, inclusive, and sustainable.

[14] https://www.pbs.gov.pk/sites/default/files/population/2023/tables/table_1_kp_districts.pdf

Table 1-18 Orakzai District Population Projection for Plan Period (2025-2045), Using Geometric Growth Model

	AREA (SQ. KM.)	POPULATION - 2023	Projected Population 2025	Projected Population 2030	Projected Population 2035	Projected Population 2040	Projected Population 2045
ORAKZAI District	1,538	387561	403749	447504	496416	551135	612394
RURAL		387561	403749	447504	496416	551135	612394
URBAN							
CENTRAL TEHSIL	399	92819	96784	107452	119296	132446	147045
RURAL		92819	96784	107452	119296	132446	147045
URBAN							
ISMAIL ZAI TEHSIL	275	39328	40156	46919	44562	46944	49452
RURAL		39328	40156	42302	44562	46944	49452
URBAN							
LOWER TEHSIL	565	125944	130015	142500	152431	165049	178712
RURAL		125944	130015	140777	152431	165049	178712
URBAN							
UPPER TEHSIL	299	129470	136795	156973	180127	206697	237186
RURAL		129470	136795	156973	180127	206697	237186
URBAN							

Table 1-19 Orakzai District Population Projection for Plan Period (2025-2045), Using Exponential Growth Model

	AREA (SQ. KM.)	POPULATION - 2023	Projected Population 2025	Projected Population 2030	Projected Population 2035	Projected Population 2040	Projected Population 2045
ORAKZAI District	1,538	387561	403932	448225	497809	553359	615641
RURAL		387561	403932	448225	497809	553359	615641
URBAN							
CENTRAL TEHSIL	399	92819	96826	107616	119609	132938	147752
RURAL		92819	96826	107616	119609	132938	147752
URBAN							
ISMAIL ZAI TEHSIL	275	39328	40160	42317	44591	60701	49510
RURAL		39328	40160	42317	44591	46986	49510
URBAN							
LOWER TEHSIL	565	125944	130048	140901	152661	170444	179206
RURAL		125944	130048	140901	152661	165401	179206
URBAN						#VALUE!	
UPPER TEHSIL	299	129470	136899	157390	180949	119393	239173
RURAL		129470	136899	157390	180949	208034	239173
URBAN							

Table 1-20 Orakzai District Population Projection for Plan Period (2025-2045), Using Linear Growth Model

	AREA (SQ. KM.)	POPULATION - 2023	Projected Population 2025	Projected Population 2030	Projected Population 2035	Projected Population 2040	Projected Population 2045
ORAKZAI District	1,538	387561	403570	443594	483618	523641	563665
RURAL		387561	403570	443594	483618	523641	563665
URBAN							
CENTRAL TEHSIL	399	92819	96742	106550	116358	126166	135974
RURAL		92819	96742	106550	116358	126166	135974
URBAN							
ISMAIL ZAI TEHSIL	275	39328	40151	42209	44268	46326	48384
RURAL		39328	40151	42209	44268	46326	48384
URBAN							
LOWER TEHSIL	565	125944	129983	140079	150176	160272	170369
RURAL		125944	129983	140079	150176	160272	170369
URBAN							
UPPER TEHSIL	299	129470	136694	154755	172817	190878	208939
RURAL		129470	136694	154755	172817	190878	208939
URBAN							

Table 1-21 Orakzai District Population Projection for Plan Period (2025-2045), Taking Average of the 3 Models

	AREA (SQ. KM.)	POPULATION - 2023	Projected Population 2025	Projected Population 2030	Projected Population 2035	Projected Population 2040	Projected Population 2045
ORAKZAI District	1,538	387561	403751	446441	492614	542712	597233
RURAL		387561	403751	446441	492614	542712	597233
URBAN							
CENTRAL TEHSIL	399	92819	96784	107206	118421	130516	143590
RURAL		92819	96784	107206	118421	130516	143590
URBAN							
ISMAIL ZAI TEHSIL	275	39328	40156	43815	44473	51323	49115
RURAL		39328	40156	42276	44473	46752	49115
URBAN							
LOWER TEHSIL	565	125944	130015	141160	151756	165255	176095
RURAL		125944	130015	140586	151756	163574	176095
URBAN							
UPPER TEHSIL	299	129470	136796	156373	177964	172323	228432
RURAL		129470	136796	156373	177964	201869	228432
URBAN							

1.5.9 Household Size

According to the 2023 census, Orakzai District has an average household size of 7.4 persons, reflecting the prevalence of extended family structures typical of rural communities.

Across tehsils, Central Tehsil reports the largest households with an average of 7.8 persons, likely influenced by cultural norms and economic factors encouraging larger family units. Lower Tehsil (7.4) and Upper Tehsil (7.2) show slightly smaller but comparable sizes, suggesting similar household dynamics. In contrast, Ismail Zai Tehsil records the lowest average of 7.0, which may indicate higher migration rates, smaller family units, or distinct socio-economic conditions.

These variations highlight how demographic, cultural, and economic influences shape household structures across the district, offering insights into living arrangements and community patterns.

1.5.10 Literacy Analysis of Orakzai District

The Pakistan Bureau of Statistics defines a literate person as someone able to read a standard newspaper and write a simple letter in any language. Literacy rates are measured as the proportion of literate individuals within the population aged 10 years and above, serving as a key indicator of educational attainment and human capital development. Reliable literacy data is essential for planning effective education programs, allocating resources, and tracking progress toward national development goals.

According to the 2023 census, literacy in Orakzai District shows clear gender disparities and a decline with age. Among children aged 10–14, the overall literacy rate stands at 35.61%, with males at 49.34% and females at only 16.81%, reflecting access primarily to primary and middle education. Literacy drops sharply in older groups, with the 40+ age group reporting rates below 15%, highlighting limited access to formal schooling in earlier decades. Educational attainment beyond matriculation remains rare, especially among females, whose literacy rates become negligible beyond age 30.

These patterns reveal persistent challenges in bridging gender gaps and improving access to higher education. Strengthened interventions in female education, adult literacy, and advanced learning opportunities are vital for enhancing human capital and promoting socio-economic development in Orakzai.

Table 1-22 Literacy Analysis of Orakzai District by Age and Sex[15]

Age Group (Years)	Male Literacy (%)	Female Literacy (%)	Overall Literacy (%)	Educational Attainment Focus
10-14	49.34%	16.81%	35.61%	Primary and middle education dominate.
15-19	63.52%	13.17%	43.17%	Matriculation level significant for males.
20-24	49.19%	2.71%	29.30%	Some progression to intermediate and graduate.
25-29	32.96%	1.41%	18.42%	Gradual drop with fewer advancing to higher education.
30-34	30.71%	1.00%	16.33%	Concentrated at matriculation and intermediate.
35-39	17.54%	0.84%	14.83%	Continued decline across all levels.
40+	14.79%	0.25%	7.92%	Mostly limited to basic or no formal education.

[15] https://www.pbs.gov.pk/sites/default/files/population/2023/tables/table_13_kp_districts.pdf

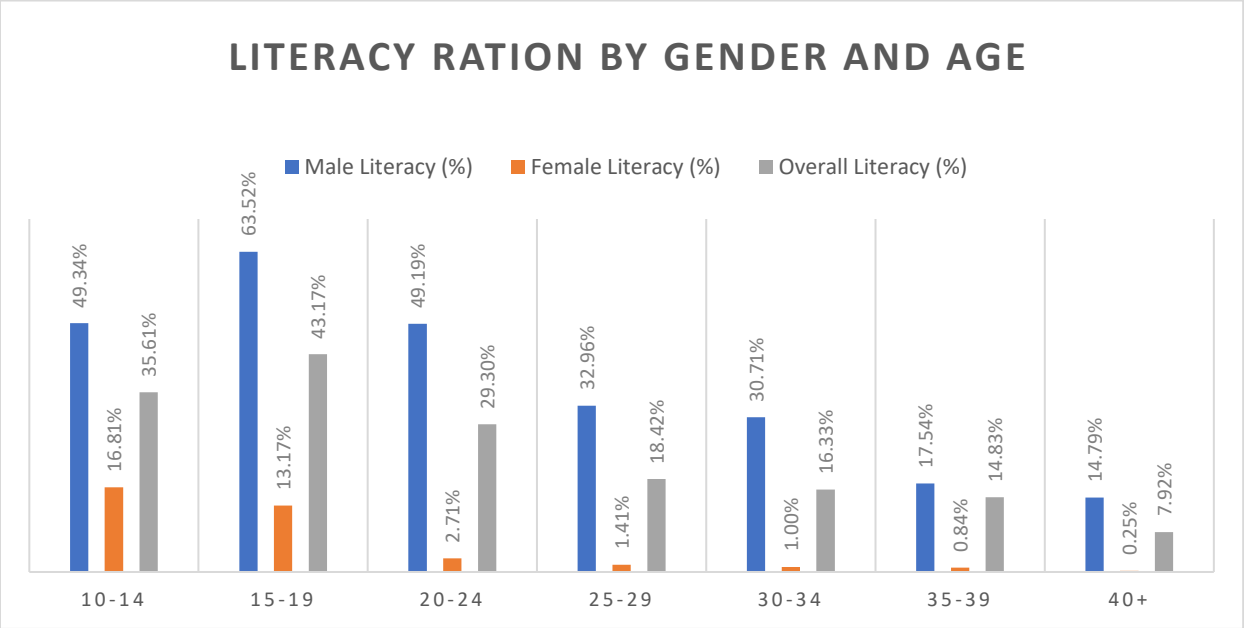


Figure 1-25: District Orakzai Literacy Ration by Age and Sex

1.5.11 Education Attainment

Educational attainment refers to the highest level of formal education completed by an individual and is a vital indicator of a population's qualifications. It ranges from primary and secondary education to higher and postgraduate levels.

Analyzing educational attainment is crucial for policymakers, as it highlights the community's skill profile and human capital. This information helps in planning education systems, workforce development, and economic initiatives. By understanding how education is distributed within the population, authorities can better align infrastructure, services, and employment opportunities with the district's growth and development needs.

1.5.11.1 Education Attainment (LFS 2021-22)

The Labour Force Survey (LFS) 2021–22 provides valuable insights into the educational attainment of the working-age population in District Orakzai. Out of a total sample of 6,080 individuals, 2,461 respondents (around 40.5%) reported their educational qualifications, forming the basis of this analysis.

Findings reveal that more than half of the respondents (52.01%) have never attended school, underscoring major barriers to accessing formal education. A further 18.24% reported education at kindergarten or below, and 2.93% at nursery level, showing the dominance of very early or no education in the district.

Among those with some schooling, 12.56% completed primary education but did not continue to middle level, while 7.68% reached middle but below matric. About 4.51% reported matric-level education but below intermediate, and only 1.26% attained intermediate education without advancing to degree level. Degree-level education is almost absent just 0.61% hold degrees in fields other than engineering, medicine, computer science, or agriculture. No respondents reported higher professional qualifications, M.Phil., or Ph.D. degrees, and only 0.20% had a master's qualification (M.A./M.Sc.).

Overall, the LFS data highlights the severe challenge of low educational attainment in District Orakzai, with the vast majority either uneducated or with very limited schooling. This situation directly impacts workforce development, employment opportunities, and socio-economic progress in the district. Addressing these gaps requires urgent interventions focused on expanding access to basic education, reducing dropouts, and creating pathways for higher learning to strengthen human capital and future growth.

Table 1-23 Educational Attainment as per Labour Force Survey[16]

Education Level	No's of Respondents	Percentages
Degree in other subjects	15	0.61%
Degree in engineering	0	0.00%
Degree in medicine	0	0.00%
Degree in computer	0	0.00%
Degree in agriculture	0	0.00%
M.Phil.	0	0.00%
Ph.D.	0	0.00%
Inter. but below degree	31	1.26%
K.G but below	449	18.24%
M.A/M.Sc.	5	0.20%
Matric but below intermediate	111	4.51%
Middle but below matric	189	7.68%
Never attended school	1280	52.01%
Nursery but below K.G.	72	2.93%
Primary but below middle	309	12.56%
Grand Total	2461	100.00%

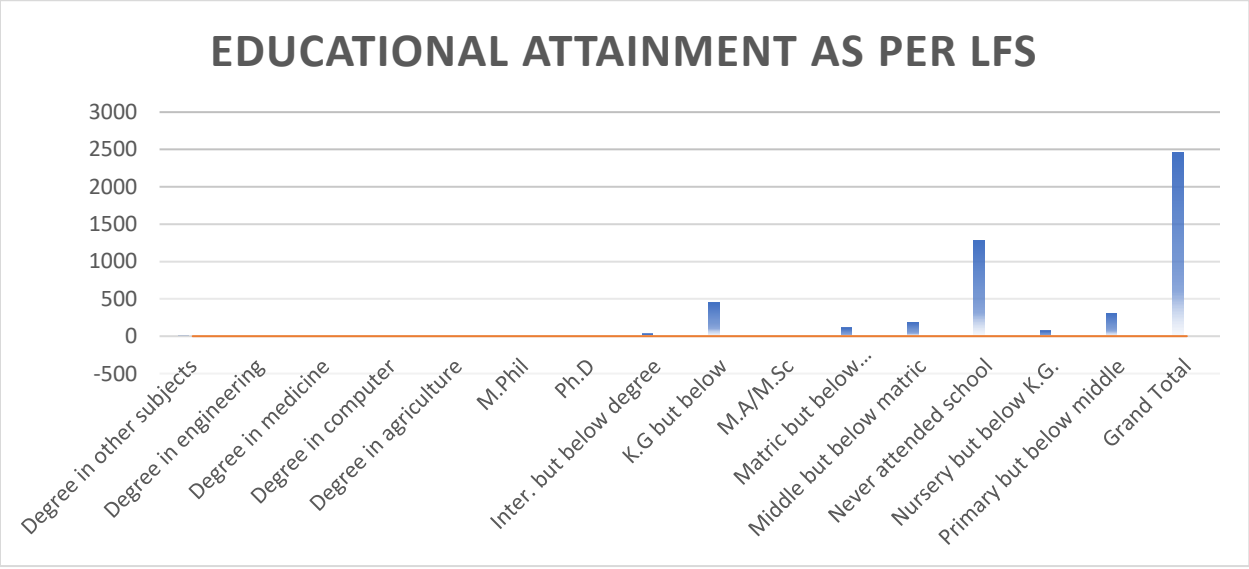


Figure 1-26 Educational Attainment of District Orakzai as per LFS 2021 2022

[16] Calculated from Micro data LFS 2020-2021, Pakistan Bureau of Statistics

1.5.11.2 Education Attainment (2023 Census)

The 2023 Population Census highlights significant gender disparities in educational attainment across District Orakzai. Only 35.20% of the population aged 10 years and above have education beyond the basic level, meaning nearly two-thirds either lack formal education or remain below matriculation.

The largest group, 25.43% of the population, falls under below matric education. This is heavily gender-skewed, with 36.45% of males compared to only 13.29% of females. At the matric level, just 5.00% of the population is educated, including 8.53% males and only 1.12% females. Intermediate education accounts for 2.32%, again dominated by males (3.85%) versus females (0.63%).

Graduation rates remain very low at 0.87% (1.40% males and 0.27% females), while master's degree holders make up only 0.33%, with negligible female representation (0.08%). MPhil/PhD holders are almost absent (0.03%), all male. Diploma and certificate holders form 1.22% of the population, where females (1.62%) slightly outnumber males (0.86%).

Overall, male educational attainment surpasses female attainment at every level. While over half of males (51.72%) have some formal education beyond basic levels, only 17.01% of females do. These disparities underscore the urgent need to expand access and retention for female education while raising overall attainment, as both are essential for Orakzai's sustainable social and economic development.

Table 1-24 Educational Attainment as per Census 2023

Education Level	Total	Male	Female
Below Matric	25.43%	36.45%	13.29%
Matric	5.00%	8.53%	1.12%
Intermediate	2.32%	3.85%	0.63%
Graduate 2 or 4 years	0.87%	1.40%	0.27%
Master	0.33%	0.57%	0.08%
MPhil/PhD	0.03%	0.06%	0.00%
Diploma/Certificate and Others	1.22%	0.86%	1.62%
Total	35.20%	51.72%	17.01%

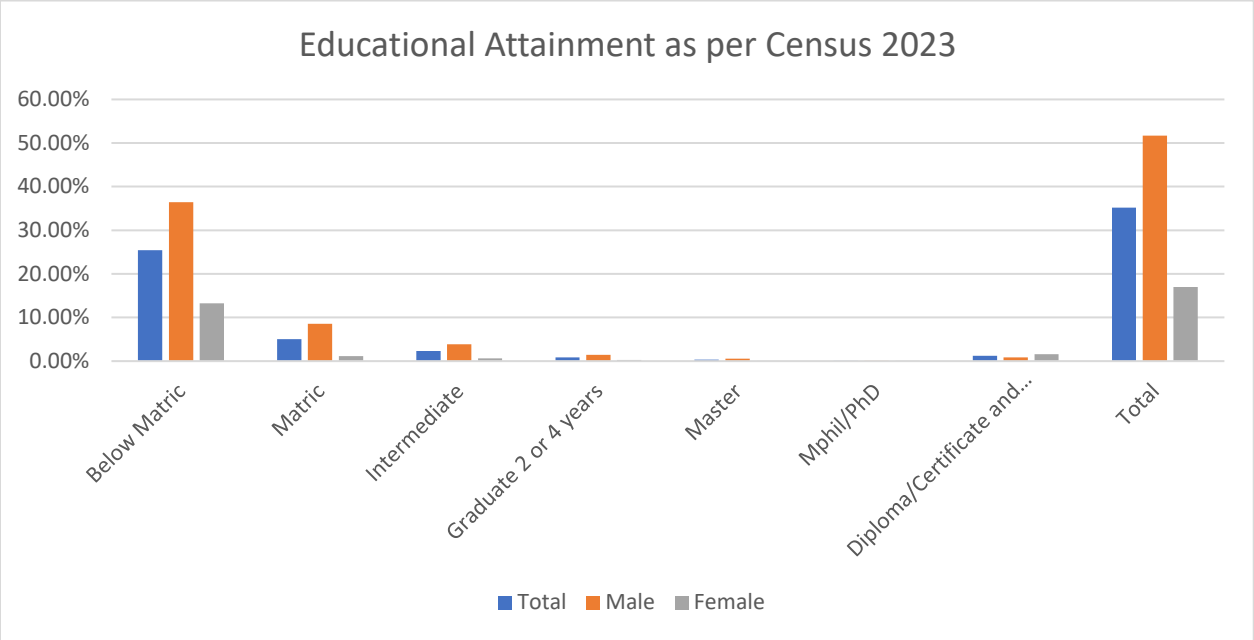


Figure 1-27 Educational Attainment of District Orakzai as per Census 2023

1.5.11.3 Education Attainment (HIS Survey)

Findings from the Household Interview Survey (HIS) reveal low levels of educational attainment across Orakzai's tehsils, with the majority of respondents reporting no formal education. Upper Tehsil has the highest proportion without education (72 respondents, 36.3%), followed closely by Lower (71), while Central and Ismail Zai report 32 and 11, respectively.

The second-largest group falls under the Below Matric category, led by Lower (53 respondents), followed by Central (30) and Upper (22). Matric-level education is most common in Lower (49 respondents), but advanced qualifications such as FA/FSc/FCS and university degrees are rare, accounting for less than 10% of the population in each tehsil.

Overall, the survey underscores a pressing need for targeted interventions to expand educational opportunities, particularly at higher levels, to enhance human capital and support long-term development in the district.

Table 1-25 Education of Respondents (HIS-Orakzai)[17]

Education Level	Central	Ismail Zai	Lower	Upper	Total	Percentage (%)
None	32	11	71	72	186	36.30%
Below Matric	30	7	53	22	112	21.80%
Matric	16	15	49	24	104	20.30%
Technical Diploma	0	2	0	4	6	1.20%
FA/FSc/FCS	10	7	23	19	59	11.50%
BA/BSc	5	6	9	8	28	5.50%
BS/MA/MSc	3	0	8	3	14	2.70%
MS/MPhil	0	0	4	0	4	0.80%
Total	96	48	217	152	513	100%

1.5.11.4 Comparative Analysis of Educational Attainment (HIS, Census 2023 & LFS 2021-22)

Educational attainment in District Orakzai remains critically low, with significant gender disparities evident across all three data sources the Household Information Survey (HIS), the 2023 Population Census, and the Labour Force Survey (LFS) 2021–22.

The HIS results show that most individuals lack formal education, with the "None" category dominating in all tehsils, particularly Upper and Lower Orakzai, where over one-third of respondents reported no schooling. Below matric and matric levels form the bulk of educational attainment, while higher education remains below 10% in every tehsil.

The 2023 Census reinforces these findings, showing that only 35.20% of people aged 10 and above have education beyond basic levels, while 25.43% remain below matriculation. Gender gaps are stark 36.45% of males compared to only 13.29% of females have education below matric, and just 1.12% of females have completed matriculation versus 8.53% of males. Higher education levels are rare, with graduation at 0.87%, master's degrees at 0.33%, and almost no postgraduate qualifications. Interestingly, diploma holders make up 1.22% of the population, with a slightly higher female ratio.

Similarly, the LFS (2021–22) data highlights that over half (52.01%) of respondents never attended school, and 18.24% have education at kindergarten level or below. Only 12.56% completed primary, and fewer than 10% reached matric or intermediate levels. Degree-level education is almost nonexistent, with only 0.61% holding general degrees and none in specialized or higher fields.

Across all three datasets, a consistent pattern emerges widespread educational deprivation, particularly among females, and minimal representation in higher education. These findings underline the urgent need for targeted reforms to improve access, reduce gender gaps, and promote higher learning opportunities essential for Orakzai's social and economic advancement.

[17] Calculated from the Household Survey conducted by the Consultant in August, 2024

1.5.13 Employment

Employment refers to the availability and distribution of work opportunities within an area that enable residents to earn livelihoods, support economic growth, and sustain community well-being. It encompasses not only the quantity of jobs but also the quality, accessibility, and diversity of employment sectors ranging from formal to informal work, industrial to service-based jobs integrated within the city's spatial structure. Employment influences urban development patterns, land use, transportation planning, and social equity by affecting where people live, commute, and access essential services. Thus, employment as a key factor shaping sustainable, inclusive, and resilient cities by aligning workforce needs with infrastructure, housing, and economic strategies.

1.5.13.1 Employment as Per Labour Force Survey 2021-22

The Labour Force Survey (2021–2022) for District Orakzai provides vital insights into the district's employment structure, based on a sample of 2,897 individuals, of whom 546 were employed across various sectors. Agriculture, forestry, and fishing dominate with 28.57% of total employment, reflecting the district's agrarian character and the need to preserve agricultural land and strengthen rural infrastructure. Construction follows at 19.41%, indicating active urban development and the need for planned construction zones.

Manufacturing (8.24%), transportation (8.42%), and business (11.72%) sectors reflect gradual economic diversification, requiring dedicated industrial and commercial land supported by efficient transport and utility networks. Education (4.76%), health (0.73%), food services (0.55%), and other service activities (2.93%) have smaller shares but remain essential for improving living standards and institutional growth.

This employment distribution highlights the importance of integrating workforce data into land use planning. Safeguarding agricultural areas, allocating space for industries, and expanding education and health services will ensure balanced growth. Aligning spatial planning with economic trends can enhance employment opportunities, support diversification, and promote sustainable socio-economic development across District Orakzai.

Table 1-26 Occupation of District Orakzai as per LFS 2021-2022[18]

Employment Nature	No of Responses	Percentages
Food Activities	3	0.55%
Administrative and support service activities	1	0.18%
Agriculture, forestry and fishing	156	28.57%
Construction	106	19.41%
Education	26	4.76%
Health	4	0.73%
Manufacturing	45	8.24%
Other service activities	16	2.93%
Job	79	14.47%
Transportation	46	8.42%
Business	64	11.72%
Grand Total	546	100.00%

[18] Calculated from Micro data LFS 2020-2021, Pakistan Bureau of Statistics

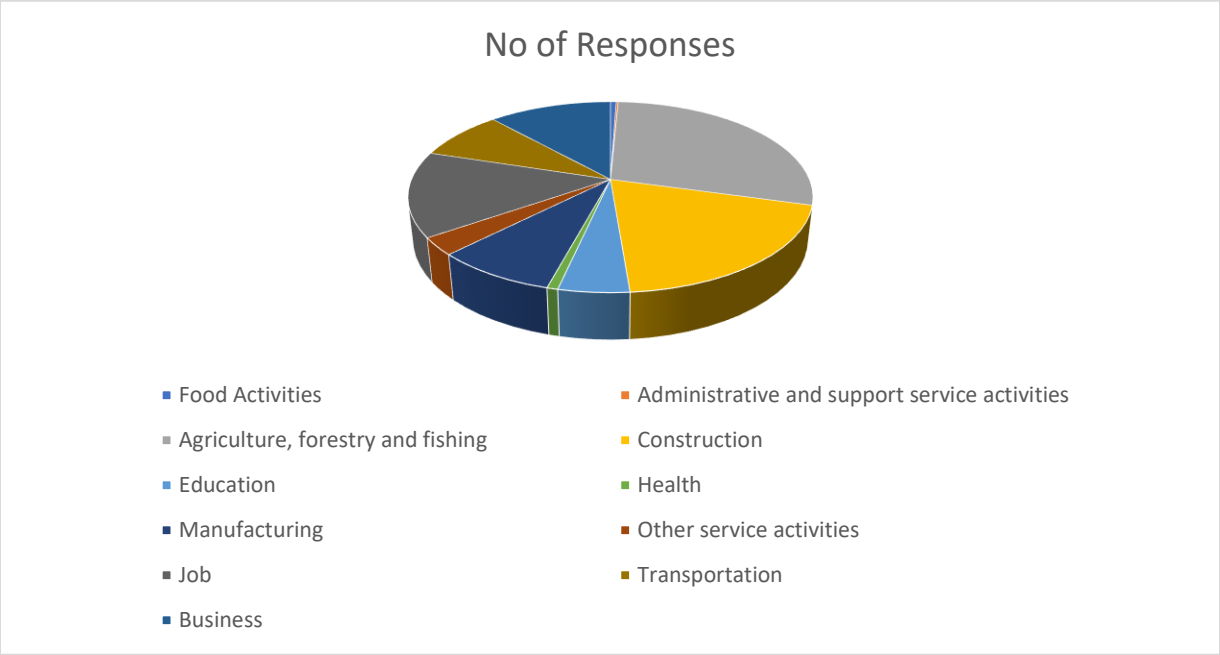


Figure 1-28 Occupation of District Orakzai from LFS 2021-2022

1.5.13.2 Employment as Per Census 2023

The 2023 census employment data for District Orakzai provides valuable insights into the occupational structure and labor market dynamics across its four tehsils Central, Ismail Zai, Lower, and Upper. This information forms a key foundation for preparing the district's land use plan by aligning workforce distribution with economic and spatial development strategies.

Employment rates vary notably across tehsils: Ismail Zai reports the highest at 4.83%, followed by Central at 7.52%, Lower at 7.54%, and Upper at 5.11%. These differences highlight uneven economic activity and the need for targeted investment in underperforming areas. Paid employment remains limited, ranging from 5.03% in Upper to 5.03% in Lower Tehsil, while self-employment especially in agriculture is more common, indicating the sector's central role in local livelihoods.

Unemployment remains high throughout the district, reaching 23.23% in Central, Ismail Zai at 19.20%, Lower 22.05% and 22.13% in Upper tehsil. Such figures underline the urgency of economic diversification and land use strategies that promote job creation. Areas with strong agricultural activity require preservation of arable land, while tehsils with emerging non-agricultural employment need space for commercial and industrial development.

Strategic land allocation for industrial zones, business hubs, and vocational centers particularly in Central and Upper Tehsils will be crucial. Enhanced transport links and public services can further improve access to employment hubs and support balanced regional growth. Integrating labor market data into spatial planning will strengthen socio-economic resilience, generate sustainable livelihoods, and guide the district's long-term development.

Table 1-27 Occupation of District Orakzai from Census 2023[19]

Occupation	Central Tehsil	Percentage	Ismail Zai Tehsil	Percentage	Lower Tehsil	Percentage	Upper Tehsil	Percentage
Employed	18749	7.52%	12045	4.83%	18809	7.54%	12736	5.11%
Paid Employee	12551	5.03%	12551	5.03%	12551	5.03%	12551	5.03%
Own Account (Agri)	13224	5.30%	13224	5.30%	13224	5.30%	13224	5.30%
Own Account (Non-A)	5566	2.23%	5566	2.23%	5566	2.23%	5566	2.23%
Unemployed	57908	23.23%	47879	19.20%	54976	22.05%	55180	22.13%

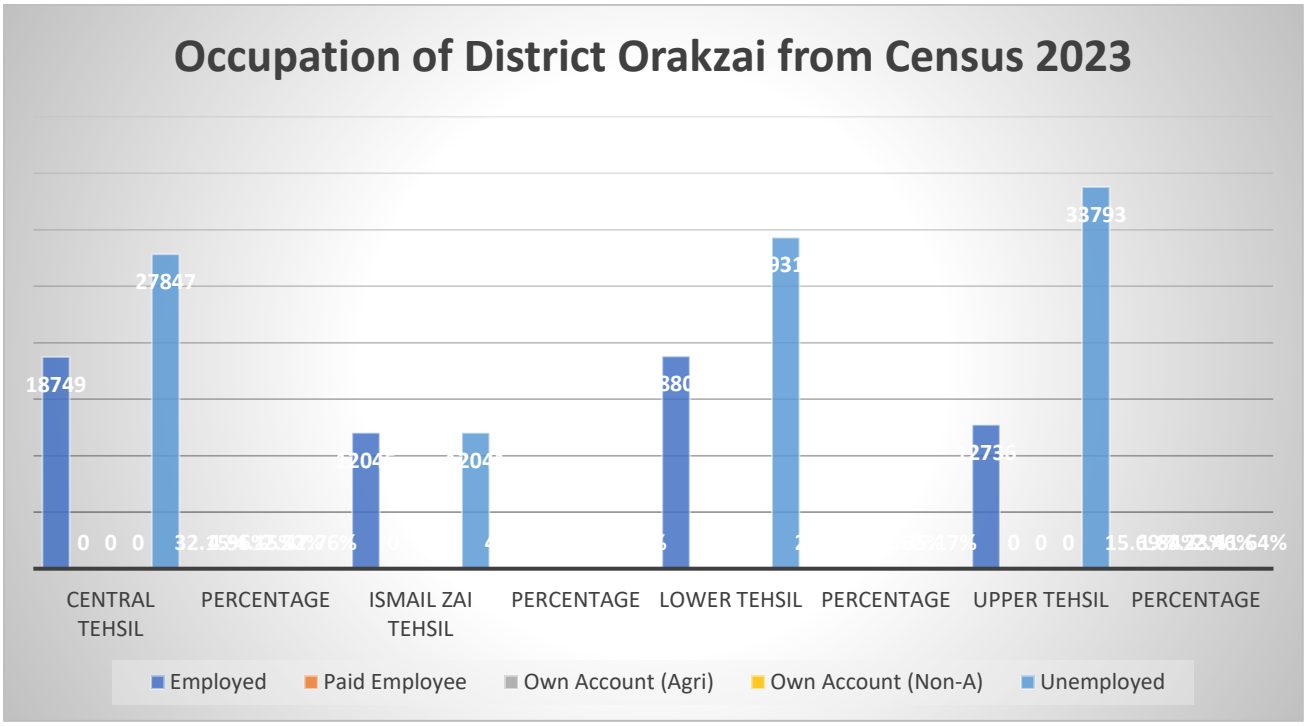


Figure 1-29 Occupation of District Orakzai from Census 2023

1.5.13.3 Employment as Per HIS Survey

The Household Information Survey (HIS) of Orakzai provides a clear picture of the district's occupational structure and economic challenges. Labor and daily wage work dominate the local economy, engaging 23.2% of respondents, highlighting the region's dependence on informal and labor-intensive employment.

[19] https://www.pbs.gov.pk/sites/default/files/population/2023/tables/table_14_kp_districts.pdf

Unemployment remains a major concern, with 20.9% of individuals not engaged in any formal work, reflecting the need for targeted livelihood programs.

Students make up 14.6% of the surveyed population, particularly concentrated in Central and Ismail Zai Tehsils, indicating a gradual rise in educational participation among youth. Agriculture and livestock (10.5%), private sector jobs (10.7%), and government employment (10.9%) form the next major occupational groups, together representing a substantial share of the workforce. Sectors such as transport (2.9%), business and trade (5.3%), and miscellaneous occupations (1.0%) remain limited, suggesting restricted economic diversification.

Tehsil-wise, Lower and Upper Tehsils show higher participation in labor and government sectors, whereas Central and Ismail Zai display a more balanced occupational mix. Overall, the HIS data underscores the urgent need for job creation, skill development, and sectoral diversification to reduce unemployment and reliance on daily wage labor in District Orakzai.

Table 1-28 Occupation of Respondent Tehsil-Wise from HIS[20]

Occupation	Central	Ismail Zai	Lower	Upper	Total	Percentage
None	10	6	55	36	107	20.90%
Student	18	16	25	16	75	14.60%
Labor/Daily Wages	19	7	32	61	119	23.20%
Transport	1	3	5	6	15	2.90%
Business/Trade	6	6	13	2	27	5.30%
Agriculture/Livestock	24	2	27	1	54	10.50%
Private Job	11	4	26	14	55	10.70%
Government Job	7	4	34	11	56	10.90%
Other	0	0	0	5	5	1.00%
Total	96	48	217	152	513	100.00%

1.5.13.4 Comparative Analysis of Employment (HIS, Census 2023 and LFS)

Employment data from the Household Information Survey (HIS), 2023 Census, and Labour Force Survey (LFS 2021–2022) together provide a comprehensive picture of District Orakzai's labor market, revealing deep economic challenges and opportunities for future land use planning.

The HIS data shows a heavy reliance on informal labor, with 23.2% of respondents engaged in daily wage work and 20.9% unemployed, reflecting significant economic vulnerability. Students represent 14.6% of respondents, mostly in Central and Ismail Zai tehsils, indicating a growing educated youth base. Agriculture and livestock (10.5%) and government and private jobs (about 10% each) highlight the district's mixed yet limited economic base.

According to the 2023 Census, employment rates vary sharply across tehsils: Ismail Zai leads with 45.49%, followed by Central (32.15%), Lower (22.57%), and Upper (15.69%). Unemployment, however, remains high reaching 47.76% in Central Tehsil. The Census also indicates that most workers are self-employed in agriculture, confirming Orakzai's agrarian character. This underscores the need to protect farmland and rural

[20] Calculated from the Household Survey conducted by the Consultant in August, 2024

infrastructure in Upper and Lower tehsils, while promoting commercial and industrial development in Central and Ismail Zai.

The LFS further refines this picture, showing agriculture, forestry, and fishing as the leading employment sectors (28.57%), followed by construction (19.41%), manufacturing (8.24%), transport (8.42%), and business (11.72%). These figures reflect gradual economic diversification and increasing urbanization pressures. Careful zoning is essential to balance agricultural preservation with the allocation of land for industries, business hubs, and logistics centers.

Collectively, the data highlight two major challenges: sustaining the district's agrarian base while expanding non-agricultural employment to reduce unemployment and economic informality. A balanced land use plan must therefore prioritize agricultural protection, support rural infrastructure, and create zones for industrial, commercial, and vocational development. Central and Ismail Zai tehsils require mixed-use expansion, while Upper and Lower tehsils should focus on rural productivity and land conservation.

Integrated spatial planning combined with improved connectivity will enhance labor mobility, stimulate economic diversification, and ensure sustainable, inclusive growth across District Orakzai.

1.6 Urbanization and Hierarchy of Human Settlement

1.6.1 Urbanization

Urbanization refers to the transformation of rural areas into urban centers, largely driven by economic growth and industrialization. Demographically, it signifies the movement of people from villages to towns and cities in search of better livelihoods and living conditions. Over the past five decades, this shift has accelerated, especially in developing countries, leading to the rapid expansion of metropolitan areas. It represents a deep and continuing transformation in human society, where traditional rural lifestyles are increasingly replaced by urban living patterns.

Urbanization offers both opportunities and challenges. On the positive side, it stimulates economic growth, enhances access to education and healthcare, and fosters innovation and cultural exchange. However, rapid and unplanned urban growth can strain infrastructure and public services, causing housing shortages, informal settlements, and inadequate access to water, sanitation, and transportation.

To address these challenges, effective urban planning is crucial. Sustainable urban development requires well-integrated strategies for housing, transport, employment, healthcare, and education. With thoughtful, forward-looking planning, cities can evolve into inclusive, resilient, and sustainable communities that provide equitable opportunities and improved quality of life for all residents.

1.6.2 Urbanization in District Orakzai

In the context of Pakistan, urbanization has been marked by significant population growth in urban areas, primarily driven by rural-to-urban migration and high natural population growth. According to the 2017 Census by the Pakistan Bureau of Statistics (PBS), the urban population of Pakistan has witnessed a substantial rise, leading to the rapid expansion of cities and towns across the country. This urban growth, however, is accompanied by numerous challenges, including insufficient infrastructure, inadequate housing, and the rise of informal settlements. In Khyber Pakhtunkhwa (KP), this urbanization trend mirrors the national pattern, with cities like Peshawar experiencing significant population increases and urban sprawl.

Specifically, District Orakzai within KP has seen a sharp population surge, growing from 283,557 residents in 1972 to over 358,751 by 1981.But from 1981 to 2017 the population significantly decrease from 358,751

to 254,303. The causes of the population decrease in Orakzai District from 1981 to 2017 are deeply rooted in the region's complex history and security landscape.

1.6.3 Urbanization Trend in Historical Perspective

For the preparation of the district land use plan for the next 20 years, we recognize the ongoing global and national urbanization trends shaping our strategies. In 2019, the United Nations estimated that over half of the world's population (4.2 billion) lived in urban areas, and by 2041[21] this figure will reach 6 billion. Pakistan, with one of the highest urbanization rates in South Asia, reflects this shift. According to the 2023 Population Census, 38.82% of Pakistan's population now lives in urban areas[22], up from 36.44% in the 2017 Census.[23]

Population Census data (1951–2017) shows a steady urbanization trend nationwide and in Khyber Pakhtunkhwa (KP). In 1951, 17.74% of Pakistan's population was urban, rising to 36.44% by 2017 due to industrialization, migration, and better infrastructure. KP's growth was slower from 11.08% in 1951 to 18.80% in 2017 reflecting its agrarian nature and geography.

District Okazaki currently has no designated urban areas and remains largely rural, though nearby District Orakzai is experiencing development that may influence future growth. A major milestone is the Kalaya Master Plan 2024-42, positioning Kalaya, the District Headquarters of Orakzai, as a hub of urban development focused on infrastructure and sustainable growth.

Kalaya's urbanization will likely create spillover effects in Orakzai, driving migration for jobs, education, and healthcare, and possibly forming new suburban centers. Therefore, it is crucial to monitor these trends and plan for gradual urban expansion, ensuring sustainable infrastructure, service provision, and improved quality of life across both districts.

1.6.4 Urban Growth Trend

The spatial pattern of urban growth refers to how a city's physical expansion develops over time, including changes in land use, population density, and infrastructure distribution. Studying these patterns helps planners identify rapidly developing, stagnant, or potential growth areas, supporting informed decisions on land use, zoning, transport, and public services to ensure sustainable development.

A key tool for assessing urban growth is change detection analysis in Geographic Information Systems (GIS), which compares spatial datasets from different periods to detect changes in land use and built-up areas. This provides accurate insights into the scale and direction of urban expansion. Alternatively, Google Earth and historical satellite imagery can be used to manually delineate built-up boundaries over time. Though less precise than GIS, this approach remains useful and accessible where advanced tools are limited.

Urban growth trends are driven by economic development, migration, government policy, and technology. Cities often evolve from low-density sprawl to compact, high-density forms, increasing demand for infrastructure and services. Growth is rarely uniform areas near transport routes or economic centers expand faster, while others lag due to weaker investment or geography. Recognizing these disparities enables better land use planning and resource allocation.

[21] United Nations. (2019). World Urbanization https://population.un.org/wup/publications/Files/WUP2018-Report.pdf Prospects: The 2018 Revision.
[22] Pakistan Bureau of Statistics. (2023, August 5). Announcement of Results of 7th Population and Housing Census-2023. Press Release.
[23] Pakistan Bureau of Statistics. (2021, April 12). Final Results of Sixth Population and Housing Census-2017. Table-1: Area, Population by Sex, Sex Ratio, Population Density, Urban Proportion, Household Size and Annual Growth Rate.

Finally, urbanization impacts the environment, contributing to habitat loss, pollution, and higher energy use. Modern planning now emphasizes sustainability, promoting green spaces, energy-efficient buildings, and mixed-use neighborhoods that enhance walkability and reduce car dependency.

1.6.4.1 Kalaya Urban Area

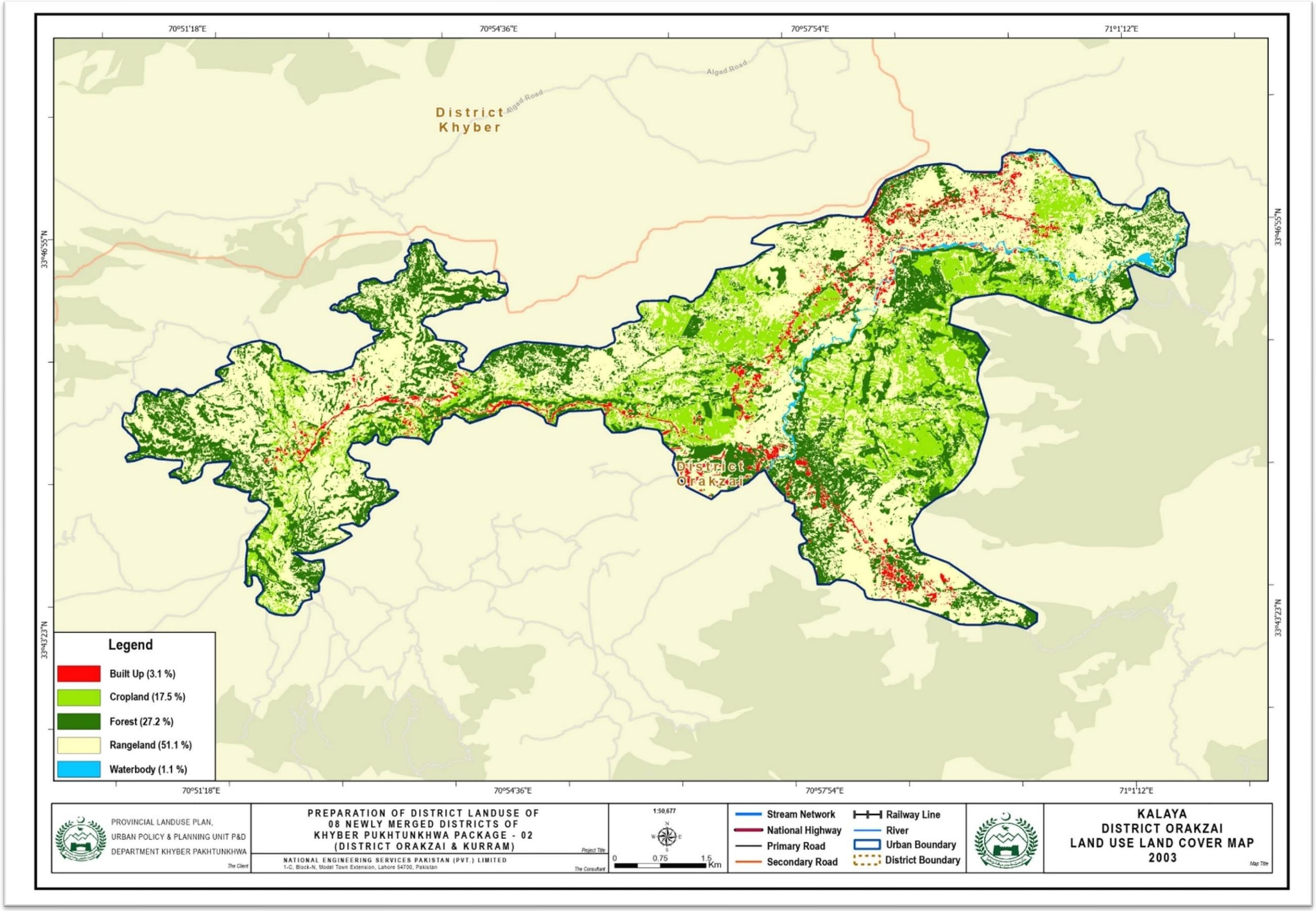
The temporal analysis of Kalaya Urban Area (2003–2023) shows a clear trend of urban expansion accompanied by the decline of agricultural and natural lands. Over this 20-year period, the built-up area increased from 3.10% in 2003 to 8.10% in 2023, reflecting rapid urbanization driven by population growth and infrastructure development.

Meanwhile, rangeland declined from 51.10% to 36.40%, primarily due to urban encroachment on rangeland land. Forest cover dropped sharply from 27.20% to 16.30%, in contrast cropland increase from 17.50% to 36% waterbodies showed a minor increase from 1.10% to 1.22%, suggesting relative stability in water resources.

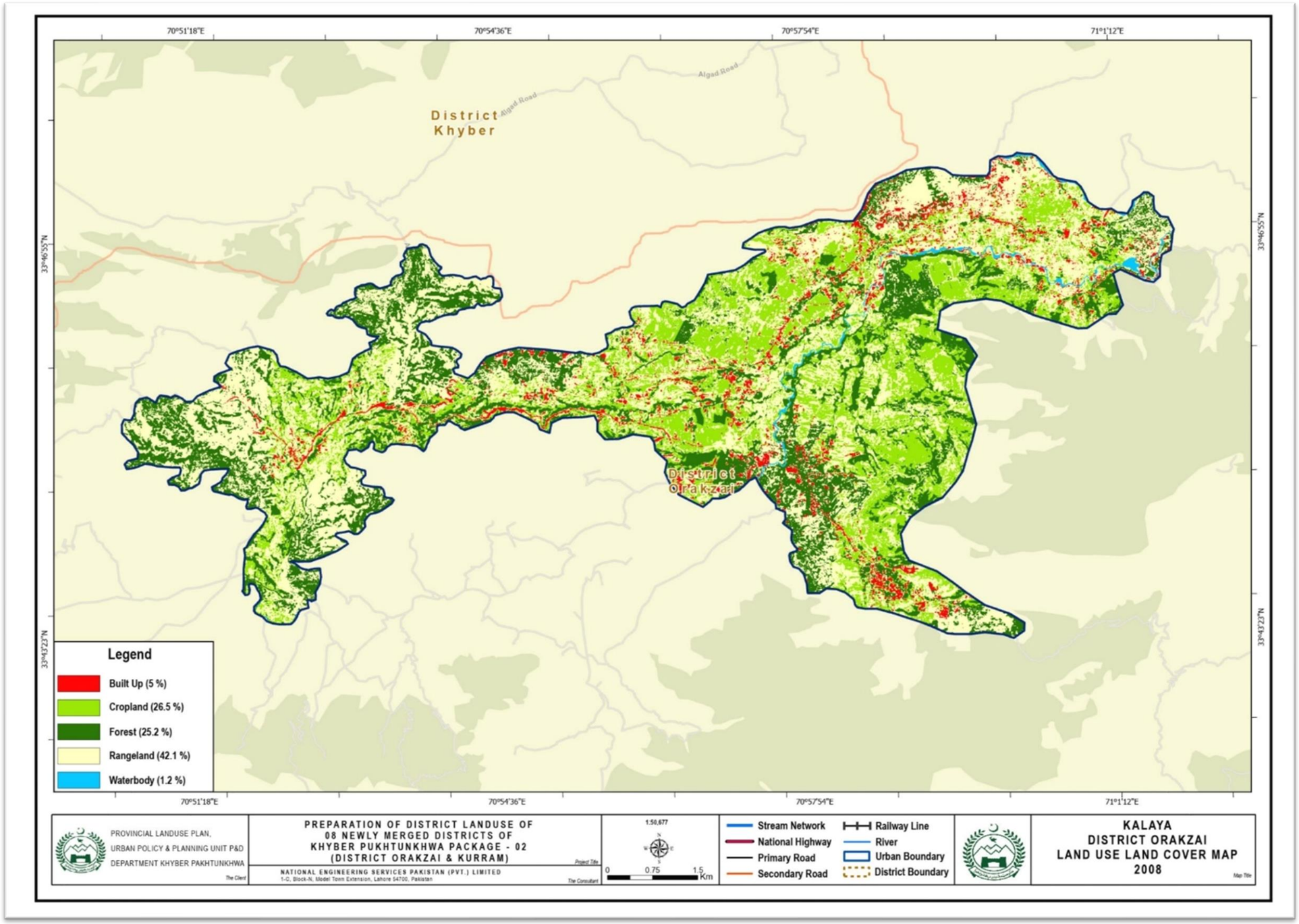
Overall, the data highlights a steady shift from rural to urban land use, emphasizing the need for sustainable urban planning to balance development with environmental conservation and agricultural preservation in Kalaya.

Table 1-29 Kalaya Urban Area landcover from 2003 to 2023

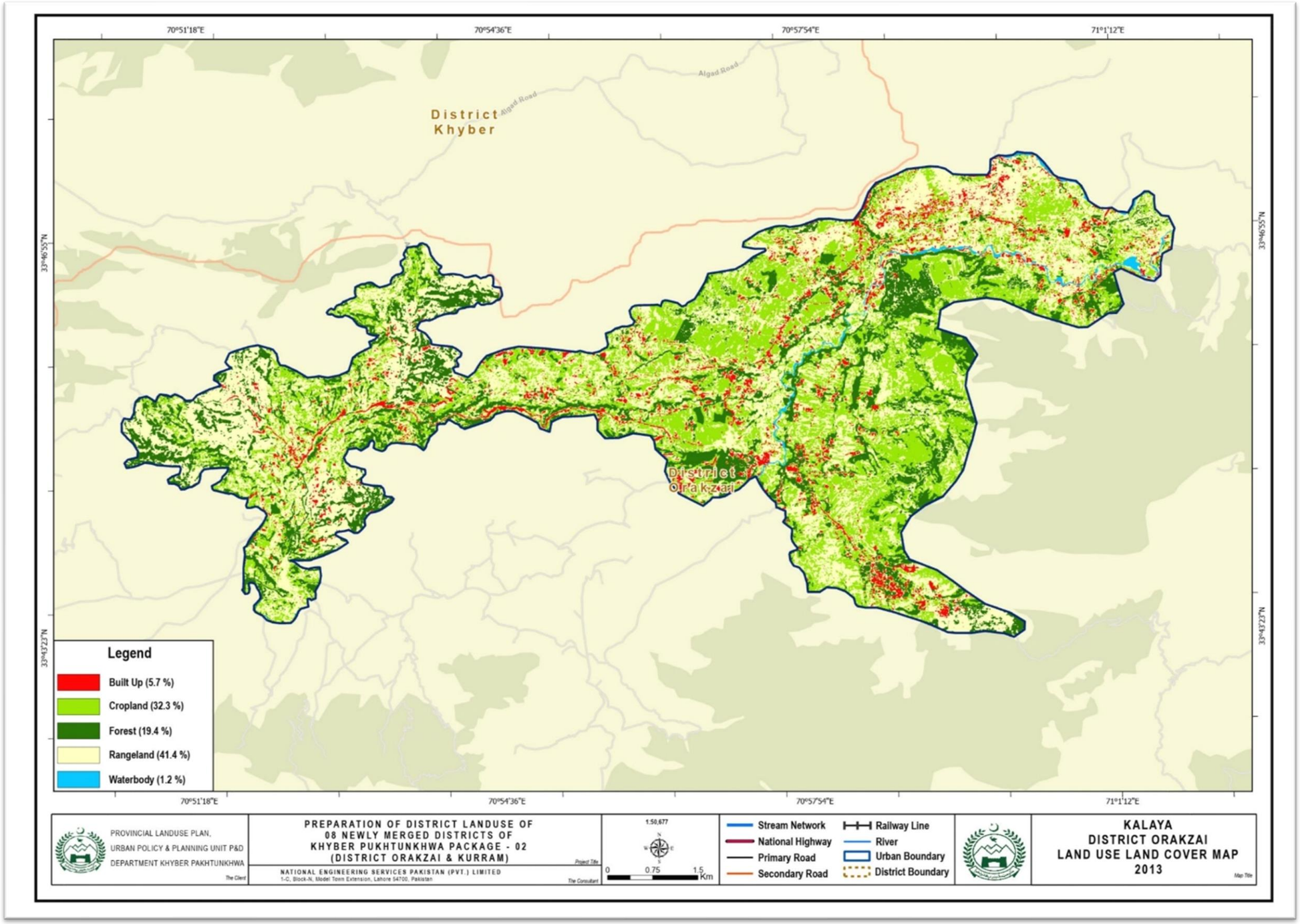
Year	Built-up	Cropland	Forest	Rangeland	Waterbodies
2003	3.10%	17.50%	27.20%	51.10%	1.10%
2008	5.10%	26.50%	25.20%	42.10%	1.20%
2013	5.70%	32.30%	19.40%	41.40%	1.20%
2018	7.30%	36.60%	17.80%	37.20%	1.10%
2023	8.10%	38.00%	16.30%	36.40%	1.22%



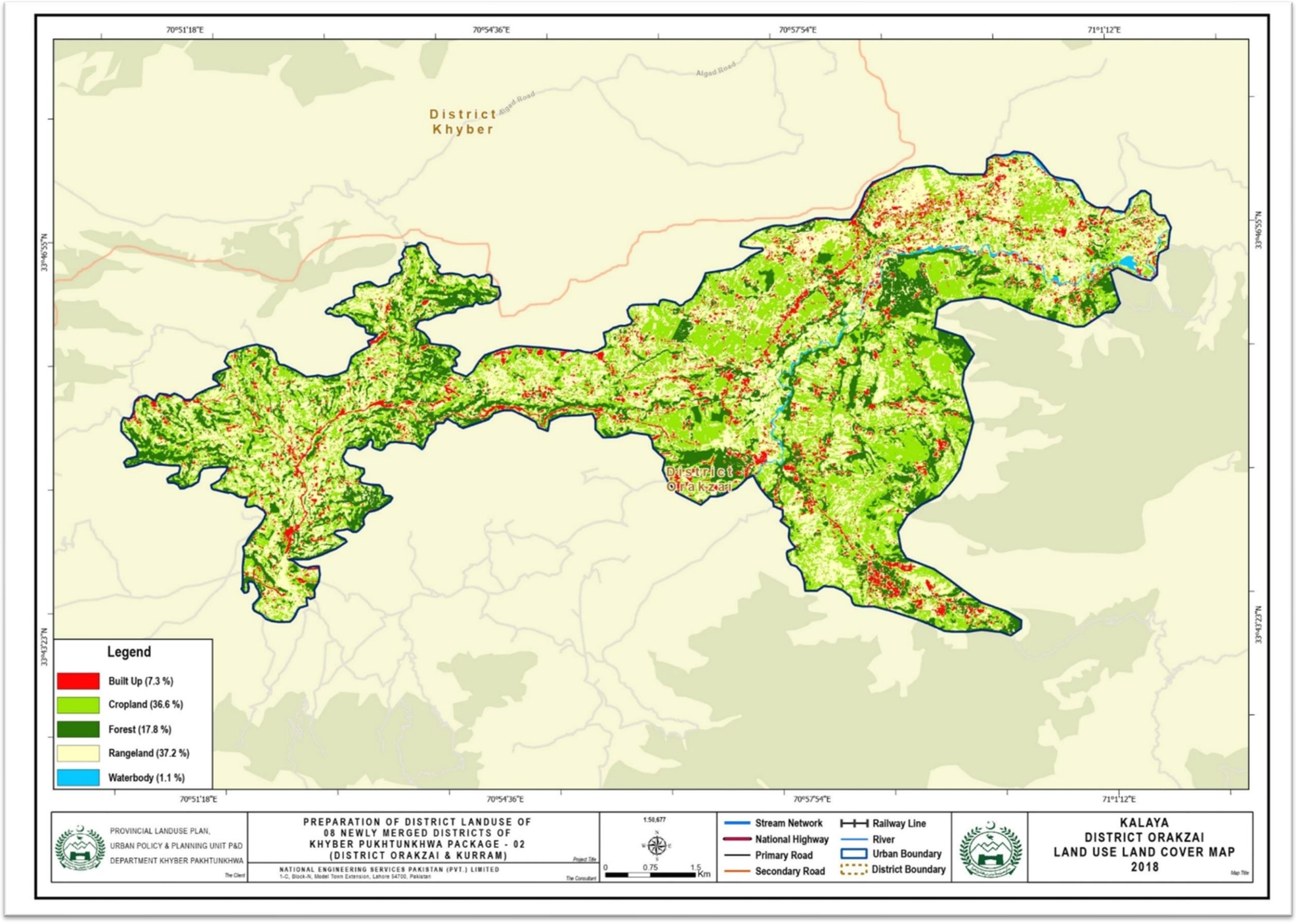
Map 1-9 Kalaya Land Cover Map 2003



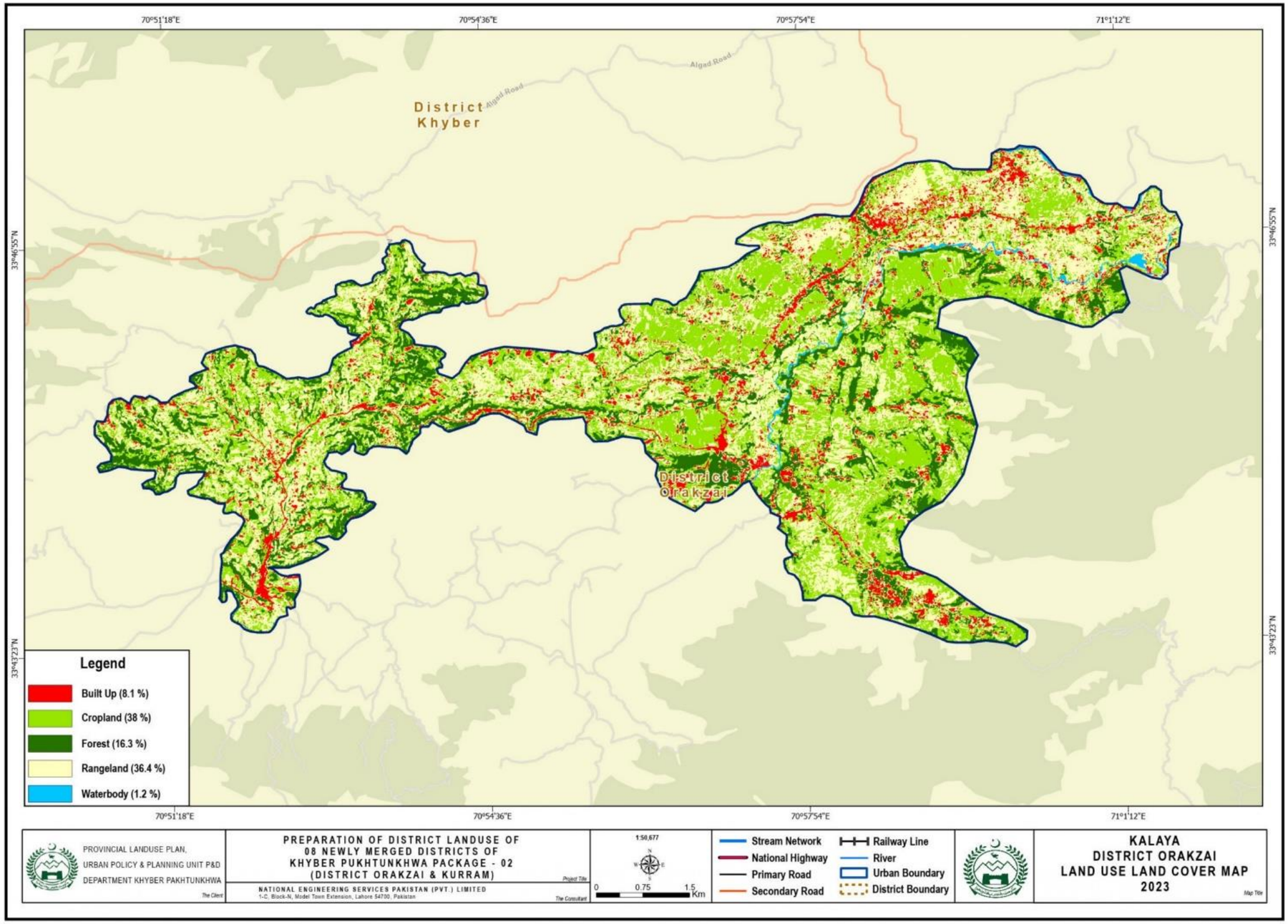
Map 1-10 Kalaya Land Cover Map 2008



Map 1-11 Kalaya Land Cover Map 2013



Map 1-12 Kalaya Land Cover Map 2018



Map 1-13 Kalaya Land Cover Map 2023

1.6.4.2 Ghiljo urban canter

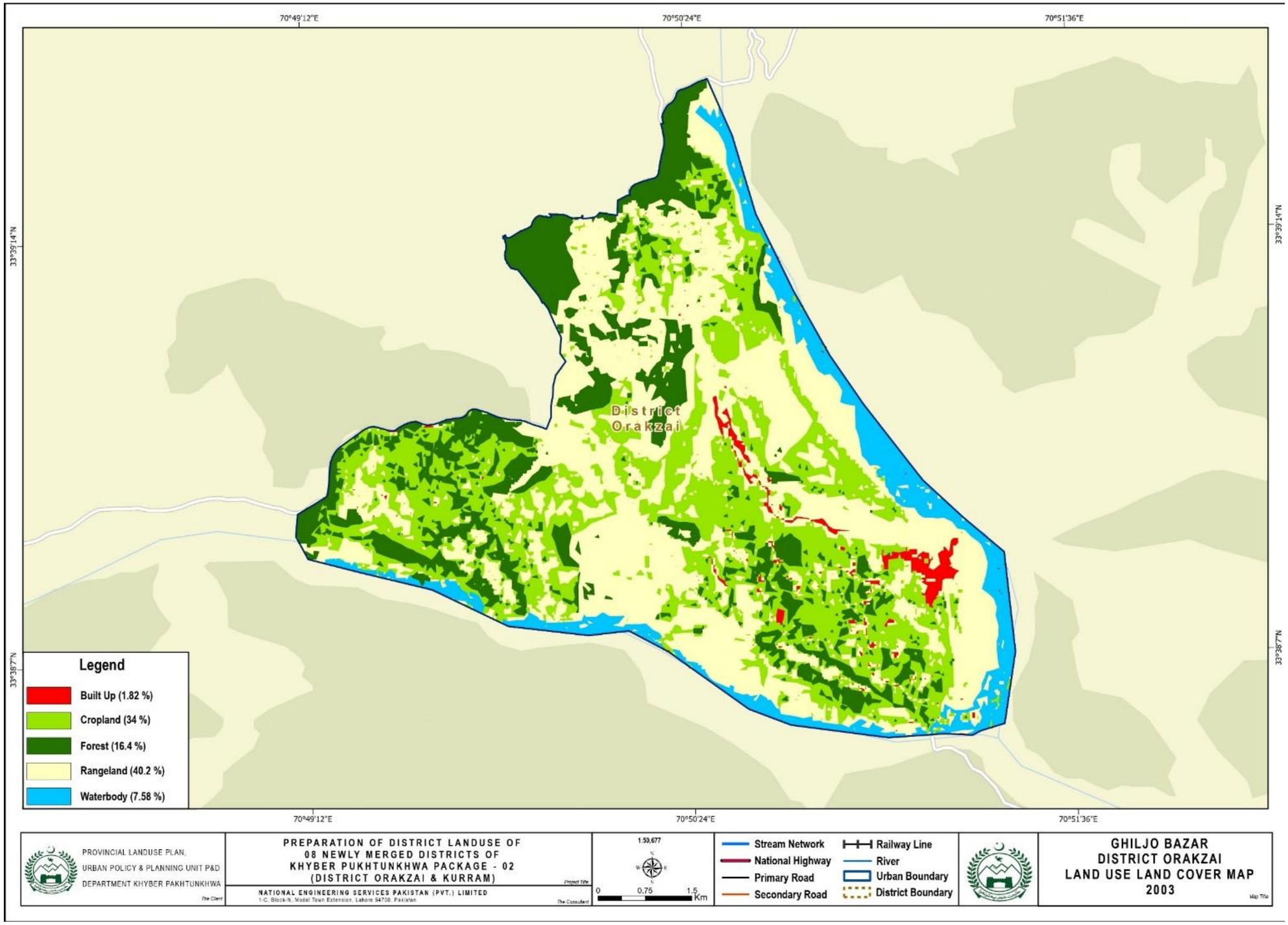
The land use analysis of ghiljo Urban Area (2003–2023) shows a clear pattern of urban expansion and shifting land use dynamics. The built-up area increased from 1.82% in 2003 to 6.50% in 2023, reflecting rapid urban growth driven by rising population and infrastructure demand.

Cropland expanded moderately from 34% to 41.50%, indicating that agriculture continues to play an important role despite urban encroachment. In contrast, rangeland experienced decline from 40.20% to 36.15%, highlighting the conversion of grazing lands into urban or agricultural areas, which may affect livestock activities and biodiversity. Waterbodies remained relatively stable, with a slight increase from 7.58% to 7.85%, suggesting that water resources have largely been preserved.

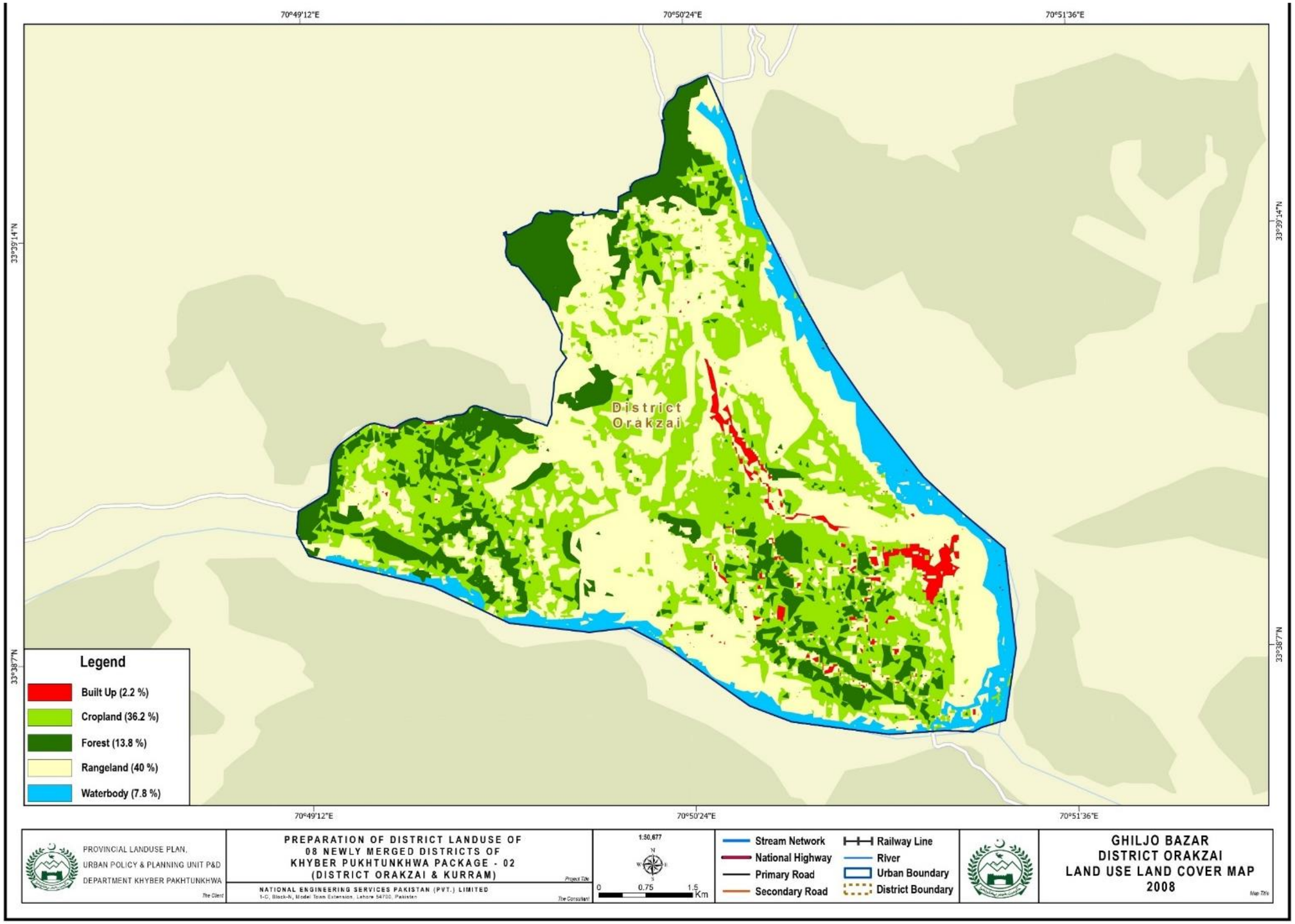
Overall, the data reflects a significant transition toward urbanization, where built-up areas are expanding at the expense of natural and grazing lands. This trend underscores the need for balanced land use planning to ensure sustainable growth, resource conservation, and environmental protection in Sadda Urban Area.

Table 1-30 Ghiljo Urban Area landcover from 2003 to 2023

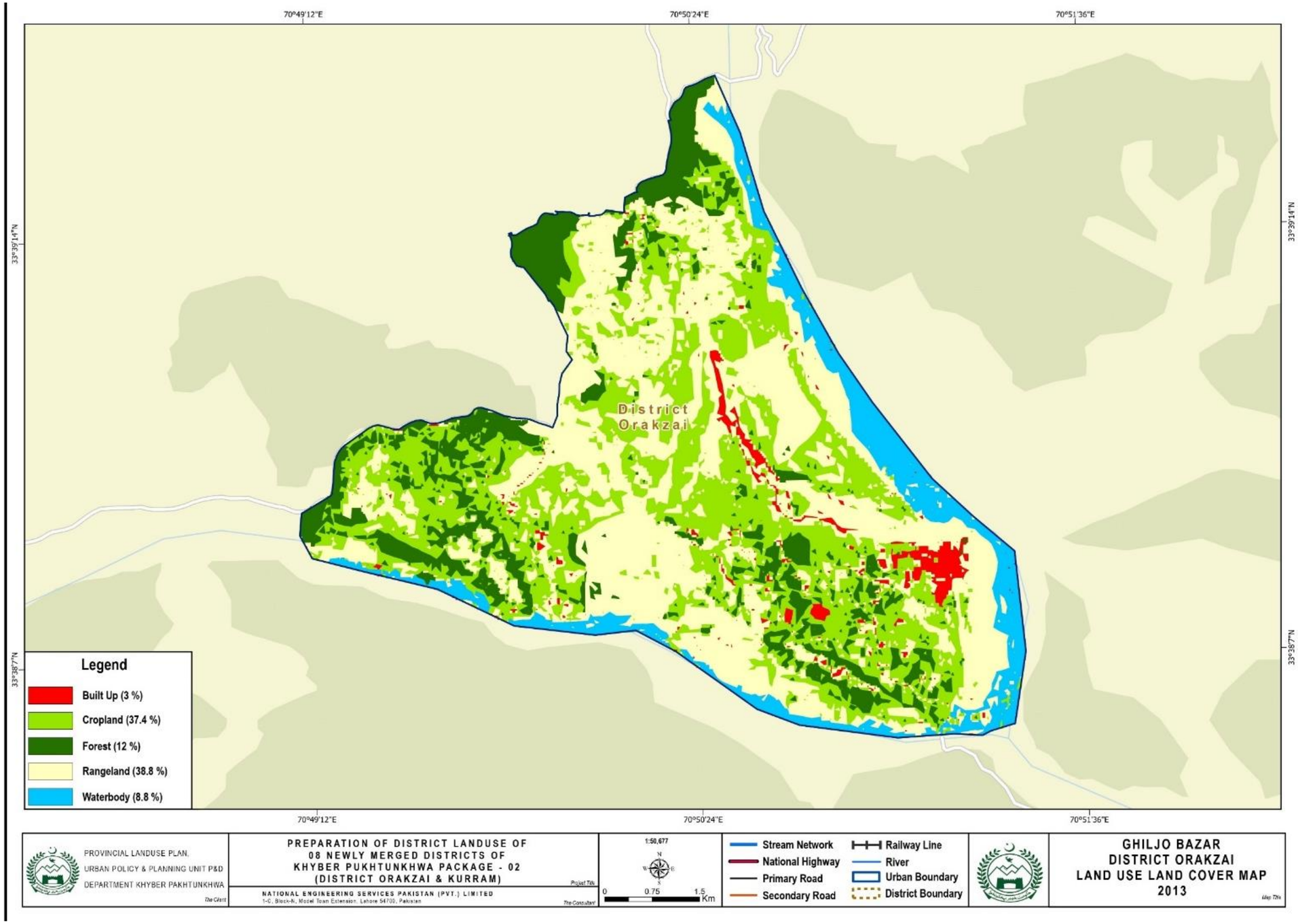
Year	Built-up	Cropland	Forest	Rangeland	Water Bodies
2003	1.82%	34.00%	16.40%	40.20%	7.58%
2008	2.20%	36.20%	13.80%	40.00%	7.80%
2013	3.00%	37.40%	12.00%	38.80%	8.80%
2018	4.70%	39.20%	10.20%	37.50%	8.40%
2023	6.50%	41.50%	8.00%	36.15%	7.85%



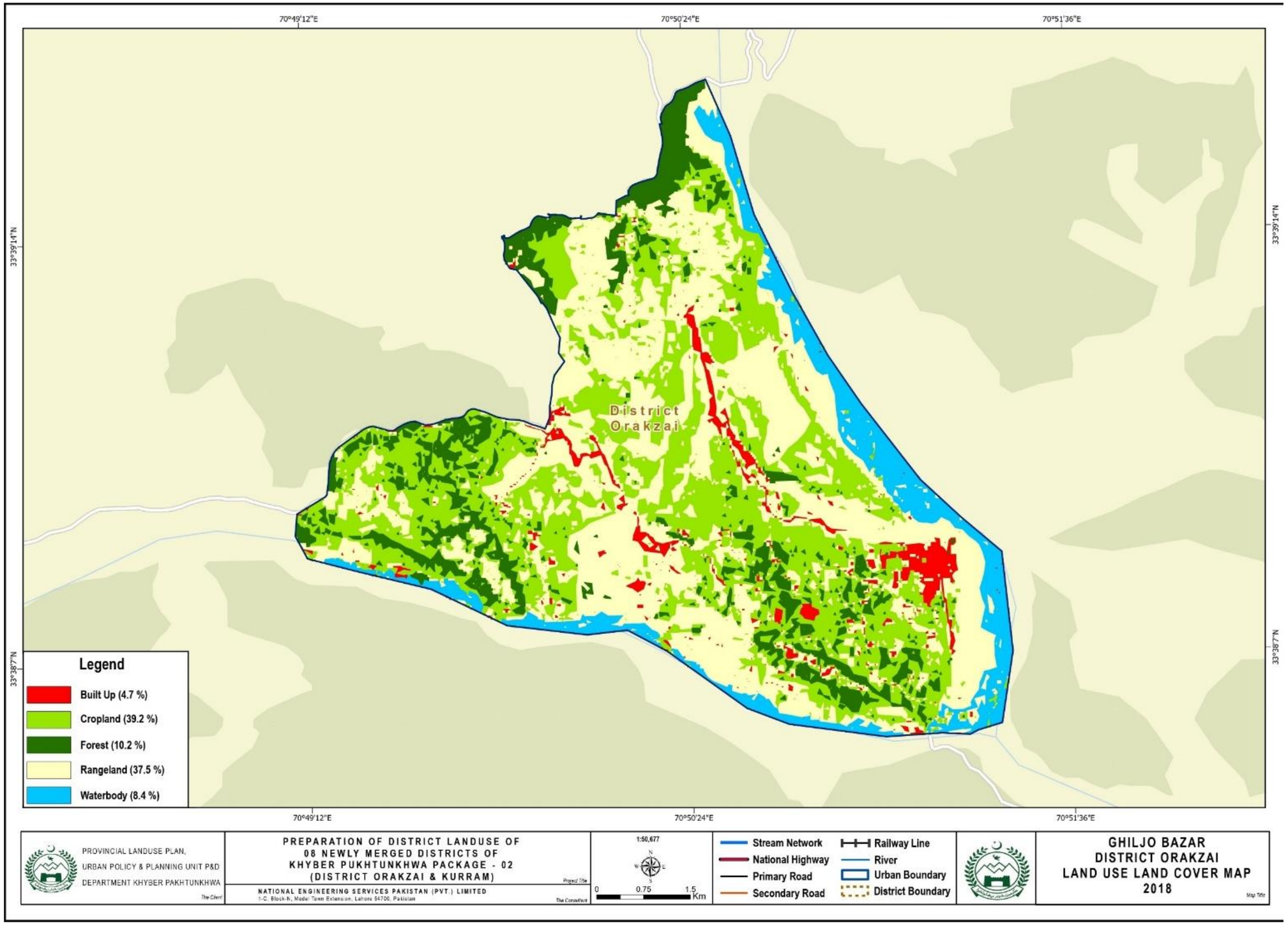
Map 1-14 Ghiljo Urban Area Land Cover Map 2003



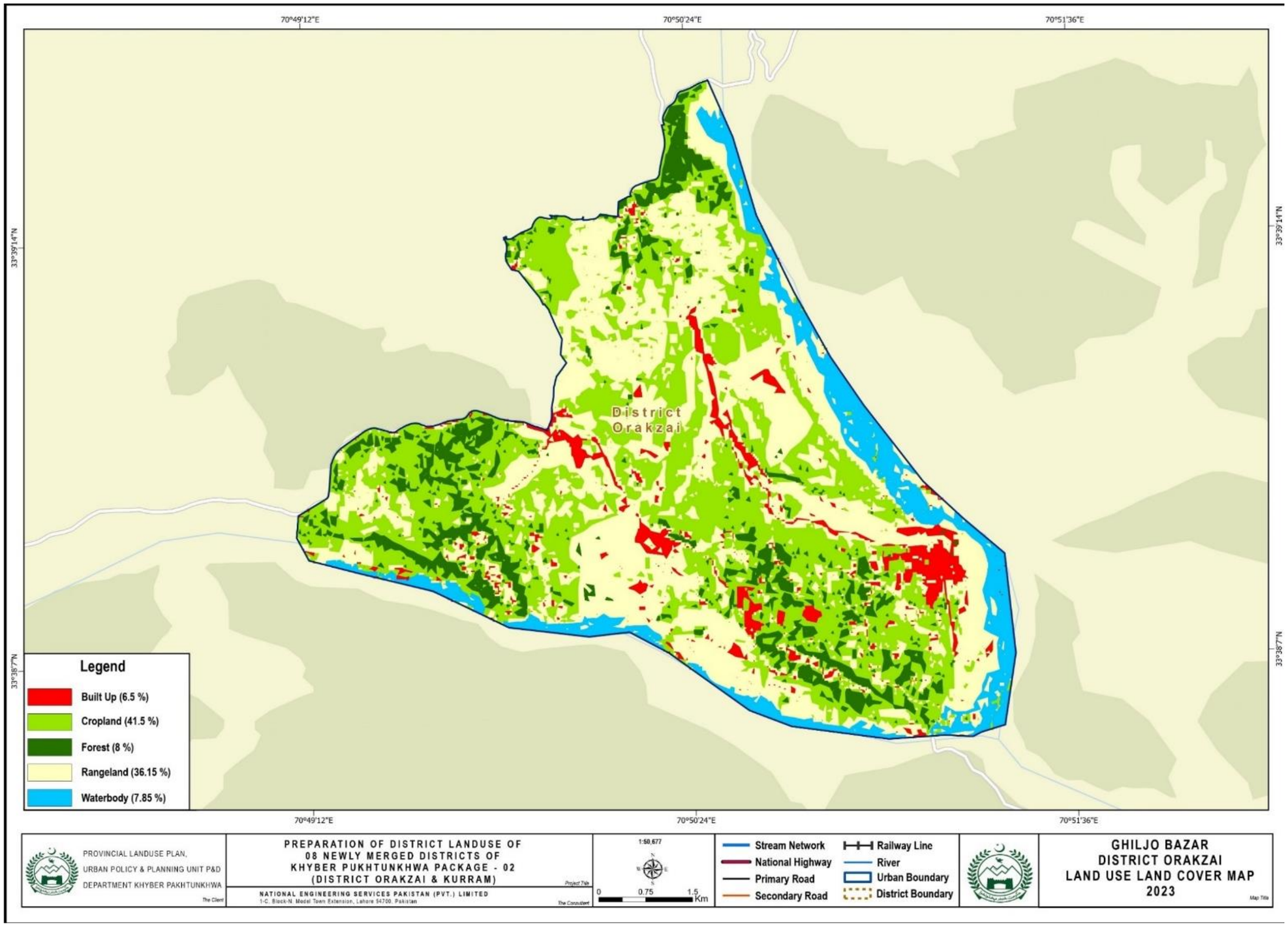
Map 1-15 Ghiljo Urban Area Land Cover Map 2008



Map 1-16 Ghiljo Urban Area Land Cover Map 2013



Map 1-17 Ghiljo Urban Area Land Cover Map 2018



Map 1-18 Ghiljo Urban Area Land Cover Map 2023

1.6.4.3 Dabori Urban Area

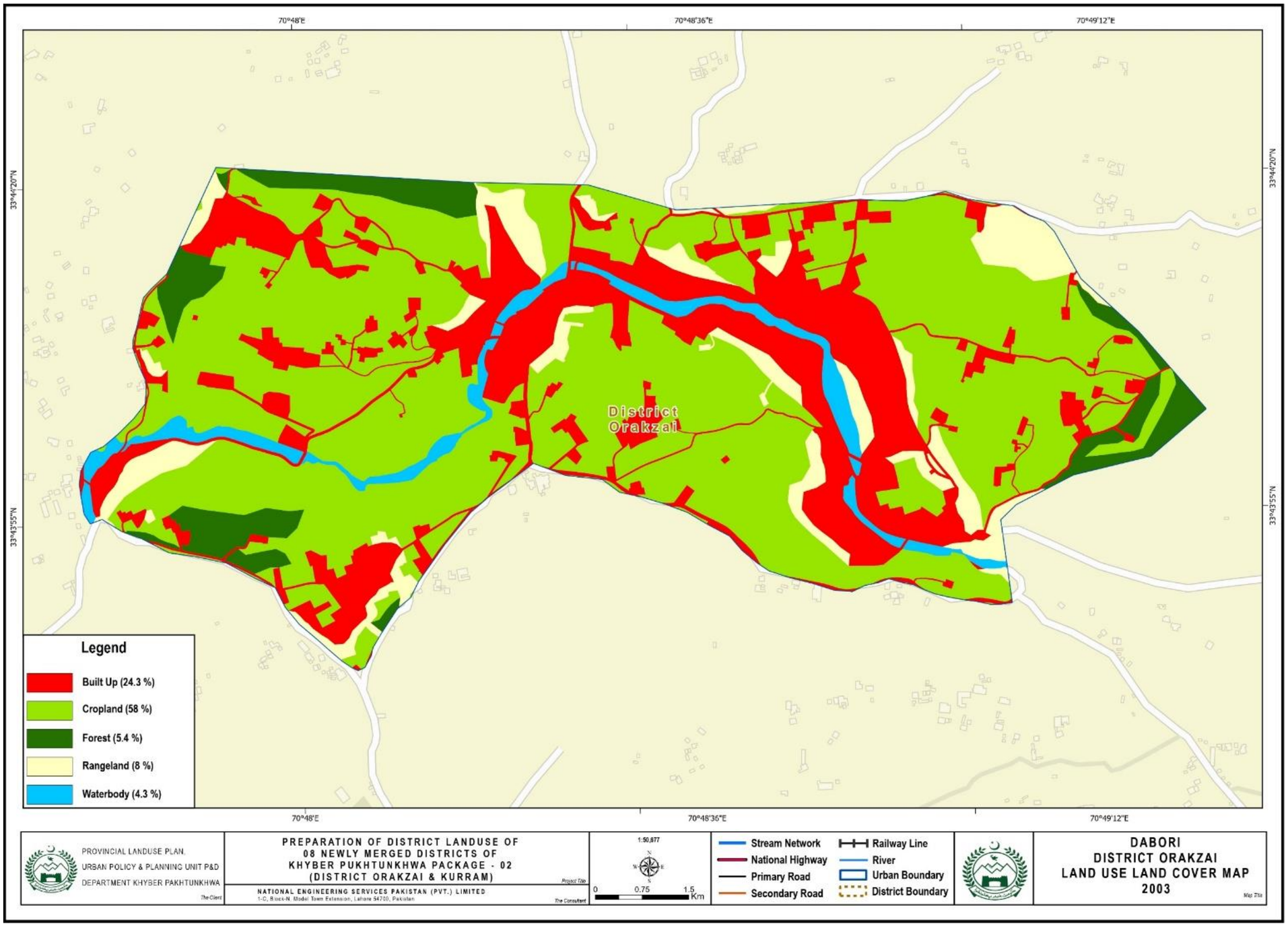
The land use analysis of Dabori Proposed Urban Area (2003–2023) shows gradual urban growth alongside changes in agricultural and natural lands. The built-up area increased from 24.30% in 2003 to 29% in 2023, reflecting ongoing development driven by population growth and infrastructure needs, though urbanization remains limited.

Cropland rose moderately from 58% to 66.70%, indicating continued reliance on agriculture, while forested land sharply declined from 5.40% to 0.04%, raising concerns about biodiversity loss and environmental impact. Rangeland decreased from 8% to 0.21%, showing some conversion to urban or agricultural use, whereas waterbodies remained stable at around 5%, suggesting preservation of water resources.

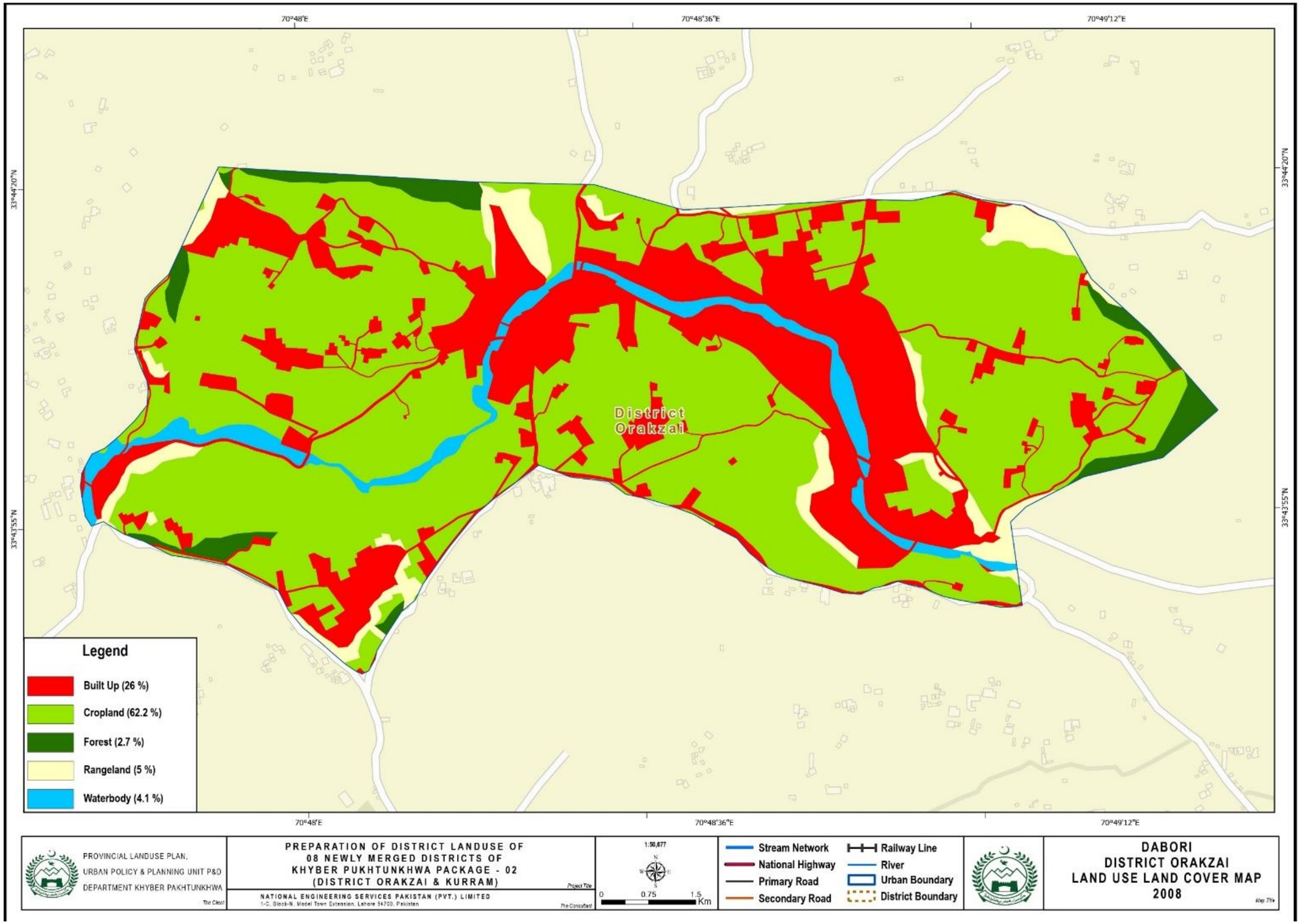
Overall, Dogar exhibits gradual urbanization, with significant loss of forests and moderate reduction in rangelands. Cropland and water bodies have remained relatively stable, but ongoing conversion of natural lands highlights the need for sustainable land management and environmental protection in the area.

Table 1-31 Dabori Urban Area landcover from 2003 to 2023

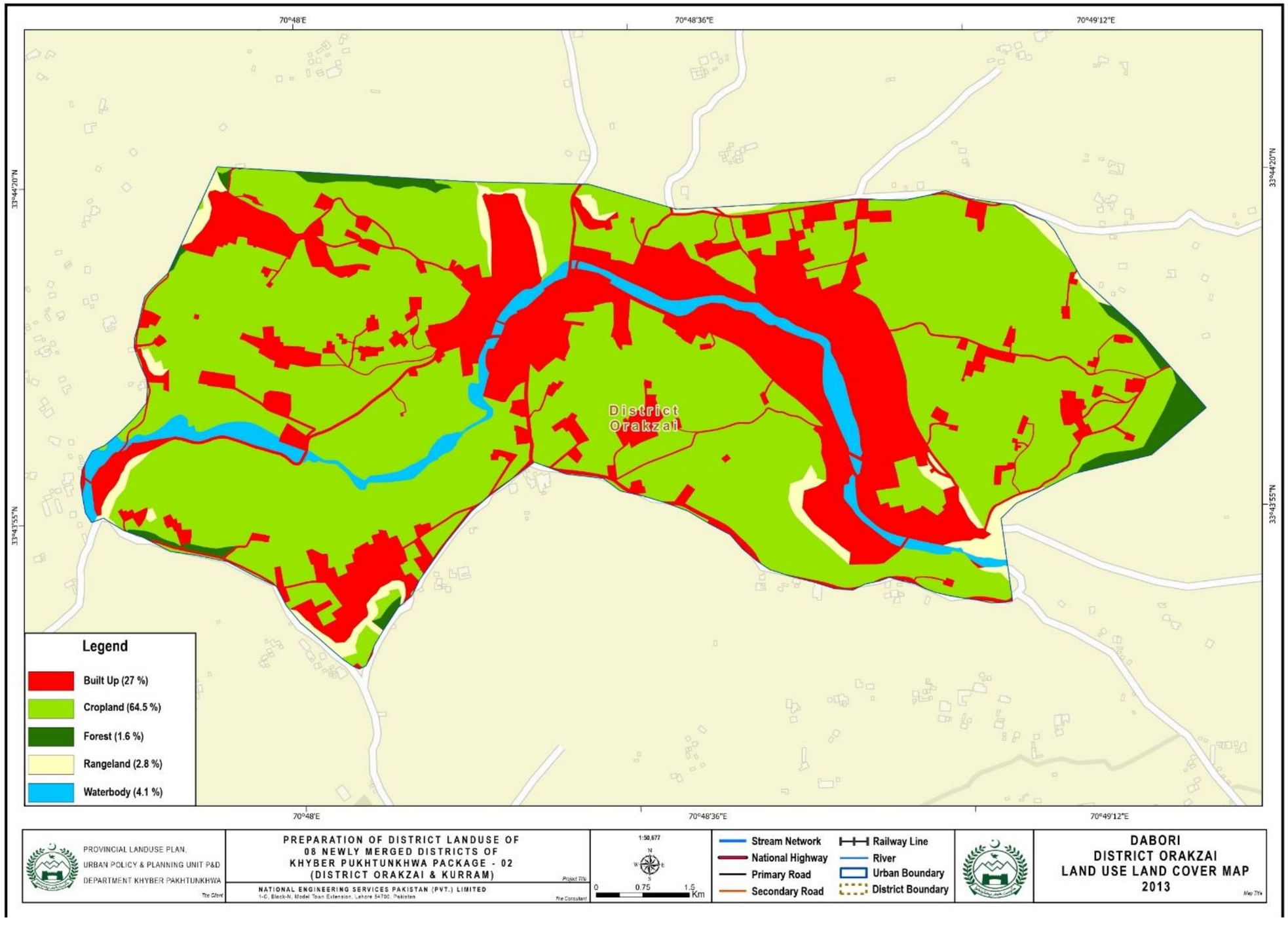
Year	Built-up	Cropland	Forest	Rangeland	Water Bodies
2003	24.30%	58.00%	5.40%	8.00%	4.30%
2008	26.00%	62.20%	2.70%	5.00%	4.10%
2013	27.00%	64.50%	1.60%	2.80%	4.10%
2018	28.30%	66.00%	0.50%	1.00%	4.20%
2023	29.00%	66.70%	0.04%	0.21%	4.00%



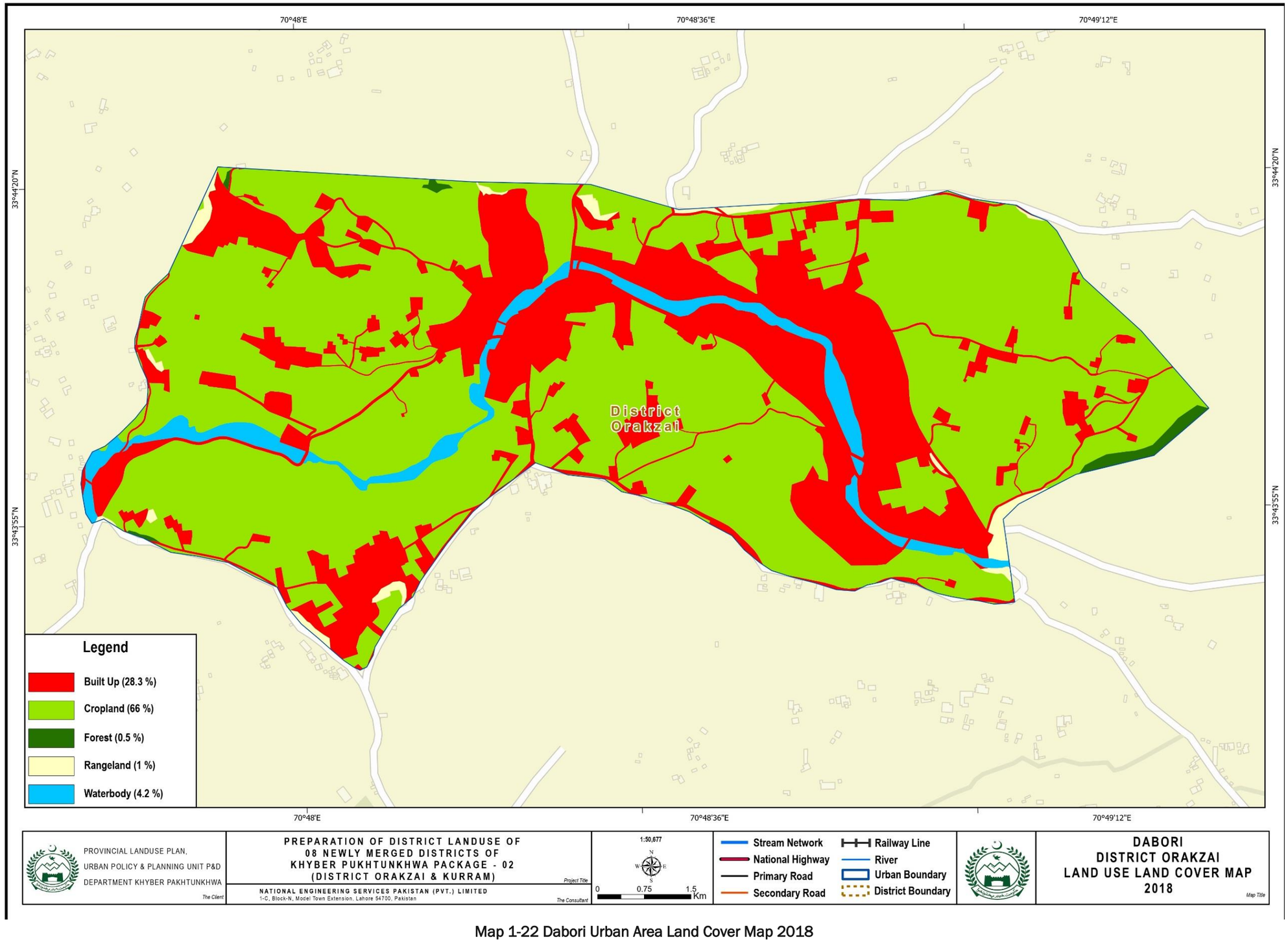
Map 1-19 Dabori Urban Area Land Cover Map 2003



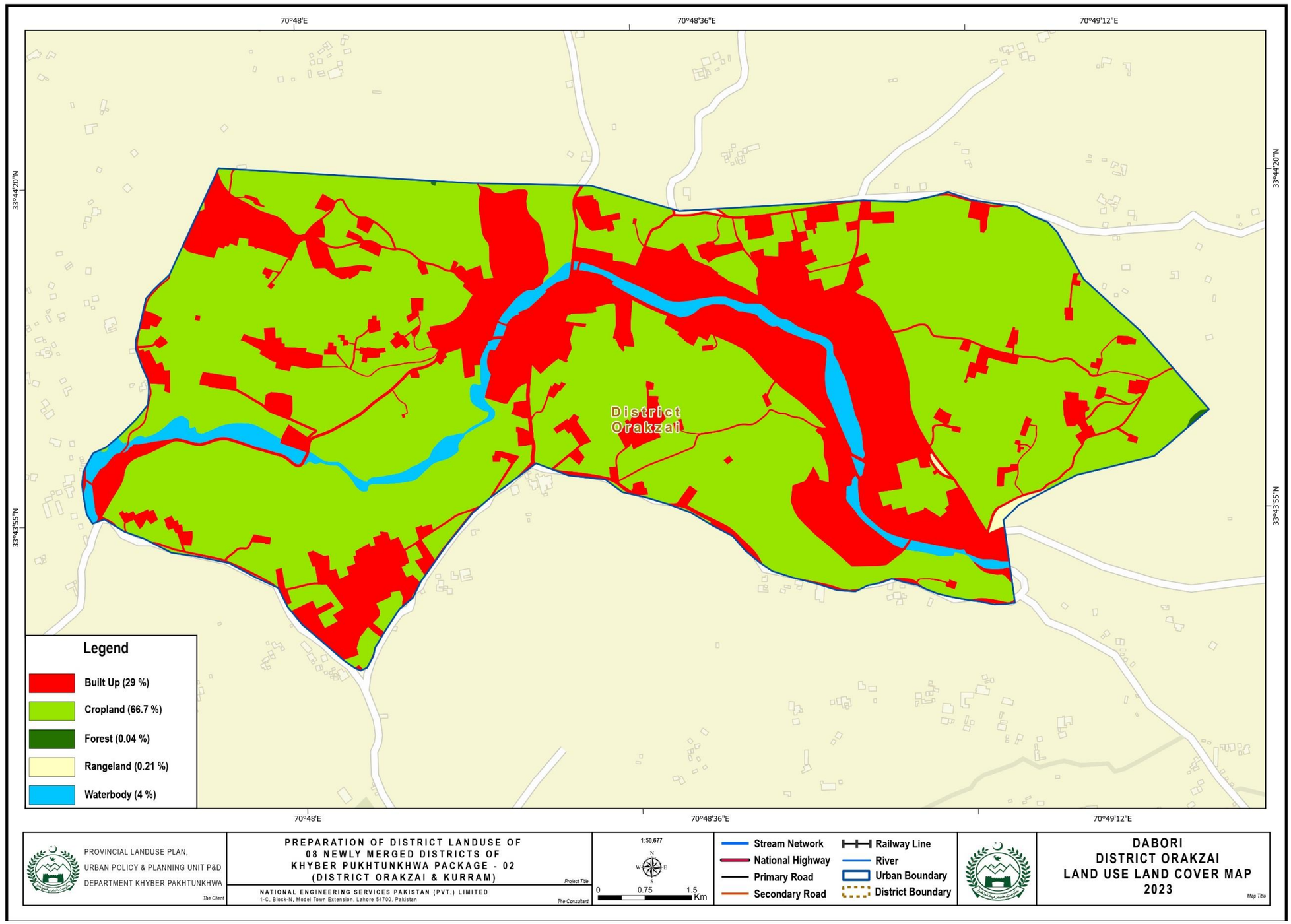
Map 1-20 Dabori Urban Area Land Cover Map 2008



Map 1-21 Dabori Urban Area Land Cover Map 2013



Map 1-22 Dabori Urban Area Land Cover Map 2018



Map 1-23 Dabori Urban Area Land Cover Map 2023

1.6.5 Human Settlement

Human settlements represent spatial areas where people reside, work, and interact socially and economically. These settlements range from small rural villages and hamlets to larger settlements that function as administrative, commercial, and service centers. Settlements provide the physical framework for housing, infrastructure, economic activities, and social interaction. The study of human settlements integrates knowledge from urban planning, geography, sociology, economics, and environmental science to understand population distribution and guide sustainable development.

Settlements are generally categorized into rural and urban types. Rural settlements consist mainly of villages and small communities characterized by low population density and a strong dependence on agriculture and livestock activities. Urban settlements, in contrast, are larger population centers with greater infrastructure provision, diversified economic activities, and higher population densities. Important characteristics used in settlement analysis include population size, density, spatial distribution, infrastructure availability, economic functions, and governance structure.

Settlement growth is influenced by several factors including geographic location, economic opportunities, accessibility, natural resources, and social dynamics. Rapid population growth and improvements in infrastructure often lead to the expansion of settlements and the transformation of rural villages into semi-urban centers. However, these changes also create planning challenges such as pressure on land resources, demand for infrastructure services, environmental sustainability concerns, and the need for improved housing and transportation systems.

Effective spatial planning plays an essential role in managing settlement growth. Through land-use zoning, infrastructure development, and settlement hierarchy planning, authorities can ensure balanced development and efficient service delivery. Modern planning practices increasingly rely on digital technologies, satellite imagery, and geospatial data systems to monitor settlement expansion and guide development decisions. Sustainable settlement planning therefore aims to create resilient, inclusive, and well-connected communities capable of supporting growing populations while maintaining environmental balance..

1.6.5.1 Settlement Wise Demography Analysis

The demographic structure of settlements in Orakzai District shows considerable variation in population distribution and growth across different administrative levels, including tehsils, sections, and individual settlements. The settlement system of the district is predominantly rural, consisting of numerous villages distributed across mountainous terrain and valleys.

Population projections indicate a steady demographic increase across the district during the planning horizon. The total population of Orakzai District is projected to increase from 387,561 in 2023 to approximately 587,485 by 2045, representing an increase of more than 50 percent over the planning period. This growth reflects natural population increase along with gradual improvements in accessibility, infrastructure, and social services within the district.

The settlement hierarchy reveals that while many settlements remain small rural villages, a number of larger settlements function as local service centers and are expected to experience higher population growth due to their administrative importance, accessibility, and availability of services.

1.6.5.1.1 District Level Overview

At the district level, Orakzai District serves as the primary administrative and spatial planning unit encompassing a network of settlements distributed across four tehsils. The district's population is projected

to grow from 387,561 in 2023 to approximately 587,485 by 2045, reflecting a significant demographic expansion during the planning period.

This growth is primarily driven by natural population increase and gradual improvements in infrastructure, healthcare services, and educational facilities. Larger settlements and administrative centers within the district serve as focal points for economic activities and service provision. These centers attract populations from surrounding rural areas seeking better employment opportunities, market access, and public services.

Despite this growth, the overall settlement pattern of Orakzai District remains predominantly rural, with dispersed villages forming the basic settlement structure across the region.

1.6.5.1.2 Tehsil Level

Orakzai District is administratively divided into four tehsils: Central Tehsil, Ismail Zai Tehsil, Lower Tehsil, and Upper Tehsil. Each tehsil demonstrates distinct settlement characteristics and population growth trends.

Central Tehsil had a population of 92,819 in 2023, projected to increase to approximately 143,496 by 2045. The population growth in this tehsil is associated with the presence of relatively large sections such as Esa Khel and Mushti, which include several moderately populated settlements engaged in agricultural activities and local trade. The central location of this tehsil also contributes to its demographic growth.

Ismail Zai Tehsil recorded a population of 39,328 in 2023, projected to reach approximately 49,149 by 2045. This tehsil consists mainly of smaller rural settlements organized within sections such as Biland Khel, Dare Plare, Ibrahim Khel, and Mohsin Khel. Population growth in this tehsil remains moderate due to its rural nature and limited urban infrastructure.

Lower Tehsil represents one of the largest population clusters within the district, with 125,944 residents in 2023, projected to increase to 166,407 by 2045. This tehsil includes several densely populated sections such as Beznoot, Mastori Khel, Mini Khel, Misa Zai, and Utman Khel, which contain numerous settlements and agricultural communities. Improved accessibility and land availability contribute to the steady population growth observed in this area.

Upper Tehsil contains the largest share of the district population. The population of this tehsil is projected to increase from 129,470 in 2023 to approximately 228,432 by 2045, indicating the fastest growth rate within the district. Sections such as Ali Zai, Imal Khan Khel, and Shawas Mirwas contain several major settlements and contribute significantly to the demographic expansion of this tehsil.

1.6.5.1.3 Section Level

At the section level, population distribution reflects the tribal settlement structure characteristic of the region. Sections consist of clusters of villages and settlements that share cultural, social, and economic connections.

Several sections demonstrate relatively higher population concentrations. For example, Mushti Section had a population of 54,861 in 2023, projected to grow to 84,814 by 2045, indicating strong demographic expansion. Similarly, Ali Zai Section is projected to increase from 35,347 in 2023 to 62,365 by 2045, reflecting significant settlement growth in Upper Tehsil.

One of the largest population concentrations in the district is observed in Shawas Mirwas Section, which is projected to grow from 74,714 in 2023 to approximately 131,823 by 2045. This substantial growth highlights the importance of this section as a major settlement cluster within the district.

Other sections such as Beznoot, Mastori Khel, and Misa Zai also show steady population growth, reflecting stable expansion of rural settlements throughout the district.

1.6.5.1.4 Settlement Level

At the settlement level, individual villages display significant variation in population size and growth trends. Larger settlements act as local service centers and attract population from surrounding smaller villages due to better access to markets, employment opportunities, and public services.

For example, Mir Kalam Khel, with a population of 18,251 in 2023, is projected to grow to approximately 32,201 by 2045, indicating strong demographic expansion. Similarly, Char Khela is projected to increase from 21,518 in 2023 to approximately 37,966 by 2045, making it one of the most significant population centers in the district.

Other settlements such as Jasrat Khel, Panchwan Tappa, and Shawas Mirwas also demonstrate considerable population growth and are likely to function as important settlement nodes within the district's spatial structure.

In contrast, smaller settlements such as Dare Plare and Farash Khel have relatively small populations and exhibit slower growth due to their limited economic opportunities and rural character.

1.6.5.2 Population Growth Trend and Implication

The settlement pattern of Orakzai District indicates gradual population concentration in larger settlements and section centers that provide improved access to infrastructure and services. Settlements with better connectivity, markets, and public facilities are expected to attract populations from smaller surrounding villages.

This demographic trend highlights the need for strategic spatial planning to manage settlement expansion and ensure balanced regional development. Growing settlements will require improved infrastructure, including housing, transportation networks, water supply systems, healthcare facilities, and educational institutions.

At the same time, rural settlements require targeted development initiatives aimed at improving agricultural productivity, rural connectivity, and access to essential services. Balanced settlement planning will therefore play a crucial role in ensuring sustainable development and improving the quality of life for residents of Orakzai District.

Table 1-32 Settlement Wise Population Projections

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	Population 2023	Population 2025	Population 2030	Population 2035	Population 2040	Population 2045
ORAKZAI DISTRICT	**387561**	**402989**	**443678**	**487698**	**535473**	**587485**
CENTRAL TEHSIL	**92819**	**96778**	**107182**	**118377**	**130449**	**143496**
ESA KHEL SECTION	**37958**	**39577**	**43832**	**48410**	**53347**	**58682**
BAZID KHEL SHEIKHAN	11171	11647	12900	14247	15700	17270
ESA KHEL	3372	3516	3894	4300	4739	5213
SAMUZAI	10649	11103	12297	13581	14966	16463
UMER ZAI	12766	13310	14741	16281	17942	19736
MUSHTI SECTION	**54861**	**57201**	**63350**	**69967**	**77103**	**84814**
DARWI KHEL	27358	28525	31591	34891	38449	42295

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	Population 2023	Population 2025	Population 2030	Population 2035	Population 2040	Population 2045
KHEDER KHEL MISHTI	18713	19511	21609	23866	26300	28930
MAMEZI MISHTI	8790	9165	10150	11210	12354	13589
ISMAIL ZAI TEHSIL	**39328**	**40158**	**42286**	**44491**	**46777**	**49149**
BILAND KHEL SECTION	**8425**	**8603**	**9059**	**9531**	**10021**	**10529**
ADEE ZAI	3320	3390	3570	3756	3949	4149
LUDYANI PEERAN	1384	1413	1488	1566	1646	1730
MASTI KHEL	1745	1782	1876	1974	2076	2181
PILMAT KHEL	1976	2018	2125	2235	2350	2469
DARE PLARE SECTION	**10243**	**10459**	**11013**	**11588**	**12183**	**12801**
AYAZ KHEL	2402	2453	2583	2717	2857	3002
BABI KHEL	1452	1483	1561	1643	1727	1815
DARE PLARE	162	165	174	183	193	202
FARASH KHEL	544	555	585	615	647	680
MACHI KHEL	1768	1805	1901	2000	2103	2210
SARKI KHEL	3915	3998	4209	4429	4657	4893
IBRAHIM KHEL SECTION	**8904**	**9092**	**9574**	**10073**	**10590**	**11128**
AFZAL KHEL	1711	1747	1840	1936	2035	2138
HADI NAWASI	882	901	948	998	1049	1102
IBRAHIM KHEL	1452	1483	1561	1643	1727	1815
PAYAW KHEL	4859	4962	5224	5497	5779	6072
MOHSIN KHEL SECTION	**11756**	**12004**	**12640**	**13299**	**13983**	**14692**
DALAK NAWASI	5123	5231	5508	5795	6093	6402
MOHSIN KHEL	1403	1433	1509	1587	1669	1753
SADA KHEL	702	717	755	794	835	877
SHUMALI NAMSI	4528	4624	4869	5122	5386	5659
LOWER TEHSIL	**125944**	**129257**	**137837**	**146866**	**156377**	**166407**
BEZNOOT SECTION	**31194**	**32015**	**34140**	**36376**	**38732**	**41216**
GHERAT KHEL	5737	5888	6279	6690	7123	7580
JUYSIAL KHEL	5144	5279	5630	5999	6387	6797
QASIM KHEL	6047	6206	6618	7052	7508	7990
QIMAT KHEL	7080	7266	7749	8256	8791	9355
BEZOT BATANI	2370	2432	2594	2764	2943	3131
MIR KALI KHEL	3047	3127	3335	3553	3783	4026
QUMBER KHEL	1769	1816	1936	2063	2196	2337
LAKHRI KHEL SECTION	**11278**	**11575**	**12343**	**13152**	**14003**	**14901**
AHMED KHEL	1829	1877	2002	2133	2271	2417
ESA KHEL	1317	1352	1441	1536	1635	1740
LAKHRARI KHEL	4713	4837	5158	5496	5852	6227

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	Population 2023	Population 2025	Population 2030	Population 2035	Population 2040	Population 2045
MIR WAS KHEL	488	501	534	569	606	645
SABOORA KHEL	1390	1427	1521	1621	1726	1837
TITRAI	1541	1582	1687	1797	1913	2036
MASTORI KHEL SECTION	**29231**	**30000**	**31991**	**34087**	**36294**	**38622**
BAR MAIRAKO	1553	1594	1700	1811	1928	2052
MANDRA KHEL	747	767	818	871	928	987
PATHAN KHAN KHEL	2312	2373	2530	2696	2871	3055
SHIA STOORY KHEL	5486	5630	6004	6397	6812	7249
STOORY KHEL	7384	7578	8081	8611	9168	9756
SULTAN ZAI	3496	3588	3826	4077	4341	4619
SUNI STOORY KHEL	8253	8470	9032	9624	10247	10905
MINI KHEL SECTION	**7654**	**7855**	**8377**	**8926**	**9504**	**10113**
ABDUL AZIZ KHEL	1124	1154	1230	1311	1396	1485
BADOA KHEL	1203	1235	1317	1403	1494	1589
KALAY SAIDAN	1498	1537	1639	1747	1860	1979
MAST ALI KHEL	1007	1033	1102	1174	1250	1331
SABZI KHEL	1104	1133	1208	1287	1371	1459
ZIKRYA KHEL	1718	1763	1880	2003	2133	2270
MISA ZAI SECTION	**25767**	**26445**	**28200**	**30047**	**31993**	**34045**
ALAT KHEL	3371	3460	3689	3931	4186	4454
BABA NAWASI	4614	4735	5050	5380	5729	6096
KHOEDAD KHEL	5085	5219	5565	5930	6314	6719
MIRA ZAI	1250	1283	1368	1458	1552	1652
MUHAMMAD TAQI NAWASI	4901	5030	5364	5715	6085	6476
SAEED KHEL	2919	2996	3195	3404	3624	3857
TITRAI	3627	3722	3970	4230	4503	4792
UTMAN KHEL SECTION	**20820**	**21368**	**22786**	**24279**	**25851**	**27509**
ABA KHEL	7441	7637	8144	8677	9239	9832
BAZRAN KHEL	6658	6833	7287	7764	8267	8797
BARANKA KHEL	4692	4815	5135	5471	5826	6199
SHABBI KHEL	313	321	343	365	389	414
YAR KALI KHEL	1716	1761	1878	2001	2131	2267
UPPER TEHSIL	**129470**	**136796**	**156373**	**177964**	**201869**	**228432**
ALI ZAI SECTION	**35347**	**37347**	**42692**	**48587**	**55113**	**62365**
ABDUL RAHIM KHEL	4952	5232	5981	6807	7721	8737
KHADIZAI	1546	1633	1867	2125	2411	2728
MIR KALAM KHEL	18251	19284	22043	25087	28457	32201
SAMADU KHEL	6618	6992	7993	9097	10319	11677
SIPAYA (MAMOZI)	3980	4205	4807	5471	6206	7022
IMAL KHAN KHEL SECTION	**19409**	**20507**	**23442**	**26679**	**30262**	**34245**

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	Population 2023	Population 2025	Population 2030	Population 2035	Population 2040	Population 2045
IBRAHIM KHEL	1448	1530	1749	1990	2258	2555
IMAL KHAN KHEL	2919	3084	3526	4012	4551	5150
QUTAB KHEL	5223	5519	6308	7179	8144	9215
SHER KHEL	8336	8808	10068	11458	12997	14708
KHANKI ESA KHEL	1483	1567	1791	2038	2312	2617
SHAWAS MIRWAS SECTION	**74714**	**78942**	**90239**	**102699**	**116494**	**131823**
AZIZ KHEL	6882	7271	8312	9460	10730	12142
CHAR KHELA	21518	22736	25989	29578	33551	37966
JASRAT KHEL	15043	15894	18169	20678	23455	26541
PANCHWAN TAPPA	10797	11408	13041	14841	16835	19050
SHAWAS MIRWAS	20474	21633	24728	28143	31923	36124

1.6.6 Hierarchy of Human Settlement

Establishing a hierarchy of human settlements is crucial for effective resource allocation, infrastructure development, and overall land use planning. This process usually involves analyzing settlement size, function, services, and accessibility. However, in the absence of spatially delineated boundaries, identifying settlement hierarchies becomes complex. In such cases, classification can rely on available data like population size and housing stock, which serve as indirect indicators of settlement size and urbanization.

Commonly used methods for classifying human settlements based on population and housing stock include:

1.6.6.1 Population-Based Hierarchical Classification:

This method classifies settlements by population size, assuming larger settlements have more services and economic activities. For instance, settlements with fewer than 5,000 people may be small, while those with over 500,000 are metropolitan.[24]

1.6.6.2 Housing Stock-Based Classification:

Settlements are classified by the number of housing units, assuming that more housing indicates better infrastructure and development levels. [25]

1.6.6.3 Combined Population and Housing Stock Classification:

This approach integrates both factors into a composite score, offering a clearer picture of settlement size and infrastructure. The score is calculated by standardizing and combining population and housing data to categorize settlements from small to metropolitan.[26]

[24] Mesev, V., & Longley, P. A. (2001). *Measuring the 'Urban': Measuring and Modelling a Regional Settlement Hierarchy. Modelling Scale in Geographical Studies*
[25] Kawashima, T., & Korcelli, P. (1982). Human Settlement Systems: Spatial Patterns and Trends. IIASA
[26] Tang, L., Ruth, M., He, Q., & Mirzaee, S. (2017). *Comprehensive Evaluation of Trends in Human Settlements Quality Changes. Habitat International*

1.6.6.4 Central Place Theory (Centrality-Based Classification):

Based on Walter Christaller's theory, this method classifies settlements by their centrality and the services they provide. Larger settlements offering specialized services like healthcare and higher education rank higher in the hierarchy.[27]

1.6.6.5 Fuzzy Analytic Hierarchy Process (FAHP):

A multi-criteria decision-making method using fuzzy logic to handle uncertain or incomplete data. Settlements are ranked by assigning fuzzy ratings to factors like population and housing stock, producing a final score.[28]

1.6.6.6 Composite Characteristic Approach:

Combines various characteristics population, housing, economic role, and land use into one composite score for a comprehensive classification.[29]

1.6.6.7 Density-Based Classification:

Classifies settlements by population density (population-to-housing ratio). Higher densities usually indicate more urbanized areas with better services, though settlements with similar densities may differ in infrastructure or function.[30]

1.6.7 Defining Characteristics and Scores

The population scores for each settlement are calculated by projecting their population to the end of the planning period. The projected population is divided by 1,000, and scores are then assigned accordingly. Settlements are ranked on a scale from 0–10 for the 5th order, 11–20 for the 4th order, 21–30 for the 3rd order, 31–40 for the 2nd order, and those with populations above 40 (thousand) are placed in the 1st order. This ranking provides a clear categorization where higher scores represent larger, more populous settlements, while lower scores denote smaller ones.

This hierarchical scoring system enables structured classification of settlements based on projected growth and population size, ensuring effective planning and equitable resource allocation. Higher-order settlements will require greater infrastructure and services, while lower-order ones may need focused strategies to address their distinct development needs.

Table 1-33 Scoring for Population Size

Scores	Settlement Orders
Above 40	1st Order
31-40	2nd Order
21-30	3rd Order
11-20	4th Order
0 -10	5th Order

[27] Newman, P., Birrell, B., Spessa, A., & Tait, D. (1996). *Human Settlements. Transport*
[28] Zhang, Y., & Fan, Q. (2020). *The Application of the Fuzzy Analytic Hierarchy Process in the Assessment and Improvement of the Human Settlement Environment. Sustainability*
[29] Newton, P., Baum, S., Bhatia, K., Brown, S., & Cameron, S. (2001). *Human Settlements*
[30] Douglas, I. (1994). *Changes in Land Use and Land Cover: A Global Perspective. Urban Geography*

1.6.8 Hierarchy of Human Settlement District Orakzai

In examining international methods for determining the hierarchy of human settlements, several factors such as data limitations and boundary constraints were considered. Based on these, a population-based settlement hierarchy was found most suitable for Orakzai District. This approach is appropriate given the absence of clear settlement boundaries, allowing classification based on projected population growth and size. It provides a flexible, data-driven framework for planning, resource allocation, and understanding demographic dynamics.

The population-based hierarchy serves as a strategic framework for urbanization and land use planning for the next 20 years. With the district's population expected to grow from 387,561 in 2023 to 597,233 by 2045, effective planning is essential to balance urban and rural needs. Settlements are categorized into five orders based on projected population, guiding land use and infrastructure development.

1st Order settlements, such as Darwi Khel (projected population 42,295 by 2045), are expected to become urban centers requiring comprehensive development plans with mixed-use zoning, transportation infrastructure, and public services.
2nd Order settlements, including Char Khela and Shawas Mirwas (30,000–40,000 by 2045), should act as regional growth centers with improved transport links, expanded utilities, and mixed-use development.
3rd Order settlements, like Jasrat Khel and Khader Khel Mishti (20,000–30,000), will need infrastructure upgrades roads, water, and waste systems—alongside planned residential and commercial expansion.
4th Order settlements, such as Bazid Khel Sheikhan and Samuzai (10,000–20,000), will see gradual growth with focused urbanization, local commercial areas, and preservation of surrounding agricultural land.
5th Order settlements, including Farash Khel and Sarki Khel (under 10,000), will retain their rural nature, focusing on rural infrastructure, sanitation, and sustainable agricultural practices.

For land use planning, 1st and 2nd Order settlements should be prioritized for urban growth zones, while 3rd and 4th Orders receive targeted infrastructure support. The 5th Order should focus on rural services and agricultural preservation. Sustainable development principles must guide all planning to mitigate environmental impacts and ensure equitable service distribution. Overall, the strategy aims to balance urban expansion with rural preservation, promoting inclusive and sustainable growth across Orakzai District.

Table 1-34 Hierarchy of Settlements

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	Population 2023	Population 2025	Population 2030	Population 2035	Population 2040	Population 2045	Settlement Score	Settlement Order
ORAKZAI DISTRICT	387561	403751	446441	492614	542712	597233		
CENTRAL TEHSIL	92819	96784	107206	118421	130516	143590		
ESA KHEL SECTION	37958	39577	43832	48410	53347	58682	59	
BAZID KHEL SHEIKHAN	11171	11647	12900	14247	15700	17270	17	4th Order
ESA KHEL	3372	3516	3894	4300	4739	5213	5	5th order
SAMUZAI	10649	11103	12297	13581	14966	16463	16	4th Order
UMER ZAI	12766	13310	14741	16281	17942	19736	20	4th Order
MUSHTI SECTION	54861	57201	63350	69967	77103	84814	85	

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	Population 2023	Population 2025	Population 2030	Population 2035	Population 2040	Population 2045	Settlement Score	Settlement Order
DARWI KHEL	27358	28525	31591	34891	38449	42295	42	1st order
KHEDER KHEL MISHTI	18713	19511	21609	23866	26300	28930	29	3rd Order
MAMEZI MISHTI	8790	9165	10150	11210	12354	13589	14	4th Order
ISMAIL ZAI TEHSIL	**39328**	**40156**	**43815**	**44473**	**51323**	**49115**		
BILAND KHEL SECTION	**8425**	**8603**	**9059**	**9531**	**10021**	**10529**	**11**	
ADEE ZAI	3320	3390	3570	3756	3949	4149	4	5th order
LUDYANI PEERAN	1384	1413	1488	1566	1646	1730	2	5th order
MASTI KHEL	1745	1782	1876	1974	2076	2181	2	5th order
PILMAT KHEL	1976	2018	2125	2235	2350	2469	2	5th order
DARE PLARE SECTION	**10243**	**10459**	**11013**	**11588**	**12183**	**12801**	**13**	
AYAZ KHEL	2402	2453	2583	2717	2857	3002	3	5th order
BABI KHEL	1452	1483	1561	1643	1727	1815	2	5th order
DARE PLARE	162	165	174	183	193	202	0	5th order
FARASH KHEL	544	555	585	615	647	680	1	5th order
MACHI KHEL	1768	1805	1901	2000	2103	2210	2	5th order
SARKI KHEL	3915	3998	4209	4429	4657	4893	5	5th order
IBRAHIM KHEL SECTION	**8904**	**9092**	**9574**	**10073**	**10590**	**11128**	**11**	
AFZAL KHEL	1711	1747	1840	1936	2035	2138	2	5th order
HADI NAWASI	882	901	948	998	1049	1102	1	5th order
IBRAHIM KHEL	1452	1483	1561	1643	1727	1815	2	5th order
PAYAW KHEL	4859	4962	5224	5497	5779	6072	6	5th order
MOHSIN KHEL SECTION	**11756**	**12004**	**12640**	**13299**	**13983**	**14692**	**15**	
DALAK NAWASI	5123	5231	5508	5795	6093	6402	6	5th order

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	Population 2023	Population 2025	Population 2030	Population 2035	Population 2040	Population 2045	Settlement Score	Settlement Order
MOHSIN KHEL	1403	1433	1509	1587	1669	1753	2	5th order
SADA KHEL	702	717	755	794	835	877	1	5th order
SHUMALI NAMSI	4528	4624	4869	5122	5386	5659	6	5th order
LOWER TEHSIL	**125944**	**129983**	**140079**	**150176**	**160272**	**170369**		
BEZNOOT SECTION	**31194**	**32015**	**34140**	**36376**	**38732**	**41216**	**41**	
GHERAT KHEL	5737	5888	6279	6690	7123	7580	8	5th order
JUYSIAL KHEL	5144	5279	5630	5999	6387	6797	7	5th order
QASIM KHEL	6047	6206	6618	7052	7508	7990	8	5th order
QIMAT KHEL	7080	7266	7749	8256	8791	9355	9	5th order
BEZOT BATANI	2370	2432	2594	2764	2943	3131	3	5th order
MIR KALI KHEL	3047	3127	3335	3553	3783	4026	4	5th order
QUMBER KHEL	1769	1816	1936	2063	2196	2337	2	5th order
LAKHRI KHEL SECTION	**11278**	**11575**	**12343**	**13152**	**14003**	**14901**	**15**	
AHMED KHEL	1829	1877	2002	2133	2271	2417	2	5th order
ESA KHEL	1317	1352	1441	1536	1635	1740	2	5th order
LAKHRARI KHEL	4713	4837	5158	5496	5852	6227	6	5th order
MIR WAS KHEL	488	501	534	569	606	645	1	5th order
SABOORA KHEL	1390	1427	1521	1621	1726	1837	2	5th order
TITRAI	1541	1582	1687	1797	1913	2036	2	5th order
MASTORI KHEL SECTION	**29231**	**30000**	**31991**	**34087**	**36294**	**38622**	**39**	
BAR MAIRAKO	1553	1594	1700	1811	1928	2052	2	5th order
MANDRA KHEL	747	767	818	871	928	987	1	5th order
PATHAN KHAN KHEL	2312	2373	2530	2696	2871	3055	3	5th order

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	Population 2023	Population 2025	Population 2030	Population 2035	Population 2040	Population 2045	Settlement Score	Settlement Order
SHIA STOORY KHEL	5486	5630	6004	6397	6812	7249	7	5th order
STOORY KHEL	7384	7578	8081	8611	9168	9756	10	5th order
SULTAN ZAI	3496	3588	3826	4077	4341	4619	5	5th order
SUNI STOORY KHEL	8253	8470	9032	9624	10247	10905	11	4th Order
MINI KHEL SECTION	**7654**	**7855**	**8377**	**8926**	**9504**	**10113**	**10**	
ABDUL AZIZ KHEL	1124	1154	1230	1311	1396	1485	1	5th order
BADOA KHEL	1203	1235	1317	1403	1494	1589	2	5th order
KALAY SAIDAN	1498	1537	1639	1747	1860	1979	2	5th order
MAST ALI KHEL	1007	1033	1102	1174	1250	1331	1	5th order
SABZI KHEL	1104	1133	1208	1287	1371	1459	1	5th order
ZIKRYA KHEL	1718	1763	1880	2003	2133	2270	2	5th order
MISA ZAI SECTION	**25767**	**26445**	**28200**	**30047**	**31993**	**34045**	**34**	
ALAT KHEL	3371	3460	3689	3931	4186	4454	4	5th order
BABA NAWASI	4614	4735	5050	5380	5729	6096	6	5th order
KHOEDAD KHEL	5085	5219	5565	5930	6314	6719	7	5th order
MIRA ZAI	1250	1283	1368	1458	1552	1652	2	5th order
MUHAMMAD TAQI NAWASI	4901	5030	5364	5715	6085	6476	6	5th order
SAEED KHEL	2919	2996	3195	3404	3624	3857	4	5th order
TITRAI	3627	3722	3970	4230	4503	4792	5	5th order
UTMAN KHEL SECTION	**20820**	**21368**	**22786**	**24279**	**25851**	**27509**	**28**	
ABA KHEL	7441	7637	8144	8677	9239	9832	10	5th order
BAZRAN KHEL	6658	6833	7287	7764	8267	8797	9	5th order
BARANKA KHEL	4692	4815	5135	5471	5826	6199	6	5th order
SHABBI KHEL	313	321	343	365	389	414	0	5th order

NAME OF MAUZA / DEH / VILLAGE / SETTLMENT	Population 2023	Population 2025	Population 2030	Population 2035	Population 2040	Population 2045	Settlement Score	Settlement Order
YAR KALI KHEL	1716	1761	1878	2001	2131	2267	2	5th order
UPPER TEHSIL	129470	136796	156373	177964	172323	228432		
ALI ZAI SECTION	35347	37347	42692	48587	55113	62365	62	
ABDUL RAHIM KHEL	4952	5232	5981	6807	7721	8737	9	5th order
KHADIZAI	1546	1633	1867	2125	2411	2728	3	5th order
MIR KALAM KHEL	18251	19284	22043	25087	28457	32201	32	2nd Order
SAMADU KHEL	6618	6992	7993	9097	10319	11677	12	4th Order
SIPAYA (MAMOZI)	3980	4205	4807	5471	6206	7022	7	5th order
IMAL KHAN KHEL SECTION	19409	20507	23442	26679	30262	34245	34	
IBRAHIM KHEL	1448	1530	1749	1990	2258	2555	3	5th order
IMAL KHAN KHEL	2919	3084	3526	4012	4551	5150	5	5th order
QUTAB KHEL	5223	5519	6308	7179	8144	9215	9	5th order
SHER KHEL	8336	8808	10068	11458	12997	14708	15	4th Order
KHANKI ESA KHEL	1483	1567	1791	2038	2312	2617	3	5th order
SHAWAS MIRWAS SECTION	74714	78942	90239	102699	116494	131823	132	
AZIZ KHEL	6882	7271	8312	9460	10730	12142	12	4th Order
CHAR KHELA	21518	22736	25989	29578	33551	37966	38	2nd Order
JASRAT KHEL	15043	15894	18169	20678	23455	26541	27	3rd Order
PANCHWAN TAPPA	10797	11408	13041	14841	16835	19050	19	4th Order
SHAWAS MIRWAS	20474	21633	24728	28143	31923	36124	36	2nd Order

1.6.9 Declaration of Human Settlement

As cities and towns grow in population and complexity, designating urban centers in land use planning becomes essential for sustainable development and effective management. In a 20-year land use plan, declaring urban centers serves as a strategic tool for organizing spatial growth and providing essential infrastructure for future populations.

1.6.9.1 Defining Urban Centers

Urban centers are areas within a city or region that act as hubs for economic, social, and cultural activities. They feature higher population densities, mixed-use developments, and access to key services like healthcare, education, transport, and employment. Such centers drive the economy and serve as focal points for urban growth.

1.6.9.2 Importance of Urban Centers in Land Use Planning

- Declaring urban centers helps address key issues:
- **Efficient Land Utilization:** Concentrating population and services minimizes sprawl and environmental impact. [31]
- **Improved Infrastructure:** Focused growth supports efficient development of transport, utilities, and mobility systems. [32]
- **Economic Growth:** Concentrated economic activity creates jobs, attracts investment, and enhances quality of life.
- **Social Integration:** Centralized access to education, healthcare, and services promotes inclusion and equity. [33]

1.6.9.3 Key Components of a 20-Year Land Use Plan

- **Strategic Location:** Identify areas with growth potential, good accessibility, and existing infrastructure. [34]
- **Zoning and Mixed-Use:** Ensure multifunctional spaces integrating residential, commercial, and recreational uses.[35]
- **Sustainability:** Include parks, green areas, and eco-friendly practices such as renewable energy and waste management. [36]
- **Public-Private Partnerships:** Encourage collaboration among government, private sector, and communities to align development goals. [37]

1.6.9.4 The Role of Technology in Shaping Urban Centers

Technological advances will transform urban planning through smart cities, digital systems, and data-driven tools. Smart technologies in transport, waste, and resource management will enhance efficiency and adaptability.

Declaring urban centers as part of a 20-year land use plan ensures sustainable, inclusive, and well-managed urban growth. With careful planning, balanced development, and technological integration, future urban centers can thrive as dynamic and resilient spaces.

1.6.10 Settlements to be Urbanized up to 2045

In order to establish a robust framework for the land use plan, a thorough and systematic procedure was followed for identifying settlement hierarchies. This process involved classifying settlements into five orders

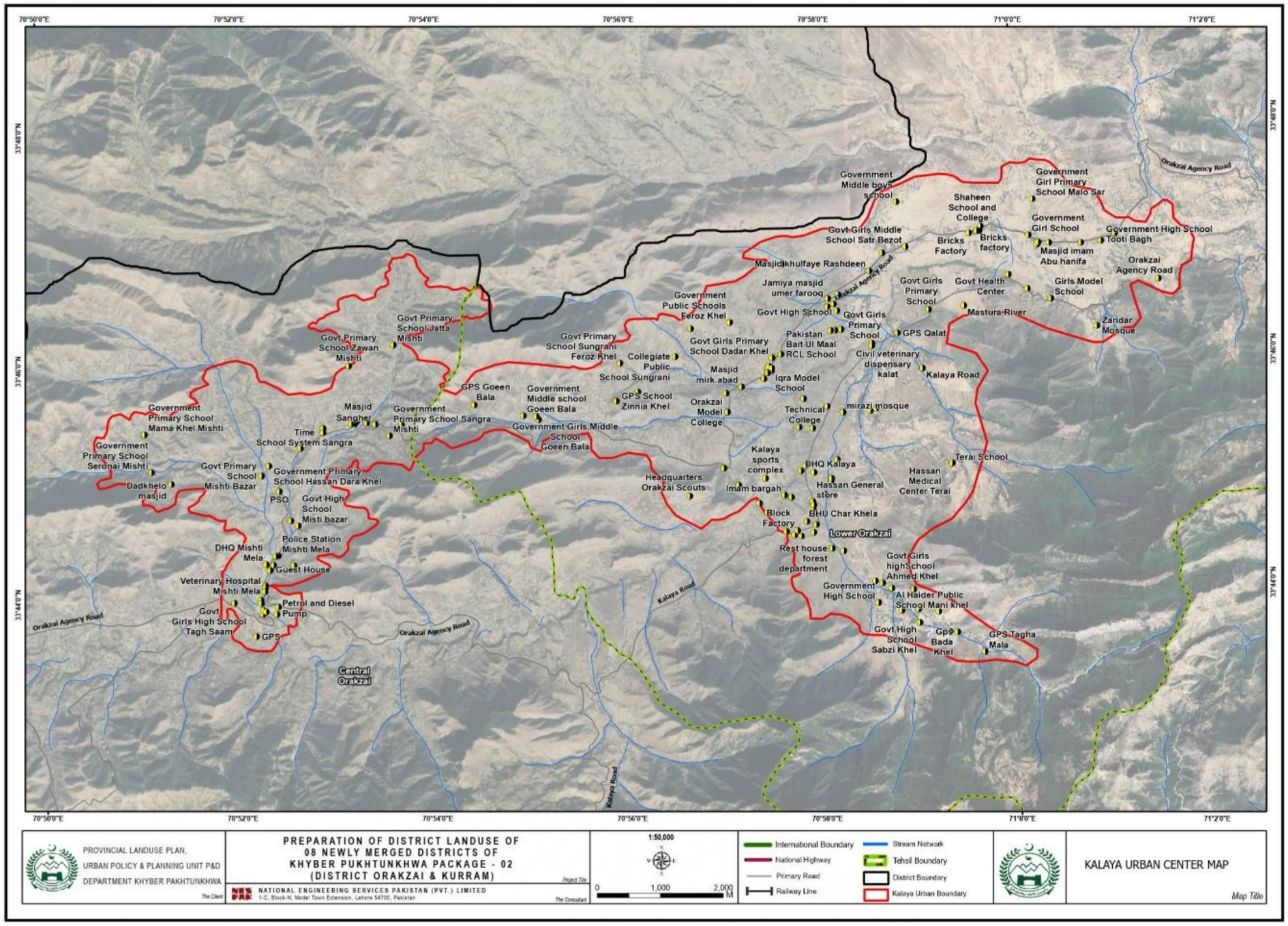
[31] Bertaud, A. (2004). *The Spatial Structure of Cities: What We Know and What We Don't Know*. World Bank.
[32] Lundqvist, L., et al. (2012). *Urban Planning and Management in the 21st Century*. Routledge.
[33] Cheshire, P. (2011). *Urban Economics*. Routledge.
[34] Batty, M., et al. (2012). *Planning Support Systems and Urban Planning*. Springer.
[35] Harrison, C., et al. (2010). *Urban Regeneration and Sustainability: New Challenges for Cities*. Springer.
[36] Williams, K. (2014). *Sustainable Cities: Integrating Design, Planning, and Policy*. Wiley-Blackwell.
[37] Stone, W., et al. (2013). *The Role of Public-Private Partnerships in Urban Development*. Oxford University Press.

(1st, 2nd, 3rd, 4th, and 5th) based on population data derived from the most recent census. The decision to rely solely on population data was necessitated by the absence of clear boundaries for each settlement, which posed challenges for precise delineation. To further strengthen the proposed urbanized boundaries and ensure alignment with regional development goals, the district administration was consulted. Through this collaboration, key areas with significant potential for urbanization were identified, considering factors such as population growth, infrastructure capacity, and environmental suitability. These identified areas will play a crucial role in the development and implementation of the land use plan over the designated planning period, ensuring a sustainable and orderly expansion of urban spaces

1.6.10.1 Kalaya Proposed Urban Area

The Kalaya Proposed Urban Area, which spans both Central Tehsil and Lower Tehsil. This expansive urban area will integrate several key sections and subsections to create a cohesive urban zone. From Central Tehsil, the area will encompass Bazid Khel Sheikhan from the ESA Khel Section, as well as Darwi Khel, Kheder Khel Mishti, and Mamezai Mishti from Mushti Section. These areas are expected to see significant residential, commercial, and infrastructural development, addressing the growing population's needs for housing, services, and transport.

In Lower Tehsil, the Kalaya Proposed Urban Area will extend to include Gherat Khel, Juysial Khel, Qasim Khel, Qimat Khel, Bezot Batani, Mir Kali Khel, and Qumber Khel, all located within the Beznoot Section. These subsections will contribute to the overall urban growth, with a focus on sustainable infrastructure, community amenities, and residential zones to support the increasing population. The development of this integrated urban area will ensure a balanced distribution of resources, services, and commercial opportunities, fostering economic growth while enhancing the quality of life for the residents. Collectively, these sections and subsections will play a critical role in the successful urbanization of Kalaya, ensuring it becomes a well-developed urban center that meets the district's future needs.



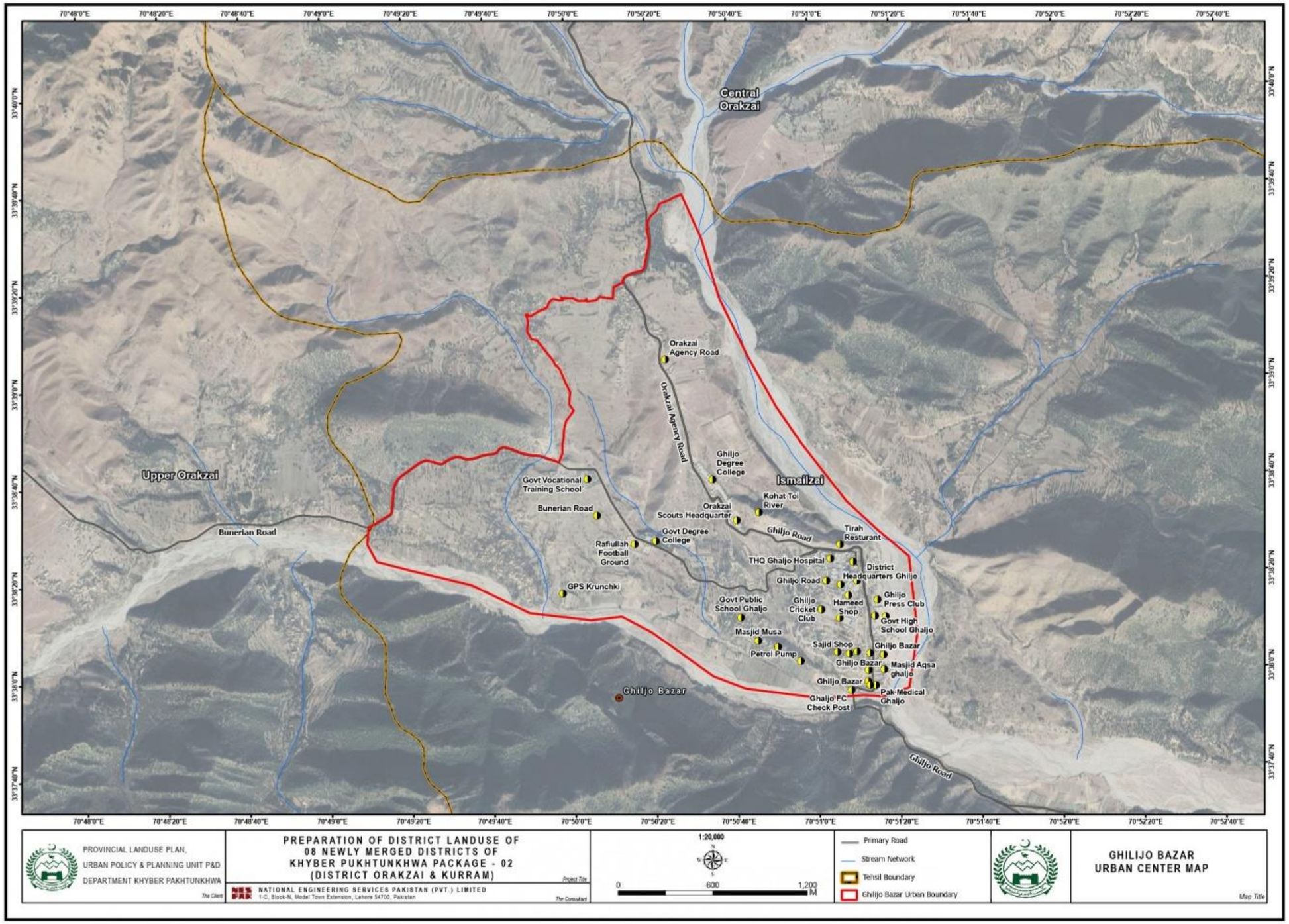
Map 1-24: Kalaya Proposed Urban Center Map

1.6.10.2 Ghiljo Proposed Uban Area

The Ghiljo Urban Area, located within Ismail Zai Tehsil of Orakzai District, will encompass the subsections of Dalak Nawasi, Mohsin Khel, and Shumali Namsi from the Mohsin Khel Section.

The development of Ghiljo Urban Area will focus on creating a balanced urban environment that integrates residential, commercial, and public spaces to cater to the needs of its growing population. The urbanization process will prioritize the establishment of modern housing, essential public services such as healthcare and education, and infrastructure improvements, including transportation networks and utilities.

Special attention will be given to the provision of basic amenities like clean water, sanitation, and energy, ensuring that all subsections within the urban area are well-served. Additionally, the development will emphasize sustainable growth practices, ensuring that the natural environment is preserved while enhancing the quality of life for residents. By 2045, Ghiljo Urban Area will not only meet the demands of its projected population but also foster economic activity, creating opportunities for local businesses and improving the overall well-being of the community.



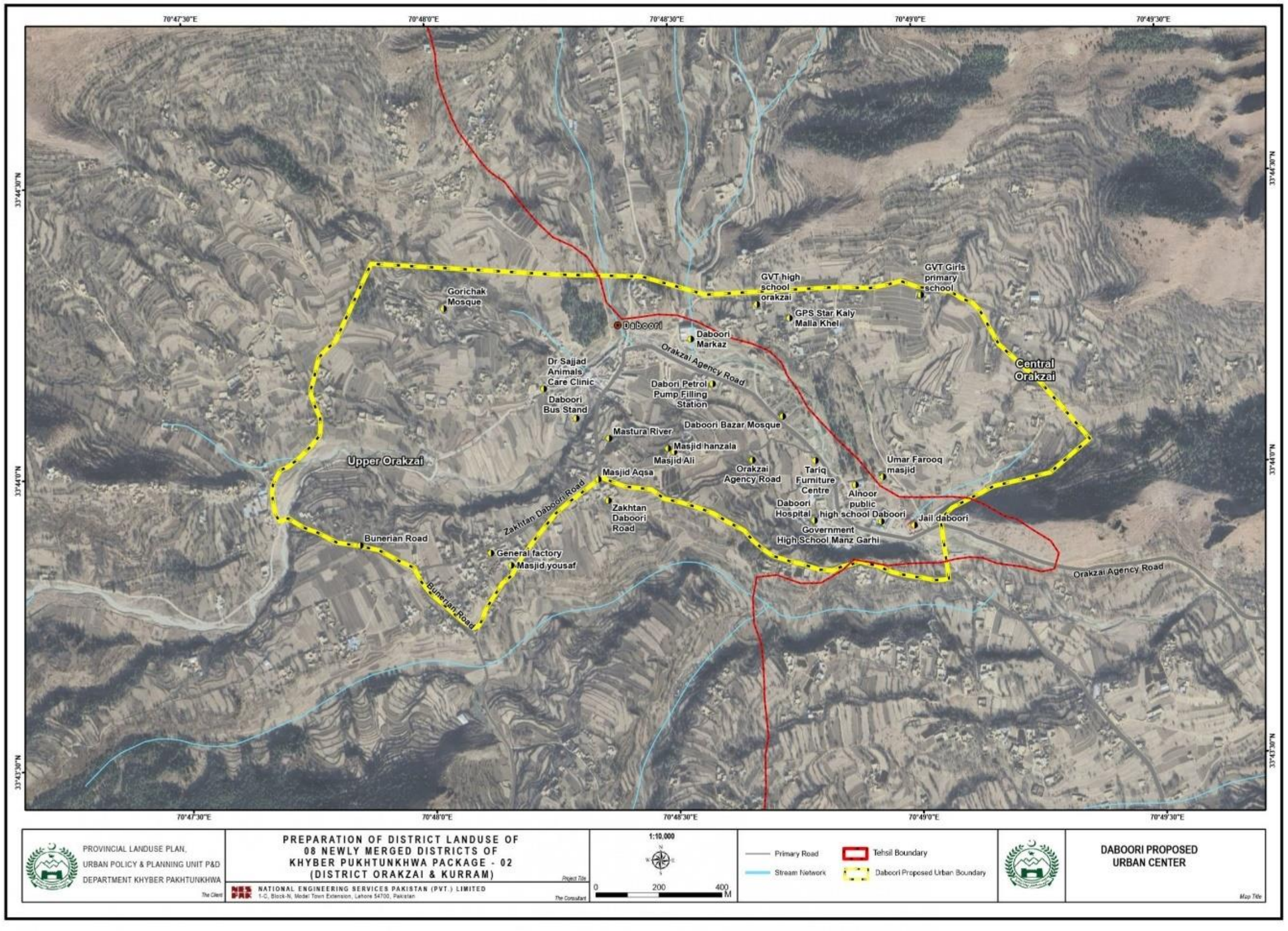
Map 1-25 Ghiljo Proposed Urban Center Map

1.6.10.3 Dabori Proposed Urban Area

The Dabori Urban Area is located within the Upper Tehsil of Orakzai District and will encompass several key subsections to form a cohesive urban zone. This urban area will cover Qutab Khel and Sher Khel from the Imal Khel Section, as well as Aziz Khel and Char Khela from the Shawas Mirwas Section. These subsections, collectively contributing to Dabori's growth, will play a crucial role in the overall urban development of Upper Tehsil.

The urbanization of Dabori will focus on integrating residential, commercial, and public spaces to cater to the needs of the growing population. Infrastructure development will be a key priority, with a focus on improving transportation networks, water and sanitation systems, and energy supply. Additionally, the establishment of essential public services such as healthcare, education, and community facilities will be integral to the development strategy.

As the urban area expands, sustainable development practices will be emphasized to ensure that natural resources are preserved and the quality of life for residents is enhanced. By 2045, Dabori Urban Area will support the growing population of the Upper Tehsil while fostering economic growth and improving the living conditions for its residents.



Map 1-26 Dabori Proposed Urban Center Map

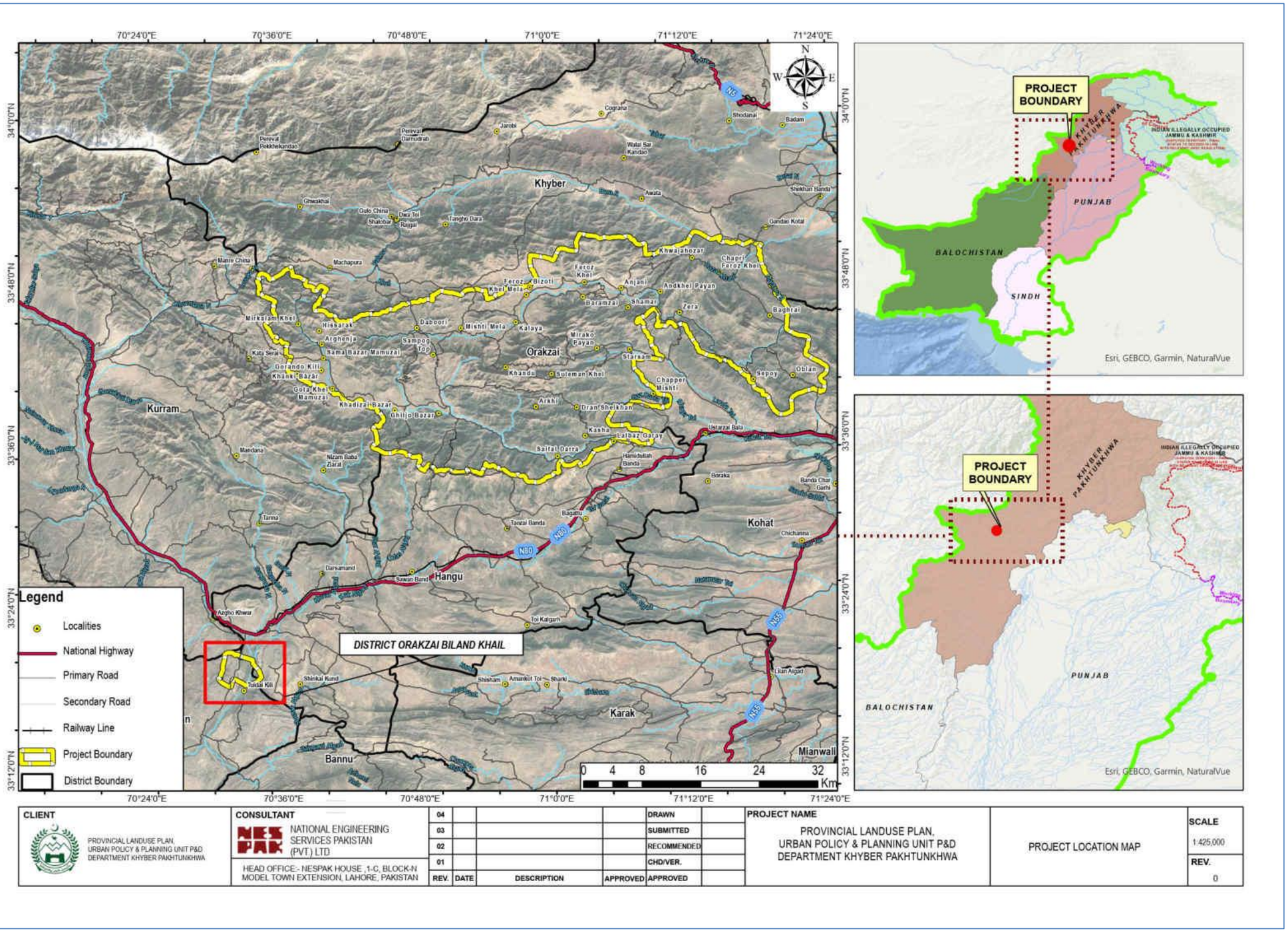
2 Existing Land Use Distribution

2.1 Project Location

Orakzai District, formerly part of the Federally Administered Tribal Areas (FATA), became a district in Khyber Pakhtunkhwa's Kohat Division following the 2018 merger. It covers an approximate area of 1370 km^2 and had a population of 254,303 as per the 2017 census. The district is characterized by rugged mountainous terrain, intersected by dry riverbeds, particularly in the southwest.

The district is subdivided into four tehsils: Central Orakzai, Ismail Zai, Lower Orakzai, and Upper Orakzai, as shown in Figure 2.1.

Kalaya Town serves as the district's administrative capital. Orakzai landscape and socioeconomic characteristics make it a crucial area for land use planning, requiring sustainable development strategies for infrastructure, agriculture, and natural resource management.



CLIENT: PROVINCIAL LANDUSE PLAN, URBAN POLICY & PLANNING UNIT P&D DEPARTMENT KHYBER PAKHTUNKHWA	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04			DRAWN	PROJECT NAME: PROVINCIAL LANDUSE PLAN, URBAN POLICY & PLANNING UNIT P&D DEPARTMENT KHYBER PAKHTUNKHWA	SCALE: 1:425,000
		03			SUBMITTED		
		02			RECOMMENDED	PROJECT LOCATION MAP	REV. 0
		01			CHD/VER.		
		REV.	DATE	DESCRIPTION / APPROVED	APPROVED		

Map 2-1: Location Map of District Orakzai

2.2 Land Use Distribution in the District

The land use profile of District Orakzai reflects the relationship between human activities and spatial organization, playing a crucial role in effective regional planning and zoning. Land use patterns in Orakzai are shaped by the nature of land use, its distribution, and spatial accumulation, indicating intensity and concentration. Transportation significantly influences activity locations and is closely linked to land use dynamics.

Key factors influencing land use in Orakzai include:

- **Transport System:** Infrastructure and connectivity supporting movement and accessibility across the district.
- **Spatial Interactions:** Movement patterns of people and goods, influenced by transport accessibility and land use characteristics.

  Land Use: Distribution of activities, mobility needs, and links to demographic and economic attributes.

Table 2-1: Land use Distribution in District Orakzai

Sr No	Land use	Area Acre	Percentages
1	Agriculture Land	56820.53	16.1808%
2	Bus Terminals	1.80	0.0005%
3	Commercial	131.37	0.0374%
4	Education	158.45	0.0451%
5	Forest Land	184126.46	52.4337%
6	Government Building	53.80	0.0153%
7	Graveyard	168.21	0.0479%
8	Health	49.77	0.0142%
9	Industry	24.10	0.0069%
10	Livestock & Fisheries	0.59	0.0002%
11	Open Spaces	2982.73	0.8494%
12	Park & Playground	49.00	0.0140%
13	Range Land	95806.93	27.2829%
14	Religious	56.31	0.0160%
15	Residential	4652.81	1.3250%
16	Restricted Area	92.78	0.0264%
17	Tourism -Historical Building	0.07	0.0000%
18	Transport	2543.51	0.7243%
19	Utilities	7.27	0.0021%
20	Water Bodies	3434.30	0.9780%
Total Area		**351160.78**	**100.000%**

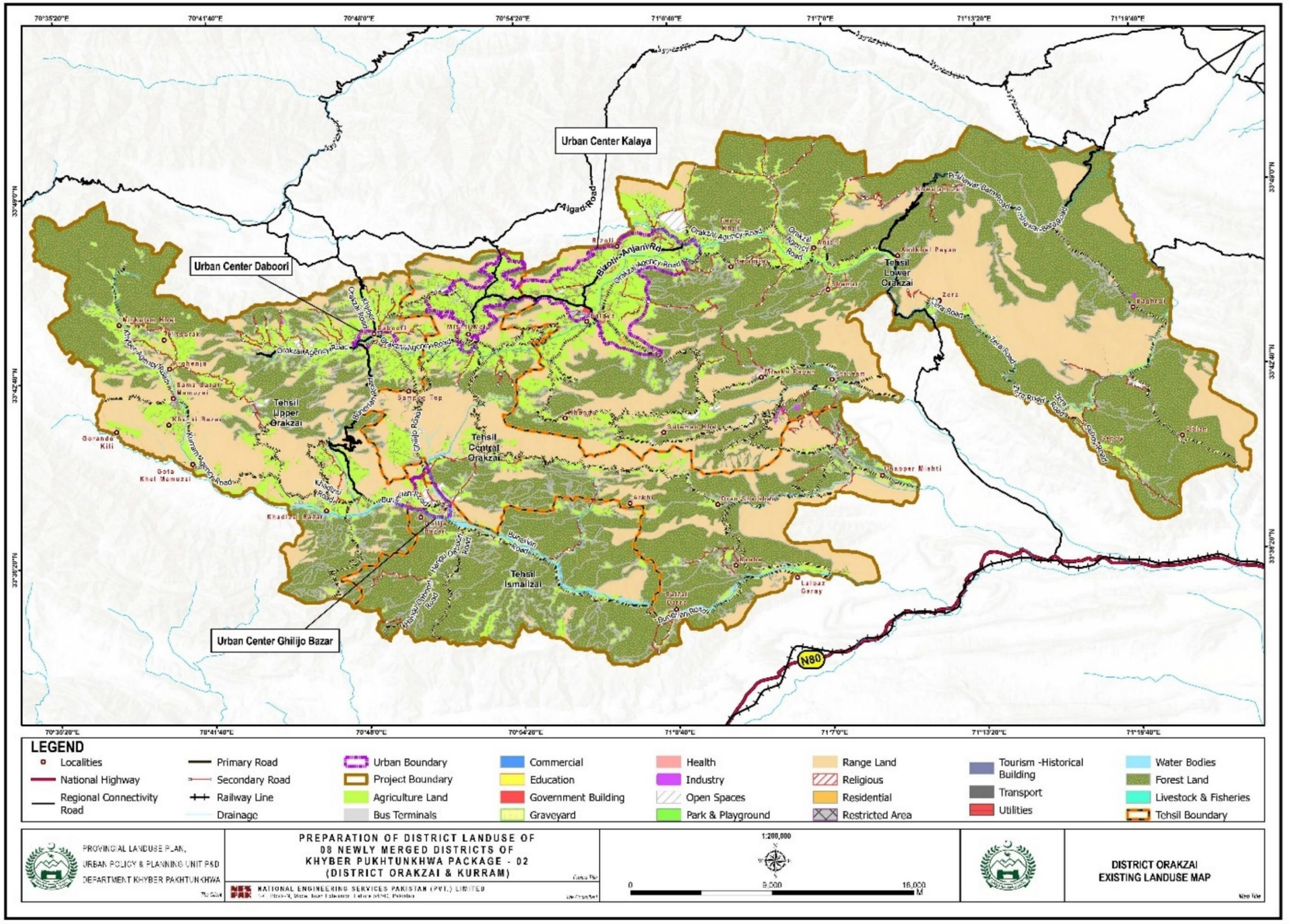
The land-use profile of District Orakzai continues to reflect a predominantly natural and rural landscape, strongly influenced by mountainous terrain and pastoral livelihoods. Forest land remains

the dominant land-use category, covering 52% of the total area, which highlights the extensive presence of natural forest cover and the importance of ecological systems across the district. Rangeland constitutes the second largest land-use at 27%, underscoring the extensive availability of grazing lands and the significance of livestock-based activities. Agricultural land accounts for 16%, indicating that cultivation is present but largely constrained to suitable valleys and plains where soil fertility and water availability permit farming.

Open spaces make up 1% of the land area, contributing to environmental balance and offering limited potential for future planned development. Water bodies, covering 1%, play a vital role in supporting agriculture, livestock, and domestic water needs.

Built-up land uses occupy a very small proportion of the district. Residential areas account for only 1.3%, while land allocated to commercial, industrial, institutional, transport, utilities, and recreational uses is negligible in comparison. This clearly indicates a low level of urbanization and limited infrastructure development.

Overall, the updated land-use structure of District Orakzai highlights a region dominated by forests and rangelands, with limited agricultural and urban development. The pattern emphasizes the need for sustainable land management, protection of natural resources, and carefully planned development to balance environmental conservation with socio-economic growth.



Map 2-2 Location Index Map

2.3 Tehsil Wise Land Use Distribution

District Orakzai is administratively divided into four tehsils, namely Upper Orakzai, Central Orakzai, Lower Orakzai, and Ismail Zai. Each tehsil exhibits distinct topographical, socio-economic, and land use characteristics, contributing uniquely to the district's overall spatial and developmental framework. The following sections present the land use statistics and corresponding maps for each tehsil, providing a detailed understanding of the existing and proposed land use patterns. These visual and statistical analyses form the foundation for the zoning proposals and planning interventions aimed at promoting balanced growth, resource optimization, and sustainable land management across the district.

2.3.1 Tehsil Upper Orakzai

The updated land-use profile of Tehsil Upper Orakzai shows a landscape that is predominantly natural and rural, with development concentrated in limited pockets. Forest land remains the dominant land-use category, covering 43% of the total area, reflecting extensive forest cover and the tehsil's ecological importance. Rangeland constitutes the second largest land-use at 31%, indicating widespread grazing lands and the continued importance of livestock-based livelihoods. Agricultural land accounts for 22%, suggesting comparatively favorable conditions for cultivation in valleys and plains, although farming remains influenced by terrain and water availability.

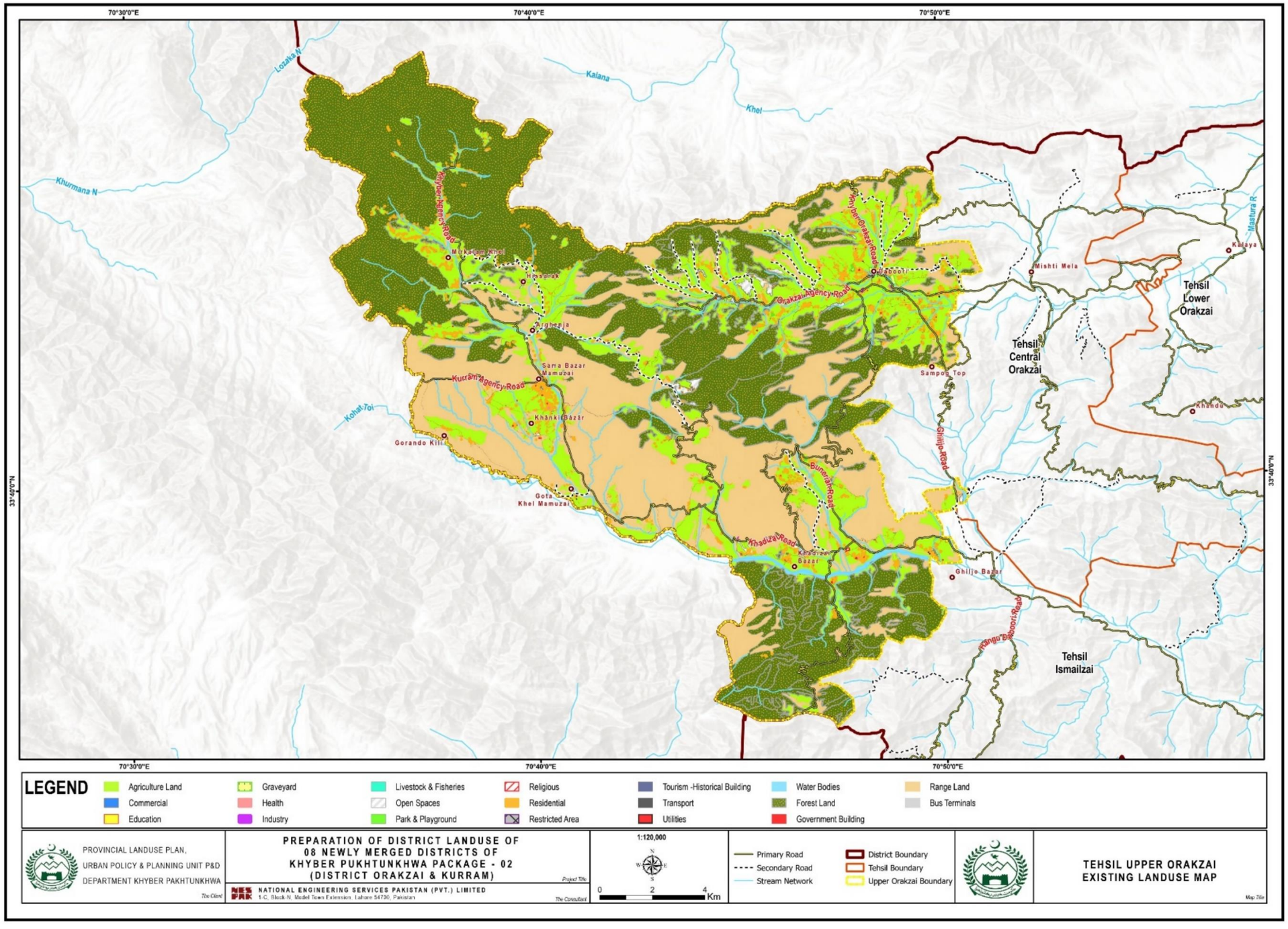
Open spaces, covering 1%, and water bodies, also accounting for 1%, contribute to environmental balance and support limited opportunities for future planned development and water resource management.

Built-up land uses occupy a very small share of the total area. Residential land covers only 1%, indicating low population density and dispersed settlement patterns. Transport infrastructure also accounts for 1%, while land allocated to commercial, education, health, government buildings, industry, utilities, religious uses, parks and playgrounds, tourism-historical buildings, bus terminals, and restricted areas remains negligible. This reflects limited urbanization and modest availability of institutional and economic infrastructure.

Overall, the updated land-use structure of Tehsil Upper Orakzai highlights a region strongly characterized by forests, rangelands, and agriculture, with minimal urban development. The pattern underscores the need for sustainable management of natural resources and carefully planned development to support socio-economic growth while preserving the tehsil's environmental integrity.

Table 2-2 Tehsil Upper Orakzai Land Use Stats

Sr No.	Land use	Area Acre	Percentages
1	Agriculture Land	16989.56	22.1313%
2	Bus Terminals	1.22	0.0016%
3	Commercial	32.35	0.0421%
4	Education	17.93	0.0234%
5	Forest Land	32926.29	42.8911%
6	Government Building	1.37	0.0018%
7	Graveyard	52.55	0.0685%
8	Health	6.86	0.0089%
9	Industry	2.13	0.0028%
10	Open Spaces	553.20	0.7206%
11	Park & Playground	5.51	0.0072%
12	Range Land	23982.12	31.2401%
13	Religious	13.43	0.0175%
14	Residential	1017.26	1.3251%
15	Restricted Area	2.15	0.0028%
16	Tourism -Historical Building	0.07	0.0001%
17	Transport	556.05	0.7243%
18	Utilities	2.72	0.0035%
19	Water Bodies	604.41	0.7873%
Total Area		**76767.19**	**100.0000%**



Map 2-3 Tehsil Upper Orakzai Land Use Map

2.3.2 Tehsil Central Orakzai

The land-use pattern of Tehsil Central Orakzai is strongly dominated by natural landscapes, reflecting its mountainous terrain and environmentally sensitive character. Forest land is the largest land-use category, covering 39% of the total area, which highlights the extensive presence of forest cover and the tehsil's ecological importance. Rangeland constitutes the second largest land-use at 37%, emphasizing the widespread availability of grazing lands and the importance of pastoral and livestock-based activities in the local economy. Together, forests and rangelands account for nearly 76% of the total land area, clearly indicating that Tehsil Central Orakzai is predominantly an environmentally rich and conservation-oriented region.

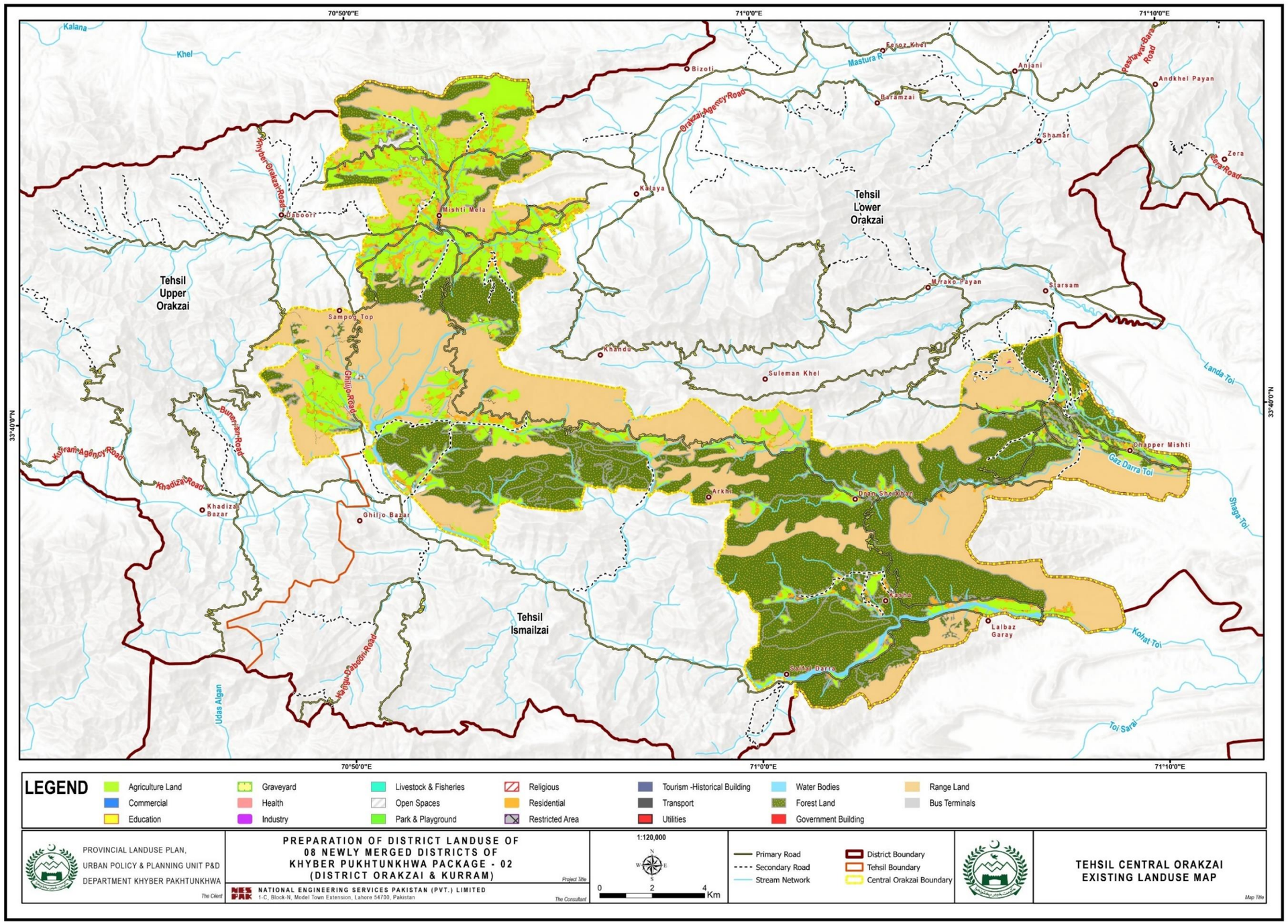
Agricultural land covers 19%, suggesting that farming activities are present but largely confined to valley floors and areas with suitable soil and water availability. Water bodies, accounting for 1%, support irrigation, domestic use, and ecological balance. Open spaces, also covering 1%, contribute to the overall environmental setting of the tehsil.

Built-up and infrastructure-related land uses occupy a very small proportion of the tehsil. Residential areas cover 2%, reflecting low population density and dispersed settlement patterns. Transport infrastructure accounts for 1%, while land allocated to commercial, education, health, industry, government buildings, utilities, religious uses, parks and playgrounds, bus terminals, and restricted areas remains negligible, indicating minimal urbanization and limited infrastructure development.

Overall, the updated land-use structure of Tehsil Central Orakzai highlights a region overwhelmingly shaped by forests and rangelands, with limited agriculture and urban development. This pattern underscores the importance of environmentally sustainable planning, protection of forest and grazing resources, and carefully managed development to balance ecological preservation with local livelihood needs.

Table 2-3 Tehsil Central Orakzai Land Use Stats

Sr No.	Land use	Area Acre	Percentages
1	Agriculture Land	12961.92	18.630%
2	Bus Terminals	0.58	0.001%
3	Commercial	18.13	0.026%
4	Education	30.67	0.044%
5	Forest Land	27259.38	39.179%
6	Government Building	1.34	0.002%
7	Graveyard	32.25	0.046%
8	Health	14.35	0.021%
9	Industry	2.37	0.003%
10	Open Spaces	593.50	0.853%
11	Park & Playground	2.45	0.004%
12	Range Land	25881.37	37.199%
13	Religious	8.63	0.012%
14	Residential	1089.42	1.566%
15	Restricted Area	0.36	0.001%
16	Transport	720.16	1.035%
17	Utilities	1.08	0.002%
18	Water Bodies	958.34	1.377%
Total Area		**69576.29**	**100.000%**



Map 2-4 Tehsil Central Orakzai Land Use Map

2.3.3 Tehsil Lower Orakzai

The updated land-use profile of Tehsil Lower Orakzai clearly indicates a landscape overwhelmingly dominated by natural land cover. Forest land is the most prominent land-use category, occupying 57% of the total area, which reflects extensive natural vegetation and highlights the ecological importance of the tehsil. This dominance also indicates limited suitability for intensive cultivation due to terrain and climatic conditions.

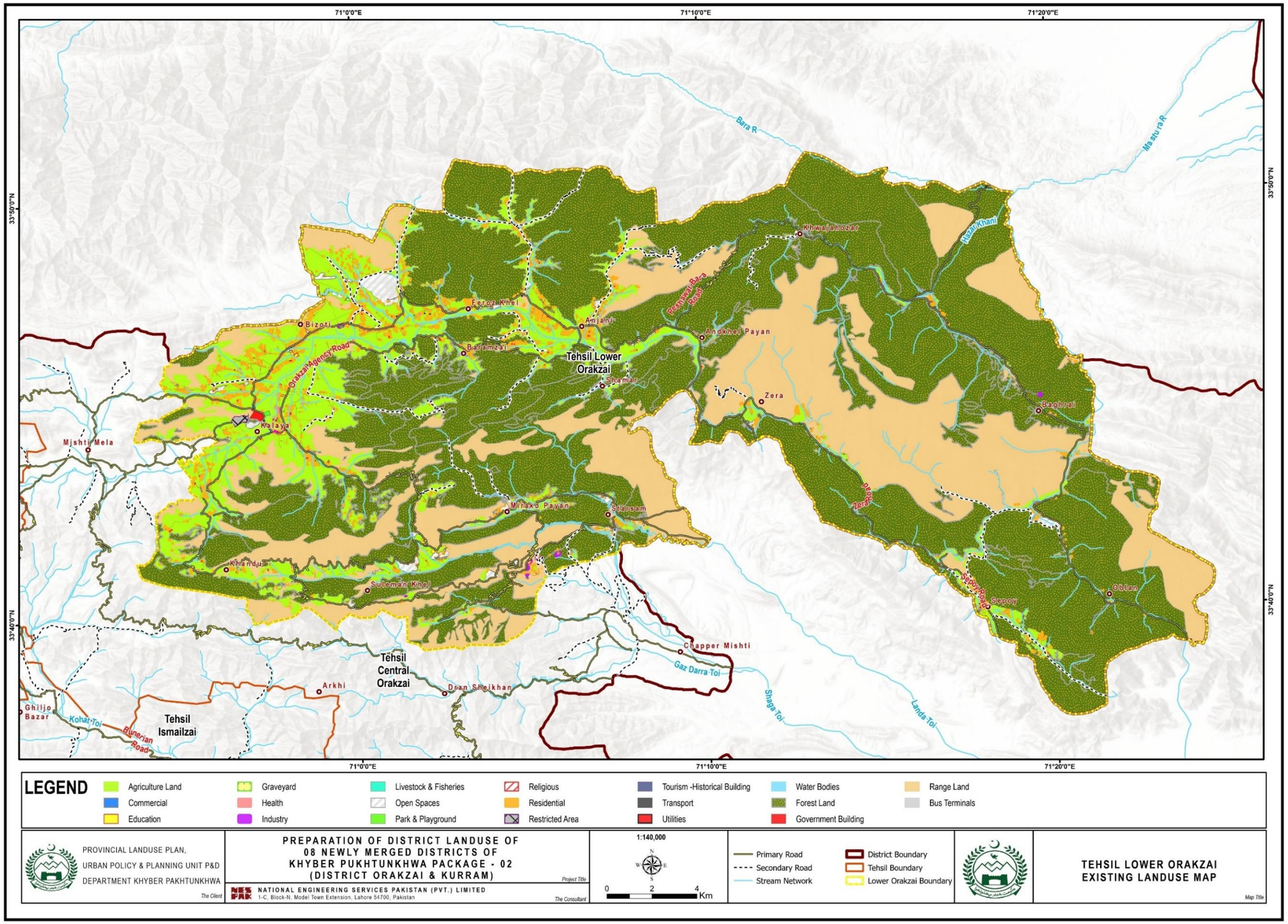
Rangeland accounts for 26% of the total area, indicating the presence of open grazing areas and highlighting the role of livestock and pastoral activities in the local economy. Agricultural land accounts for 14%, suggesting that farming is confined to specific pockets where soil quality and water availability allow cultivation. Water bodies cover a negligible proportion of the total area, but remain important for supporting livestock, agriculture, and domestic water needs, and contribute to the ecological balance of the area.

Built-up land uses remain minimal. Residential areas cover just 1%, reflecting low population density and scattered settlement patterns. Open spaces and transport land uses each account for about 1%, while land allocated to commercial, educational, health, industrial, utilities, and other institutional uses is negligible. This highlights a very low level of urbanization and limited infrastructure development.

Overall, the updated land-use structure of Tehsil Lower Orakzai portrays a predominantly rural and resource-based region, strongly dependent on forest and rangeland resources. The pattern underscores the importance of sustainable natural resource management and carefully planned development to support livelihoods while preserving the fragile natural environment.

Table 2-4 Tehsil Lower Orakzai Land Use Stats

Sr No.	Land use	Area Acre	Percentages
1	Agriculture Land	22946.67	13.7087%
2	Commercial	63.40	0.0379%
3	Education	100.19	0.0599%
4	Forest Land	94967.48	56.7352%
5	Government Building	50.82	0.0304%
6	Graveyard	68.57	0.0410%
7	Health	24.50	0.0146%
8	Industry	19.60	0.0117%
9	Livestock & Fisheries	0.59	0.0004%
10	Open Spaces	1641.84	0.9809%
11	Park & Playground	21.51	0.0129%
12	Range Land	43460.21	25.9639%
13	Religious	32.22	0.0192%
14	Residential	2176.26	1.3001%
15	Restricted Area	68.50	0.0409%
16	Transport	1048.96	0.6267%
17	Utilities	1.09	0.0007%
18	Water Bodies	694.90	0.4151%
Total Area		167387.31	100.0000%



Map 2-5 Tehsil Lower Orakzai Land Use Map

2.3.4 Tehsil Ismail Zai

The updated land-use profile of Tehsil Ismail Zai clearly indicates a landscape overwhelmingly dominated by natural and forest lands. Forest land is the most prominent land-use category, occupying 77% of the total area, which reflects extensive natural vegetation and highlights the ecological significance of the tehsil. This dominance also indicates limited suitability for intensive cultivation due to terrain and climatic conditions.

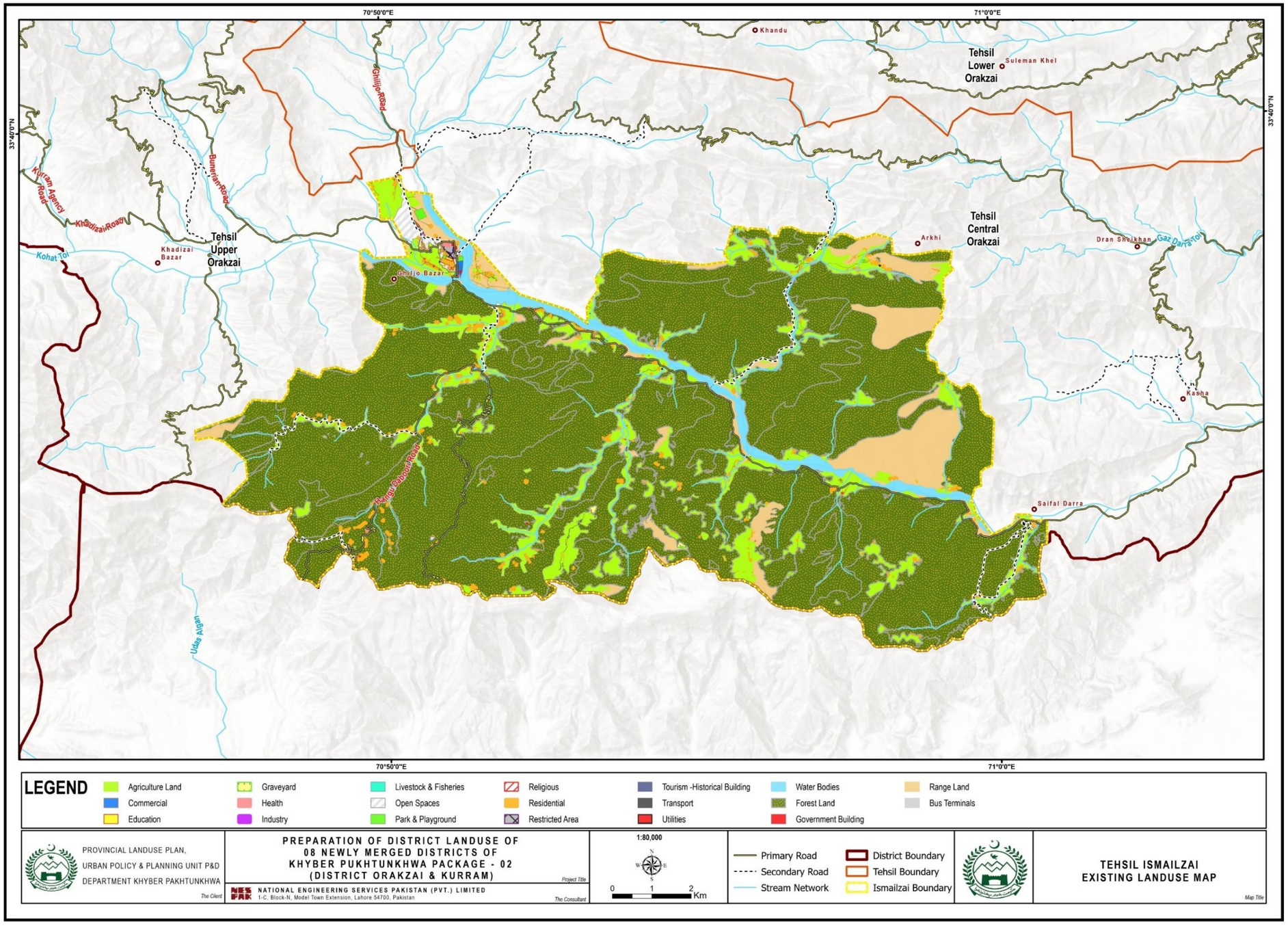
Agricultural land accounts for 10%, suggesting that farming is confined to limited pockets where soil quality and water availability allow cultivation. Rangeland covers 7%, reflecting the presence of grazing areas and highlighting the role of livestock and pastoral activities in the local economy. Water bodies, covering 3%, are important for supporting livestock, agriculture, and domestic water needs, and contribute to the ecological balance of the area.

Built-up land uses remain minimal. Residential areas cover just 1%, reflecting low population density and scattered settlement patterns. Open spaces and transport land uses each account for about 1%, while land allocated to commercial, educational, health, utilities, and other institutional uses is negligible. This highlights a very low level of urbanization and limited infrastructure development.

Overall, the updated land-use structure of Tehsil Ismail Zai portrays a predominantly rural and resource-based region, strongly dependent on forest and natural resources. The pattern underscores the importance of sustainable forest management, water resource conservation, and carefully planned development to support livelihoods while preserving the fragile natural environment.

Table 2-5 Tehsil Ismail Zai Land Use Stats

Sr No.	Land use	Area Acre	Percentages
1	Agriculture Land	3922.38	10.479%
2	Commercial	17.49	0.047%
3	Education	9.66	0.026%
4	Forest Land	28973.14	77.406%
5	Government Building	0.27	0.001%
6	Graveyard	14.84	0.040%
7	Health	4.07	0.011%
8	Open Spaces	193.89	0.518%
9	Park & Playground	19.53	0.052%
10	Range Land	2483.31	6.635%
11	Religious	2.03	0.005%
12	Residential	369.86	0.988%
13	Restricted Area	21.78	0.058%
14	Transport	218.80	0.585%
15	Utilities	2.38	0.006%
16	Water Bodies	1176.66	3.144%
Total Area		**37430.08**	**100.000%**



Map 2-6 Tehsil Ismail Zai Land Use Map

2.4 Land use Distribution in Urban Center

Land use refers to how humans utilize land for activities such as agriculture, settlements, industry, forestry, and recreation, reflecting economic and cultural practices that may change over time. Kalaya, located in Lower Orakzai Tehsil at an elevation of approximately 1,645 meters above sea level, serves as the winter administrative capital of Orakzai District, while Ghilijo Bazar functions as the summer capital. According to the 2017 census, Kalaya had a population of 17,575, representing about 16% of Lower Orakzai Tehsil's total population. Based on an annual growth rate of 2.63%, the estimated population in 2023 is approximately 20,700. Land use in Kalaya is generally stable; however, land market dynamics and development pressures make planned and sustainable land-use management essential for balanced urban growth.

2.4.1 Existing Land Use Distribution of Kalaya Urban Center

The land-use distribution of Urban Center Kalaya reveals the dominance of agricultural land, complemented by residential areas and a mix of commercial, institutional, and public service categories. The statistics highlight how the town's landscape is shaped by both rural and emerging urban functions. Agricultural land is the most prominent land-use category, occupying 79% (10,308.47 acres) of the total area, which indicates a strong reliance on farming activities and reflects the predominantly rural character of the town. This also suggests a gradual transition where agricultural lands may be converted into urban uses in the future.

Residential land covers 8% (1,010.67 acres), representing the primary built-up area and indicating a moderate level of urbanization with increasing population concentration. Rangeland accounts for 4%, supporting grazing activities and contributing to the semi-natural landscape of the area.

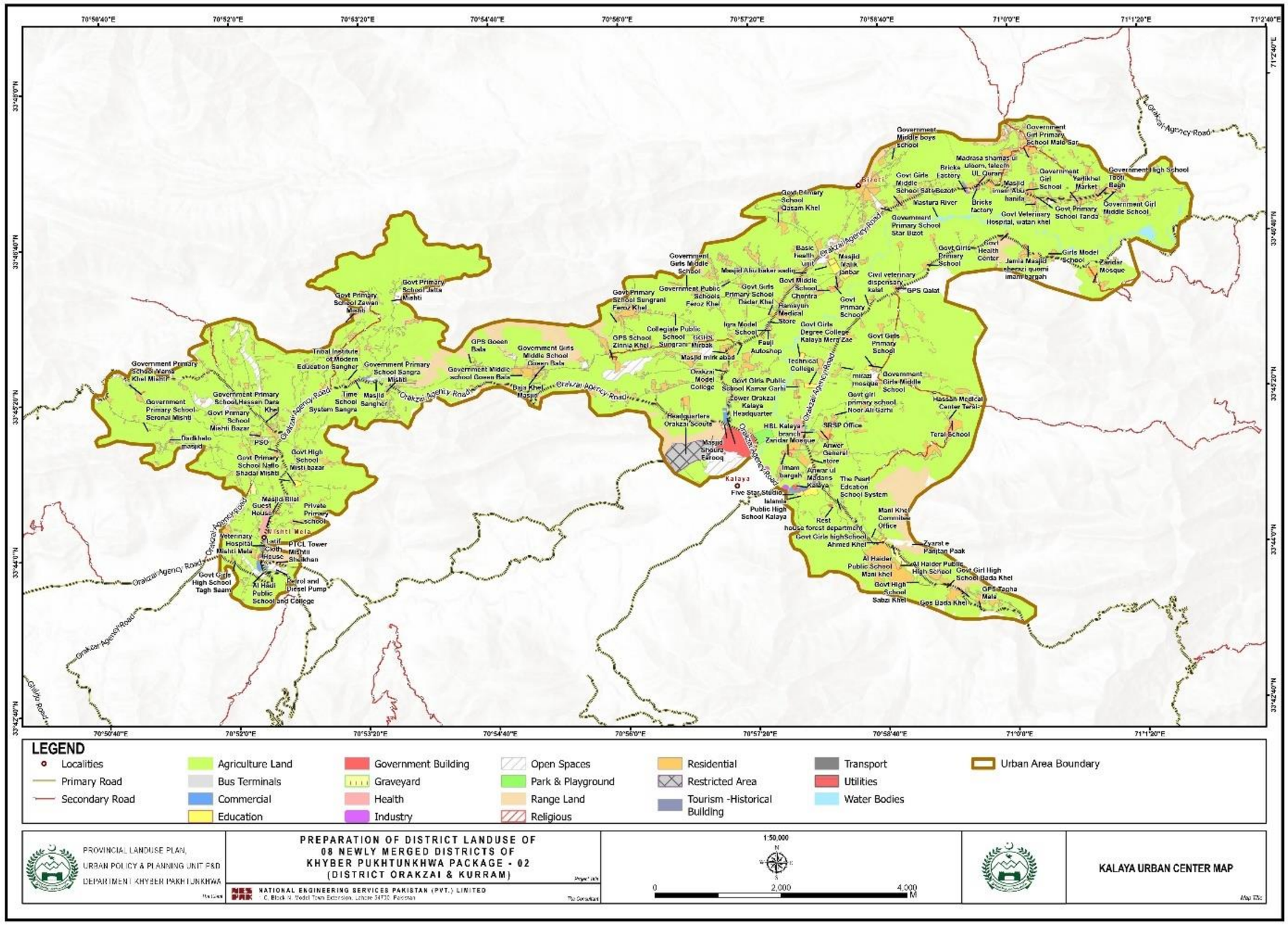
Forest land and open spaces each occupy 2%, playing an important role in maintaining environmental balance, ecological stability, and providing opportunities for future planned development. Transport infrastructure also covers 2% of the total area, facilitating mobility and connectivity within the urban center. Water bodies constitute 1%, contributing to drainage, water supply, and ecological sustainability.

Institutional and service-related land uses including education, health, government buildings, religious facilities, parks and playgrounds, graveyards, utilities, and restricted areas occupy very small proportions individually, reflecting limited but essential social and administrative infrastructure. Industrial land use, livestock and fisheries, and bus terminal areas remain negligible, highlighting the absence of significant industrial activity and confirming the agriculture- and service-oriented nature of Kalaya's economy.

Overall, the land-use structure of Urban Center Kalaya depicts a settlement in the early stages of urban transition, where agricultural and natural lands continue to dominate while residential, transport, and institutional uses are gradually expanding. This pattern underscores the need for integrated and sustainable urban planning to guide future growth, enhance infrastructure and services, and protect valuable agricultural, forest, and open lands.

Table 2-6: Land use Distribution in Urban Center Kalaya

Sr No.	Land use	Area Acre	Percentages
1	Agriculture Land	10308.47	79.0048%
2	Bus Terminals	0.58	0.0044%
3	Commercial	42.84	0.3283%
4	Education	60.09	0.4605%
5	Forest Land	239.01	1.8318%
6	Government Building	51.02	0.3910%
7	Graveyard	52.88	0.4052%
8	Health	23.92	0.1834%
9	Industry	1.37	0.0105%
10	Livestock & Fisheries	0.02	0.0001%
11	Open Spaces	197.54	1.5139%
12	Park & Playground	13.36	0.1024%
13	Range Land	565.33	4.3328%
14	Religious	15.29	0.1172%
15	Residential	1010.67	7.7458%
16	Restricted Area	60.43	0.4632%
17	Transport	306.62	2.3500%
18	Utilities	1.04	0.0080%
19	Water Bodies	97.44	0.7468%
Total Area		**13047.91**	**100.000%**



Map 2-7: Land use Index Map (Urban Center: Kalaya)

2.4.2 Existing Land Use Distribution of Ghilijo Urban Center

Urban Center Ghilijo Bazar, also known as Ghilijo or Ghilijo, serves as the summer administrative capital of Orakzai District and functions as the tehsil headquarters of Upper Orakzai Tehsil in Khyber Pakhtunkhwa. It plays a vital role in local governance, administration, and community life within the district. Although specific population and area figures for Ghilijo Bazar are not reported separately, it forms part of Upper Orakzai Tehsil, which covers approximately 299 square kilometers and had a population of 129,470 according to the 2023 census, highlighting the town's administrative and demographic significance.

Historically and culturally, Ghilijo Bazar holds importance as it is named after the Ghilijo Pashtun tribe. Despite facing challenges during past military operations, peace and stability have been restored, and the town has re-emerged as an important center for administration, culture, and daily socio-economic activities. Recent development initiatives, including the installation of solar street lights and the development of commercial markets, reflect ongoing efforts to improve infrastructure, public services, and overall urban functionality.

The land-use distribution of Urban Center Ghilijo Bazar reveals a mixed and transitional urban structure, shaped by both rural characteristics and emerging urban functions. Agricultural land dominates the land-use pattern, covering 42% (542.10 acres) of the total area, indicating the continued importance of farming activities and the peri-urban nature of the settlement. Rangeland accounts for 16% (205.16 acres), reflecting the presence of grazing and semi-natural lands within the urban boundary.

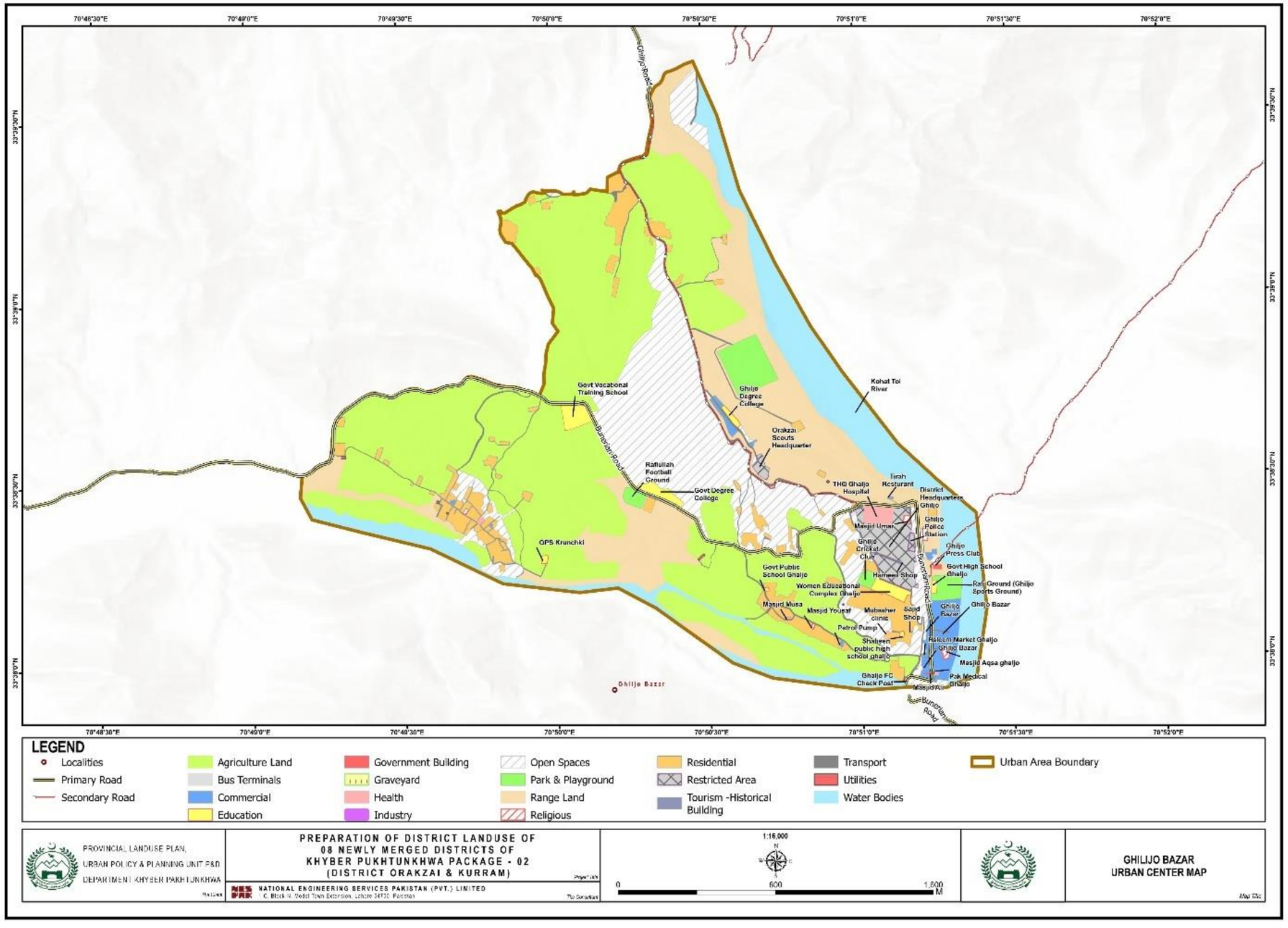
Open spaces cover 15% (200.25 acres), playing a crucial role in environmental regulation, drainage, urban ventilation, and providing reserve land for future planned development. Water bodies constitute 12% (161.40 acres), contributing to water availability, flood management, and ecological balance. Residential land occupies 5% (69.01 acres), representing the primary built-up area and indicating a moderate level of population concentration.

Transport infrastructure covers 3% (40.16 acres), supporting internal circulation and external connectivity, while restricted areas and parks & playgrounds each account for 2%, contributing to administrative control and recreational needs respectively. Institutional and service-oriented land uses, including commercial (1%), education (1%), and health, government, religious, and utility uses, occupy relatively small proportions individually but collectively support the social, administrative, and economic needs of the local population.

Overall, Urban Center Ghilijo Bazar exhibits a mixed urban-rural land-use character, where agriculture, rangeland, open spaces, and water bodies continue to play a dominant role alongside gradually expanding residential, commercial, and transport-related uses. This land-use pattern underscores the need for integrated and sustainable urban planning to guide future growth, strengthen urban services, improve connectivity, and protect valuable agricultural and environmental resources. An index map of land use is shown in the relevant map section, while detailed land-use maps are attached in the compendium of this report.

Table 2-7: Land use Distribution in Urban Center Ghilijo

Sr no.	Land use	Area Acre	Percentages
1	Agriculture Land	542.10	41.87%
2	Commercial	17.12	1.32%
3	Education	11.54	0.89%
4	Government Building	0.27	0.02%
5	Health	3.78	0.29%
6	Open Spaces	200.25	15.47%
7	Park & Playground	21.67	1.67%
8	Range Land	205.16	15.84%
9	Religious	1.35	0.10%
10	Residential	69.01	5.33%
11	Restricted Area	20.74	1.60%
12	Transport	40.16	3.10%
13	Utilities	0.32	0.02%
14	Water Bodies	161.40	12.46%
Total Area		**1294.87**	**100.00%**



Map 2-8: Land use Index Map (Urban Center: Ghilijo)

2.4.3 Existing Land Use Distribution of Dabori Urban Center

Urban Center Dabori serves as a proposed urban center in Orakzai District, reflecting a compact land-use pattern with mixed functional areas. It covers a total area of 477.67 acres, comprising agricultural, residential, commercial, transport, and community-related land uses. Although Dabori presently retains a semi-rural character, its functional importance and land-use composition indicate clear potential for structured and planned urban development in the future.

The core area of Urban Center Dabori consists of residential neighborhoods, local commercial activities, transport corridors, religious facilities, graveyards, and limited community services. However, the town has largely evolved in an unplanned and organic manner, without the guidance of a formal physical development plan or defined planning regulations. This has resulted in scattered and low-density development, leading to challenges in the efficient provision of urban services such as water supply, electricity, road connectivity, drainage, and sanitation infrastructure. The absence of an effective municipal or town-level planning authority further limits the ability to regulate growth and guide coordinated development.

The land-use pattern of Urban Center Dabori reflects a predominantly semi-rural and low-intensity urban structure, with agricultural land remaining the dominant use. Agricultural land occupies 67% (320.15 acres) of the total area, indicating the continued importance of farming activities and peri-urban agriculture within the urban boundary. Residential land accounts for 9% (41.06 acres), representing a modest and dispersed built-up area that reflects limited population concentration and low-density settlement patterns.

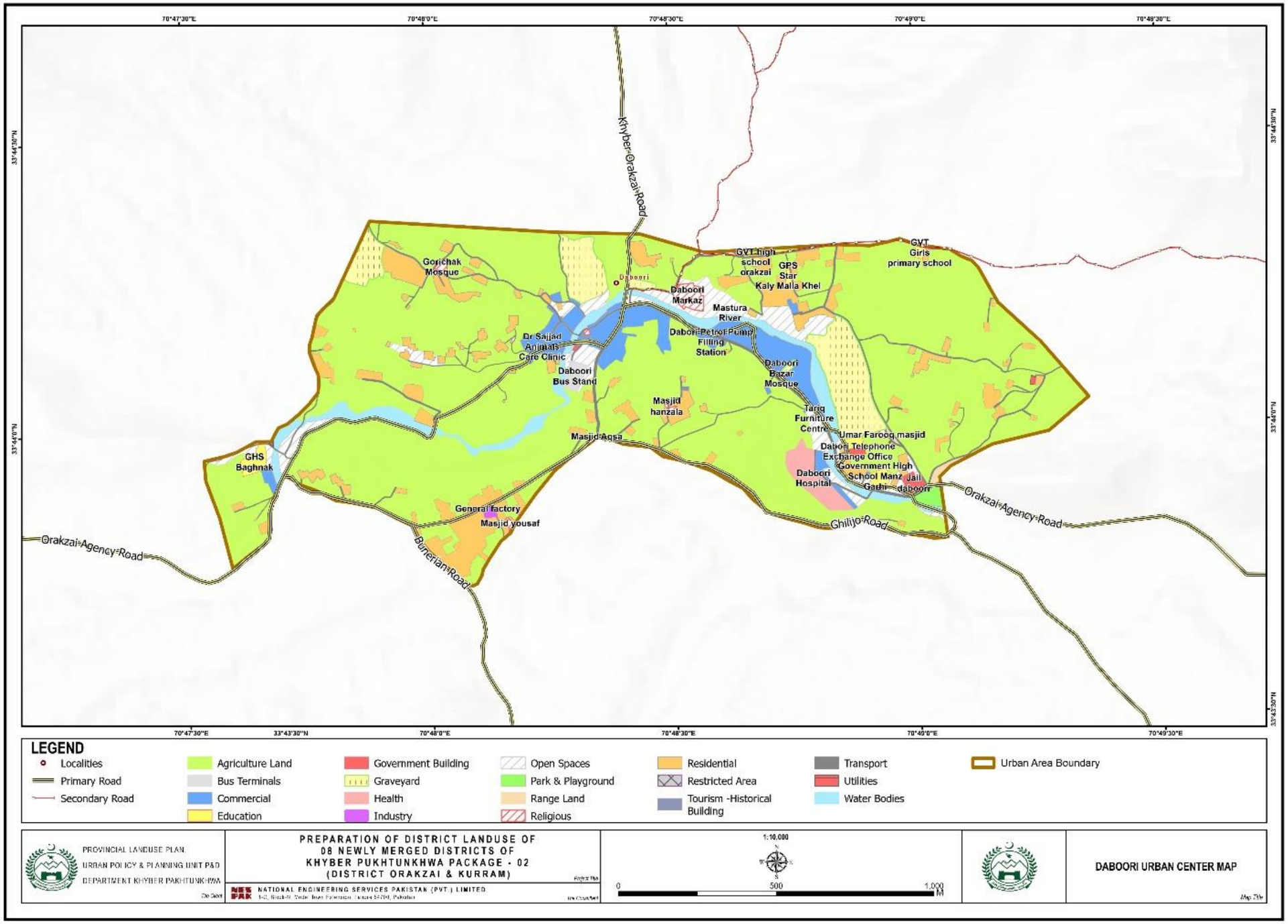
Urban support and service-related land uses occupy relatively small proportions. Commercial land (4%) and transport infrastructure (5%) highlight Dabori emerging role as a local service and movement node. Open spaces (4%) and water bodies (4%) contribute to environmental balance, drainage, and local ecological stability. Graveyards (5%) form a notable land-use category, reflecting cultural and social requirements of the community.

Institutional and public service land uses including education (1%), health (1%), religious facilities (1%), government buildings, utilities, industry, tourism-related historic structures, parks and playgrounds, and restricted areas together occupy a very limited share of land. This indicates that Dabori urban economy and service base are still at an early stage of development, with minimal industrial or high-intensity commercial activity.

Overall, Urban Center Dabori exhibits a transitional urban-rural land-use character, where agriculture remains dominant and urban functions are gradually emerging but remain scattered and low in intensity. This pattern underscores the need for planned and compact urban growth, strengthening of municipal governance, improved infrastructure provision, and protection of agricultural and environmental resources to ensure sustainable and balanced future development.

Table 2-8 Land use Distribution in Urban Center Dabori

Sr no.	Land use	Area Acre	Percentages
1	Agriculture Land	320.15	67.02%
2	Bus Terminals	1.22	0.26%
3	Commercial	20.80	4.36%
4	Education	3.36	0.70%
5	Government Building	1.26	0.26%
6	Graveyard	22.12	4.63%
7	Health	4.61	0.97%
8	Industry	0.18	0.04%
9	Open Spaces	18.20	3.81%
10	Park & Playground	1.11	0.23%
11	Range Land	1.02	0.21%
12	Religious	2.43	0.51%
13	Residential	41.06	8.60%
14	Restricted Area	0.02	0.01%
15	Tourism -Historical Building	0.07	0.01%
16	Transport	22.35	4.68%
17	Utilities	0.18	0.04%
18	Water Bodies	17.52	3.67%
Total Area		**477.67**	**100.00%**



Map 2-9: Land use Index Map (Urban Center: Dabori)

3 Sectoral Studies

3.1 Housing

Housing is a fundamental necessity for all individuals, regardless of whether they reside in urban or rural areas, and is intricately linked to various land uses. Consequently, the housing sector is diverse and encompasses all urban activities associated with employment, education, and recreation. To adequately address housing needs, it is essential to consider other land uses, as a significant amount of land is required for residential purposes, which in turn supports these activities.

Given the critical importance of housing, it is vital to examine its current characteristics and spatial dynamics to inform future Land Use Plans. Both qualitative and quantitative dimensions of the housing sector must be analyzed to assess land suitability, as well as any limitations and constraints.

In District Orakzai, the characteristics of the existing housing stock have been evaluated using a range of data sources, including secondary data from the census and primary data from the Household Information Survey. Key characteristics studied include average household size, housing stock, ownership trends, growth patterns, density trends, the existing housing backlog, and projected future housing demand for the planning period.

3.1.1 Current Housing Stock by Type

The housing stock data from the Population and Housing Censuses of 1998, 2017, and 2023 for District Orakzai provide critical insights into the evolution of residential infrastructure within the district. Understanding these trends is fundamental for the formulation of an effective land use plan that addresses housing needs, construction standards, and sustainable spatial development.

The housing stock is classified into three main categories based on construction quality and material durability: Katcha (traditional or temporary construction), Semi-Pakka (partially durable construction), and Pakka (permanent and durable construction). Katcha housing, characterized by non-permanent materials such as mud, thatch, or bamboo, has consistently constituted the majority of the housing stock in District Orakzai. In 1998, Katcha houses represented 55.8% of the total housing units. This proportion increased significantly to 66.7% in 2017 and further escalated to 76.36% in 2023. The marked rise in Katcha housing highlights the district's reliance on traditional construction methods, possibly driven by economic constraints, cultural preferences, and the availability of local materials.

Semi-Pakka houses, which combine both temporary and durable materials, showed a substantial increase over the 25-year period. From a modest 5.2% in 1998, the share of Semi-Pakka housing surged to 27.4% in 2017, before slightly declining to 19.30% in 2023. This growth indicates a transitional phase where residents are progressively adopting more resilient construction techniques, yet full permanence remains limited. The slight decrease observed in 2023 may reflect data collection nuances or a shift back towards more affordable housing solutions. Pakka housing, indicative of fully durable structures made from permanent materials like brick and concrete, has historically constituted a smaller fraction of the housing stock. The percentage of Pakka houses fell from 39.0% in 1998 to 5.8% in 2017, with a marginal increase to 4.32% in 2023. This decline suggests limited access to resources or technical capacity for constructing permanent housing and underscores the need for policy interventions to improve housing quality and resilience.

Table 3-1 District Orakzai Previous Housing Stock

Housing Type	1998 Census	Percentage (1998)	2017 Census	Percentage (2017) [38]	2023 Census	Percentage (2023)[39]
Katcha	14,260	55.8%	20,826	66.7%	39,790	76.36%
Semi-Pakka	1,329	5.2%	8,545	27.4%	10,058	19.30%
Pakka	9,957	39.0%	1,806	5.8%	2,256	4.32%
Total	25,546	100%	31,177	100%	52,104	100%

3.1.1.1 Housing Stock Projection of District Orakzai (2025)

Housing is a critical component of urban and rural development, and understanding its growth dynamics is essential for effective planning. In Orakzai District, the housing stock has historically increased significantly. Between 2017 and 2023, the number of housing units grew from 31,177 to 52,104, reflecting a substantial increase over six years. To quantify this growth, planners use the Compound Annual Growth Rate (CAGR) formula, which calculates the average annual growth rate based on the initial and final values over a given period. Using this method, the annual growth rate for Orakzai's housing stock is found to be approximately 2.64% per year.

This growth rate serves as the basis for projecting future housing stock. By applying the growth rate to the 2023 housing stock, the projection for 2025 indicates approximately 54,865 units, accounting for expected population increases and urbanization trends. Extending the same calculation further into the future, the housing stock in 2045 is projected to reach around 93,241 units, which also considers the existing housing backlog of 288 units.

These projections are crucial for land use and infrastructure planning, as they allow policymakers to anticipate the demand for residential areas, utilities, and public services. By understanding both current and future housing needs, planners can design strategies that ensure adequate housing supply, support sustainable growth, and improve living conditions across Orakzai District over the next two decades.

3.1.1.2 Distribution of Housing Types in 2025

The housing stock in Orakzai District is categorized into three types: Katcha, Semi-Pakka, and Pakka. Based on the proportions recorded in the 2023 census, the projected distribution of housing types in 2025 is as follows:

- **Katcha Housing**: Approximately 41,900 units, representing the largest share of the housing stock.
- **Semi-Pakka Housing**: Around 10,595 units, indicating moderate-quality housing.
- **Pakka Housing**: About 2,370 units, the smallest proportion, representing durable and high-quality construction.

[38] /www.pbs.gov.pk/sites/default/files/population/2017/results/03024.pdf
[39] https://www.pbs.gov.pk/sites/default/files/population/2023/tables/table_20_kp_districts.pdf

Table 3-2 Projected Housing Stock by Type (2025)

Housing Type	Percentage (2023)	Projected Units (2025)
Katcha	76.36%	41,900 units
Semi-Pakka	19.30%	10,595 units
Pakka	4.32%	2,370 units
Total	100%	54,865 units

3.1.2 Housing Stock Verification and Shortfall in 2025

To verify the projected housing stock for District Orakzai in 2025, the estimated population of 403,751 and the average household size of 7.4 persons can be used. Based on these figures, the total housing stock is expected to be approximately 54,560 units. Comparing this with current projections indicates a shortfall of around 7,276 housing units, highlighting a significant gap between demand and available housing. This deficit emphasizes the urgent need for planned and strategic interventions, including the development of affordable housing schemes, promotion of sustainable construction practices, and the allocation of adequate land resources. Addressing this housing gap is essential not only to provide adequate shelter and improve living conditions but also to support the district's socio-economic development. Without effective measures, the shortage may lead to the growth of informal settlements, strain existing infrastructure, and hinder sustainable urban and rural growth.

3.1.2.1 Average Household Size

The average household size is a critical factor in housing planning, as it determines the number of housing units needed to accommodate a population. In Orakzai District, the **average household size is 7.40.**

3.1.2.2 Ownership Pattern

According to HIS, the analysis of house ownership in Orakzai district reveals significant insights into the region's residential landscape. House ownership and description provide a multifaceted view of properties, not just in terms of physical structure but also reflecting the socio-economic, cultural, and historical contexts

Table 3-3 House Ownership Tehsil-Wise Analysis

Town/Tehsil	Owned	Lease	Rented	Total
Central	95	0	1	96
Ismail Zai	47	1	0	48
Lower	208	2	7	217
Upper	151	1	0	152
Total	501	4	8	513
Percentage%	98%	1%	2%	100%

Source: HIS Orakzai, 2024

The data indicates that house ownership is overwhelmingly prevalent across Orakzai, with **98%** of respondents owning their homes. Lower tehsil exhibits the highest number of homeowners (208), followed by Central (95), Ismail Zai (47) and Upper (151). Such high ownership rates suggest economic stability, long-term residency, or cultural preferences for owning rather than renting or leasing.

In contrast, leasing and renting remain minimal, representing only **1%** and **2%** of the total housing, respectively. Lower tehsil, despite having the highest ownership, also shows the most rented

properties (7), indicating a small yet existent rental market. The negligible percentage of leased homes (4 in total) highlights a limited preference or necessity for leasing options in the region.

The dominance of homeownership across all towns suggests strong cultural and economic factors favoring permanent residence. The low incidence of rented or leased properties further emphasizes the community's inclination towards ownership, which could be attributed to generational inheritance, financial capability, or limited rental opportunities.

3.1.2.3 Housing Current Backlog

The housing demand and supply projections for District Orakzai in the year 2023 provide vital insights into the current status and future requirements for residential infrastructure. According to the demographic projections, the district's population is approximately 403,751 by 2023. Correspondingly, the estimated housing demand calculated based on projected household sizes stands at 52,373 housing units.

Comparatively, the available housing stock for the same period is estimated at 52,104 units. This suggests that the district's housing supply slightly exceeds the immediate demand, with a calculated housing backlog of 269 units. While this backlog is relatively modest, it nonetheless represents a critical gap that must be addressed to ensure adequate housing availability for all households.

The presence of a housing backlog, even if limited, indicates that a portion of the population may be living in overcrowded, inadequate, or informal housing conditions. This gap highlights the need for targeted interventions to bridge the shortfall, improve housing quality, and prevent the emergence or expansion of substandard settlements. Although the housing backlog projected for 2025 is relatively small at 288 units, proactive planning and policy measures are required to maintain equilibrium between housing demand and supply. Integrating housing considerations into the broader land use plan will support the district's goal of sustainable urban and rural development, ensuring that all residents have access to safe, adequate, and affordable shelter.

Housing Stock (Units from Census)

Table 3-4 Current Housing Backlog

Year	Population	Housing Demand (Units)	Available Housing Stock	Housing Backlog
2023	387561	52373	52104	269

3.1.2.4 Plan Period Requirement

Demographic projections for Orakzai District indicate substantial population growth over the next two decades, rising from approximately 403,751 in 2025 to 597,233 by 2045. This growth will create significant challenges and opportunities for planners and policymakers in managing residential development sustainably.

Housing demand, based on projected population and average household size, is expected to increase from 54,561 units in 2025 to 80,707 units by 2045. These figures reflect not only population growth but also changing household patterns that add pressure to the housing stock.

Housing stock projections, which include existing units and anticipated new construction, are expected to grow from 54,849 units in 2025 to 91,646 units in 2045. Despite this increase, supply will lag behind demand, resulting in a progressively widening housing backlog:

- **2025:** A relatively minimal backlog of 2457 units suggests near equilibrium between supply and demand in the short term.
- **2030:** The demand escalates sharply to 8,226 units, signaling emerging shortages that may start to impact affordability and living conditions.
- **2035:** With a demand of 14,465 units, the deficit becomes critical, risking increased informal settlements and housing insecurity.
- **2040:** The demand reaches 21,335 units, posing substantial challenges to infrastructure, services, and social cohesion.
- **2045:** At 28,603 units, the backlog represents a significant housing crisis demanding urgent, large-scale interventions.

Table 3-5 Housing Projection

Year	Population	Housing Demand (Units)	Additional Housing Demand
2025	403750	54561	2457
2030	446441	60330	8226
2035	492614	66569	14465
2040	542712	73339	21235
2045	597233	80707	28603

This growing backlog highlights the need for a comprehensive, forward-looking housing and land use strategy. Addressing this gap will require proactive policies, strategic investments, and collaboration across sectors to ensure equitable socio-economic growth and sustainable development.

3.1.2.5 Housing Affordability and Adequacy Relative to Income Level

Housing is a basic human necessity and a critical component of socio-economic well-being. According to the World Health Organization (WHO), housing includes not only the physical shelter but also all necessary services, facilities, and environmental conditions required for the physical and mental health of a family. Globally, housing is considered affordable if a basic housing unit providing a minimum personal space of 250–500 square feet and essential amenities is accessible at 20–40 percent of gross monthly household income, either for rent or mortgage.[40]

Affordability also refers to the adequacy and habitability of a dwelling. A house cannot be considered affordable if it is overcrowded, unhealthy, or lacks essential services such as water, electricity, gas, and sanitation. Therefore, in addition to financial factors, the assessment of affordability also considers the adequacy of physical and social infrastructure.[41]

[40] A framework for affordable housing in Pakistan, International Growth Center, 2019
[41] What is affordable Housing? Habitat for Humanity.

According to the Household Information Survey (HIS 2024) conducted in District Orakzai, only 2 percent of households live in rented houses, with monthly rents ranging between Rs 3,000 and Rs 15,000, and an average rent of Rs 7,000 per month. The average household income in the district is Rs 31,000 per month. On average, around 23 percent of monthly income is spent on rent, which, as per international standards, falls within the affordable range.

Furthermore, 98 percent of houses in the district are owner-occupied, indicating strong ownership patterns that reduce financial stress on households. Therefore, the affordability of housing in Orakzai was analyzed primarily in terms of adequacy, using physical indicators such as structure type, covered area, number of rooms, bathrooms, and construction period. The average household size across the district is 7.4 persons.

Table 3-6: Physical Criteria for Affordable Housing (District Orakzai)

Structure of House (Pacca)	Avg. Covered Area (Marla)	Avg. Rooms per House	Avg. Bathrooms per House	Avg. Kitchens per House	Avg. Persons per Room	Period of Construction (11–50 Years)
38 %	10	4	1.2	0.7	3	49 %

Source: (HIS) District Orakzai, 2024[42]

Analysis of the above data indicates that more than one-third (38 %) of the housing units in District Orakzai have Pacca (permanent) structures, while the remaining units are semi-permanent or Katcha. The average house size is 10 Marla (2,720 sqft.), providing about 368 sqft. of personal space per person, which lies within the internationally accepted range for affordable housing. Each house has, on average, four rooms and 1–2 bathrooms, with three persons sharing a room, which meets the standard for healthy occupancy. Nearly half of the houses (49 %) were constructed within the last 11–50 years, indicating a relatively stable but aging housing stock that may require periodic maintenance or upgrades.

Table 3-7: Availability of Basic Facilities (District Orakzai)

Potable Water	Electricity	Gas	Sanitation
40 %	64 %	1 %	50 %

Source: (HIS) District Orakzai, 2024[43]

Analysis of the above table shows that less than half of the households have access to potable water, and around 64 percent have access to electricity. However, only 1 percent of households have access to gas (LPG or natural), indicating heavy reliance on traditional fuels such as wood or coal. Sanitation facilities are available to approximately half of the population, suggesting that the remaining households depend on open disposal practices.

These findings demonstrate that while financial affordability is generally adequate due to high ownership levels, housing adequacy and access to basic facilities remain key challenges in District Orakzai. Addressing these deficiencies through infrastructure improvement and service provision will

[42] Calculated from the Household Survey conducted by the Consultant in 2024
[43] Calculated from the Household Survey conducted by the Consultant in 2024

be crucial for enhancing overall living standards and ensuring sustainable housing development across the district.

3.1.3 Constraints and Recommendations for Housing in Kurram District

3.1.3.1 Constraints

Limited Housing Stock: The existing housing stock in District is inadequate to meet the growing population's needs. The current projections indicate a significant shortfall, with a discrepancy of the estimated housing demand and available supply.

Prevalence of Katcha Housing: A substantial portion of the housing stock consists of Katcha units, which are often constructed with temporary materials and lack durability. As of 2017, approximately 76.36% of housing units were classified as Katcha, reflecting ongoing challenges in improving housing quality.

Economic Barriers: Many residents, especially those from low- and middle-income backgrounds, face financial constraints that prevent them from accessing adequate housing. High construction costs, coupled with limited access to financing options, exacerbate the housing deficit.

Land Tenure Issues: The complex land tenure system in Kurram, characterized by tribal ownership and customary laws, poses significant challenges to land acquisition for housing development. This complexity often leads to delays in project implementation and limits the availability of land for new housing initiatives.

Lack of Public and Private Investment: There is a notable absence of organized public and private housing schemes in the district. This lack of investment hampers the development of new housing projects and contributes to the ongoing shortfall.

Inadequate Infrastructure: Insufficient infrastructure, including roads, utilities, and sanitation facilities, further complicates housing development efforts. Many areas lack essential services that are critical for sustainable living conditions.

Weak Policy Implementation: Existing national and provincial housing policies have faced challenges in effective implementation due to gaps in coordination among various governmental levels and insufficient monitoring mechanisms.

3.1.3.2 Recommendations

Increase Housing Stock: Develop targeted programs aimed at significantly increasing the housing stock through public-private partnerships (PPPs). This could involve incentivizing private developers to invest in affordable housing projects tailored to low- and middle-income families.

Focus on Durable Construction: Promote the construction of Pakka and Semi-Pakka houses by providing subsidies or financial incentives to builders and homeowners. This will help transition residents from Katcha structures to more durable housing options.

Enhance Access to Financing: Establish innovative financing mechanisms such as microcredit schemes or low-interest loans specifically designed for low-income households to facilitate home ownership and construction.

Streamline Land Acquisition Processes: Simplify land acquisition procedures by establishing clear guidelines for land use that respect tribal customs while enabling efficient access to land for development purposes.

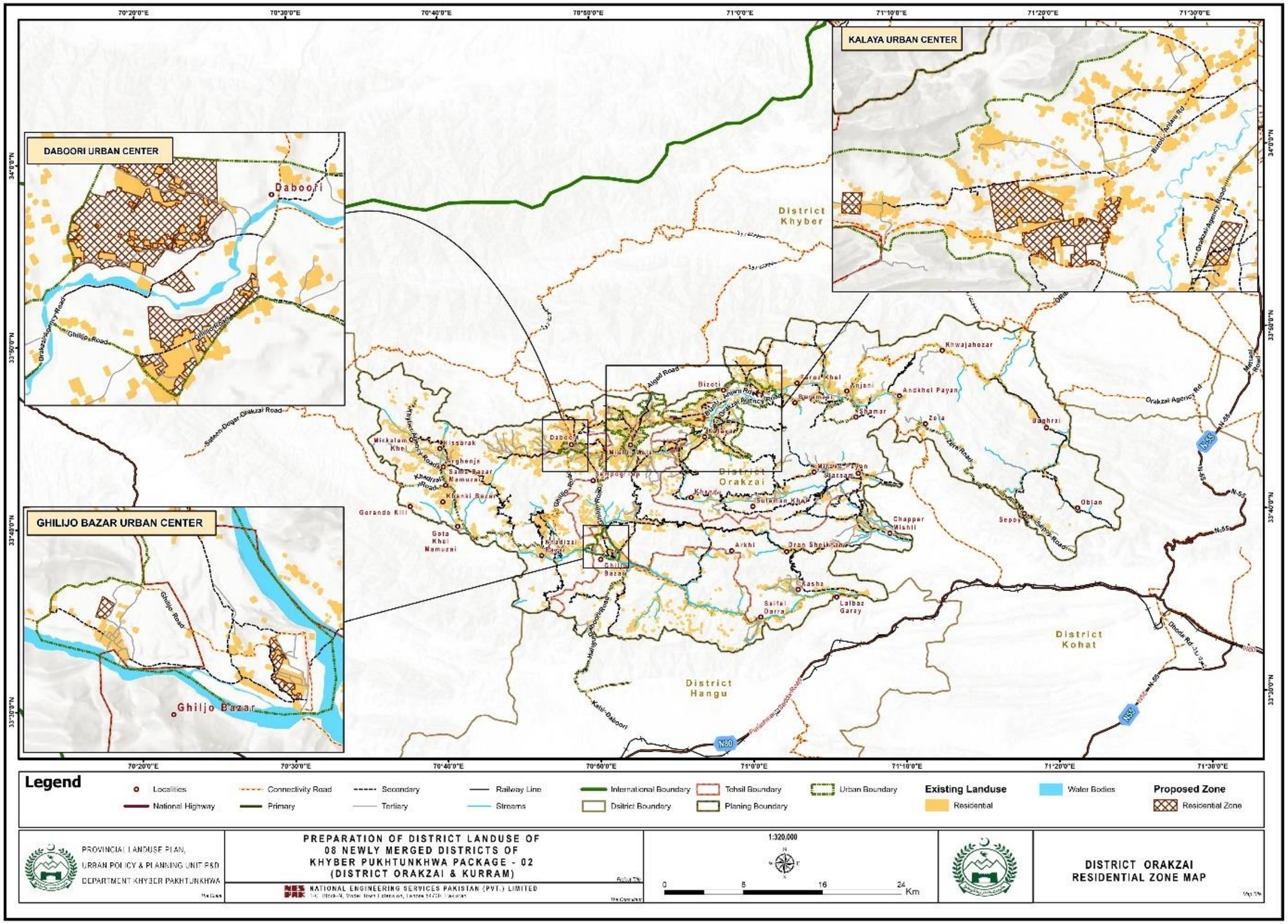
Invest in Infrastructure Development: Prioritize infrastructure improvements in conjunction with housing projects to ensure that new developments are equipped with necessary utilities and services, promoting sustainable living conditions.

Strengthen Policy Implementation: Improve coordination among federal, provincial, and local governments to enhance the implementation of existing housing policies. Establish a robust monitoring framework to track progress and make necessary adjustments based on real-time data.

Community Engagement: Involve local communities in the planning process for new housing developments to ensure that projects align with residents' needs and preferences. This engagement can foster a sense of ownership and responsibility toward new developments.

Regular Review of Policies: Conduct periodic reviews of national and provincial housing policies to ensure they remain relevant and effective in addressing current challenges in the housing sector. Focus on setting measurable targets and improving regulatory frameworks.

By addressing these constraints through targeted recommendations, Kurram District can work towards alleviating its housing deficit, improving living conditions for its residents, and fostering sustainable community development over the long term.

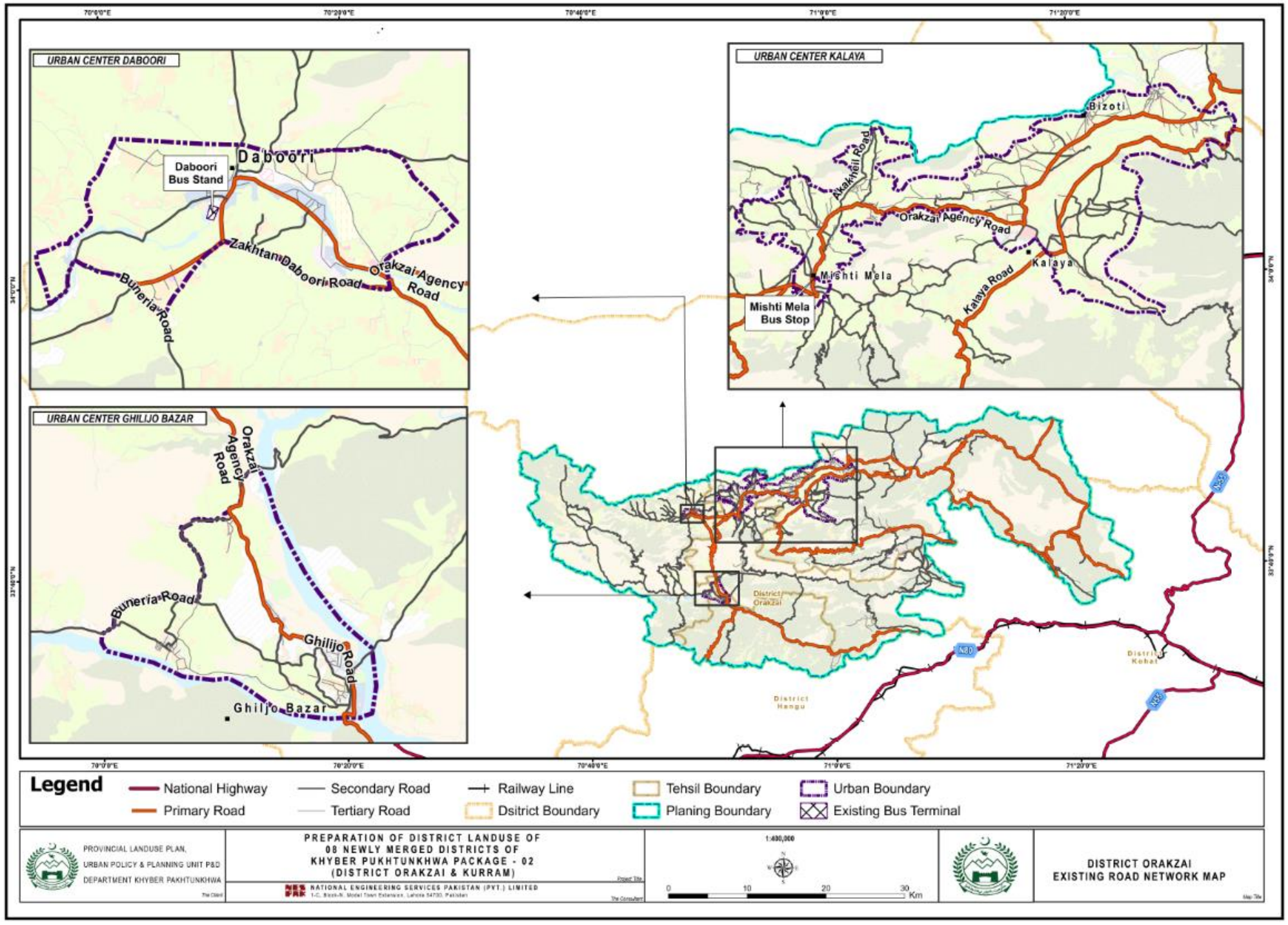


Map 3-1 Proposed Residential Zones

3.2 Communication

3.2.1 Major Road Network of Orakzai

Orakzai, a region in Pakistan's tribal areas, is known for its rugged terrain and scenic beauty. The region's road network plays a critical role in connecting its people, facilitating trade, and ensuring access to essential services. Below is an overview of the major roads in Orakzai: The hierarchy of roads in Orakzai District are given in following Map 3-2.



Map 3-2 The Hierarchy of Roads in Orakzai

Table 3-8 District Orakzai Existing Road Network

Sr No.	Name	Type	Length (km)	Start_XY	End_XY	Starting Point	Ending Point	Existing ROW (m)	Condistion
1	Sepoy Road	Primary Road	4.11	33.6454867028,71.3083414262	33.677135686,71.293292721	Paloosi	UTI	4	Fair
2	Handgu Daboori Road	Primary Road	24.08	33.6253028209,70.864377441	33.5123604365,70.8181772684	Ghiljo Road	Chanri banda	7	Fair with potholes
3	Orakzai Agency Road	Primary Road	213.39	33.594090814,71.110331686	33.802528424,71.246270111	Zeera	Ghiljo	6	Under-Construction
4	Zakhtan Daboori Road	Primary Road	1.89	33.7307168,70.7993138	33.730167056,70.817921911	Zakhtan	Daboori	4	Poor
5	Dam Road	Primary Road	5.86	33.5123604365,70.8181772684	33.4776690879,70.8621985254	Hangu Daboori Road	Kahi	5.5	Fair
6	Handgu Samana Road	Primary Road	4.73	33.5123604365,70.8181772684	33.5194350753,70.8675120209	Chanri Banda	Bilyamina	12	Fair
7	Kohat Road	Primary Road	18.58	33.670385529,71.354248798	33.6771712,71.2932872	Bosti Khel	Paloosi	6	Fair with potholes
8	Zera Road	Primary Road	17.52	33.6677289,71.2980833	33.74507175,71.184575523	Zeera	Paloosi	9	Fair
9	Orakzai Bara Road	Primary Road	18.26	33.7911351,71.2689253	33.815486834,71.184725354	Baghrai	Bara	6	Good
10	Kalaya Road	Primary Road	5.22	33.7196185214,70.9282516296	33.7472018746,70.9651852591	Pertangi	Kalaya	8	Fair
11	Ghilijo Road	Primary Road	14.36	33.5903024,70.9312061	33.655350713,70.837435564	Ghiljo	Moosa Mela	6.5	fair

12	Akakheil Road	Secondary Road	3.52	33.7824395554,70.8942217777	33.7570011767,70.8816620226	Akakheil	Tirah	4.5-5	Poor
13	Khyber Agency Road	Secondary Road	12.96	33.703028,70.6697595	33.7921032481,70.6356654222	Mamuzai	Tirah	4	Fair
14	Buneria Road	Secondary Road	27.83	33.6452355,70.7965435	33.732143173,70.795081526	Daboori	Ghiljo	6.5-7.5	Poor
15	Khadizai Road	Secondary Road	9.24	33.6452355,70.7965435	33.6552711084,70.7280143976	Teri Kally	Barlas	5.5	Fair
16	Kurram Agency Road	Secondary Road	17.47	33.6552711084,70.7280143976	33.7044926388,70.6165771003	Khanki	Barlas	6.5	Fair

1. Hangu-Daboori Road

The Hangu–Daboori Road is a secondary inter-district connector that serves as a vital link between southern Orakzai and the neighboring district of Hangu. It plays a key role in facilitating the movement of goods, passengers, and public services, providing access to markets, schools, and healthcare facilities. This two-lane (1+1) road supports moderate traffic volumes, primarily consisting of passenger vehicles, small trucks, and local buses. Due to its mountainous alignment, it features moderate curves and occasional steep gradients, with typical travel speeds ranging between 30–45 km/h. Strategically, the road forms part of Orakzai's connection to the wider provincial road network, supporting both economic activity and regional accessibility.

2. Ghiljio Road

Ghiljio Road is an essential tertiary road that connects key villages across central and upper parts of Orakzai, supporting local commerce, access to markets, and daily travel needs. It also serves as a diversion route when primary roads are congested or blocked. The road features narrow lanes and sharp bends, typical of hilly rural roads, limiting speeds to around 20–30 km/h. Traffic is generally low to moderate, dominated by motorcycles, small vehicles, and local transport, making this route important for community-level connectivity rather than regional movement.

3. Khyber Agency Road

This road acts as a secondary inter-agency corridor, linking Orakzai with the neighboring Khyber Agency to the north. It plays a significant role in facilitating trade, cultural interaction, and movement of goods and people between the two districts. The road's alignment includes uneven surfaces, steep gradients, and sharp curves, which reduce travel speeds to around 25–45 km/h. It supports a mix of light and heavy vehicles, including inter-agency convoys, and is vital for economic and administrative connectivity with areas such as Bara and Jamrud.

4. Kurram Agency Road

The Kurram Agency Road is a secondary road connecting western Orakzai to Kurram, serving as a major inter-regional trade and travel corridor. It enables the movement of goods, services, and people between Orakzai and Parachinar, and supports access to cross-agency facilities and markets. The road is slightly better paved than others in the region but still affected by hilly terrain, limiting speeds to 25–35 km/h. It experiences relatively higher traffic volumes, especially goods transport and administrative vehicles.

5. Orakzai Agency Road

This is the main internal secondary road and forms the backbone of Orakzai's intra-district connectivity. It links Upper, Central, and Lower Orakzai, facilitating the daily flow of goods, services, and people across zones 1, 2, and 3. The road is essential for local economic activity, administrative coordination, and connecting major settlements. It has a mix of paved and semi-paved sections, with moderate curves and varied terrain that constrain speeds to 25–35 km/h. Traffic includes motorcycles, cars, pickups, and light cargo vehicles, serving both personal and small-scale commercial mobility.

6. Kalaya Road

Kalaya Road is named after Kalaya, the administrative headquarters of Orakzai. Kalaya Road is a secondary road connecting the district headquarters with surrounding settlements and services. Its smoother surface and fewer bends allow slightly better speeds of 35–45 km/h. This road plays a central role in linking the administrative and economic hubs of the region with

smaller settlements. It supports the delivery of government services and serves as a primary route for accessing administrative facilities. Kalaya Road is relatively well-maintained compared to other roads in the region, with smoother gradients and fewer sharp bends. This road handles significant traffic, connecting administrative offices, markets, and local settlements.

3.2.1.1 Public transport in Orakzai District

Currently, Orakzai District lacks a properly planned intra-city public transport system. In the absence of formal services, residents are compelled to rely on private vehicles or those operated by individual drivers. Due to the district's rugged topography, pickup and jeeps are commonly used, particularly for accessing remote or mountainous villages. These vehicles, valued for their durability on unpaved terrain, frequently function as informal shared taxis. In more accessible urban and semi-urban areas, motorcycles, cars, and local taxis serve as convenient and affordable options for short-distance travel, particularly for navigating narrow streets and providing last-mile connectivity.

For inter-city movement, shared vans and minibuses constitute the most widely used public transport modes. These vehicles operate on fixed routes, linking major settlements of Orakzai to neighboring districts such as Kohat, Hangu, and Parachinar. Despite infrastructural limitations, these services play a vital role in ensuring regional mobility and socio-economic connectivity.

However, these inter-city transport services face multiple operational challenges. Overcrowding is common, especially during peak hours, due to the limited fleet size, resulting in discomfort and safety risks for passengers. Additionally, inadequate maintenance of vehicles contributes to frequent breakdowns and reduced service reliability. Adverse weather conditions, such as heavy rainfall or snowfall during certain months, further constrain the efficiency and availability of transport services, particularly in high-altitude or less accessible areas of the district.

3.2.1.1.1 Railways

Currently, there is no railway network serving Orakzai City, which limits the region's integration with Pakistan's broader rail infrastructure. This absence of railways significantly impacts the efficient movement of goods and passengers over long distances, emphasizing the reliance on road-based transportation.

3.2.1.1.2 Airport:

Orakzai lacks an airport, requiring residents to travel to nearby cities like Peshawar for air travel. This lack of direct air connectivity poses challenges for regional economic growth and the efficient movement of people, especially for emergencies or long-distance travel.

3.2.1.1.3 Traffic Management in Orakzai District

Traffic management in Orakzai District faces challenges primarily due to the lack of formal systems and limited infrastructure. The absence of traffic signals, road markings, and pedestrian crossings leads to disorganized movement, particularly at major intersections. Roads are often narrow and poorly maintained, limiting the efficient movement of vehicles, especially as the region develops. The traffic composition is varied, with a mix of shared vans, jeeps, motorcycles, and rickshaws, which are often not segregated, creating safety concerns. Additionally, the presence of encroachments along roadsides reduces available space, while inadequate parking facilities in key areas further complicate the situation. Minimal traffic law enforcement and a lack of public awareness about road safety and traffic regulations contribute to unsafe driving practices. Addressing these issues requires infrastructure improvements, better law enforcement, and public education to improve road safety and traffic management.

3.2.2 Traffic and Transportation Surveys

Different transport related surveys were conducted on important locations of the city. Various transportation surveys were carried out to explore the constraints and opportunities for future planning. A separate questionnaire was designed for all these city surveys to cover maximum information for future city land-use plan. The main surveys included:

1. Manual Classified Count (MCC) Surveys at critical intersection
2. Manual Classified Count (MCC) surveys at Cordon points
3. Origin-Destination Survey at Cordon Point

3.2.2.1 Manual Classified Traffic Count Survey

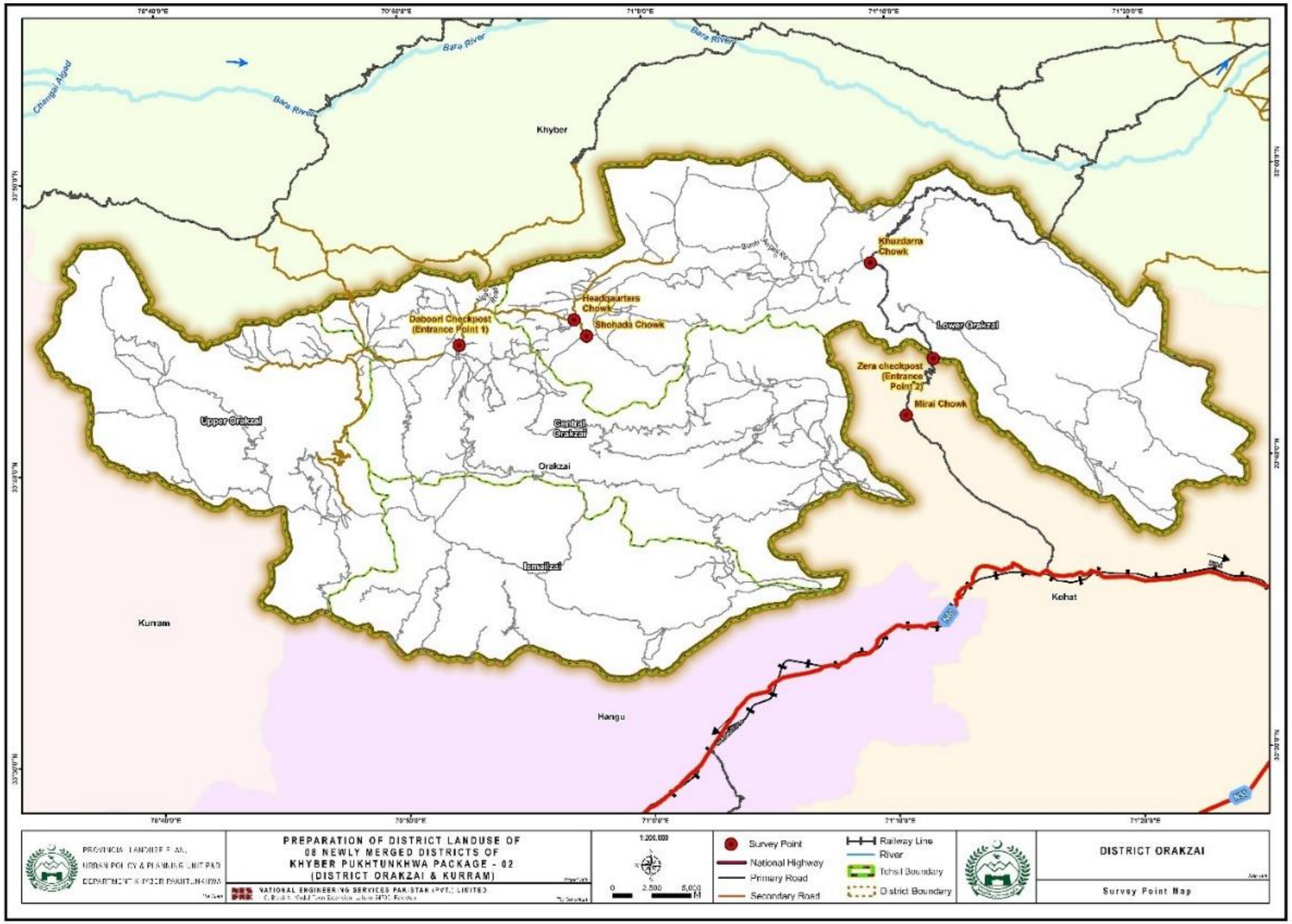
In order to assess the volume and composition of traffic loads on the major road network of the city, traffic count surveys were conducted by using the Manual classified traffic Count (MCC) method at all important intersections for at least 24 hours. These counts were undertaken on normal working days as well as off days and represented the various daily peak hours. For MCC surveys, the surveyors were trained before deployment to the survey site. The supervisors monitored the survey activity by being present on the site to restrict intentional and unintentional human errors and to maintain the quality and reliability of the data.

It was ensured by the supervisors that all surveys were conducted with high standards of quality control while at the same time, giving due importance to the safety and security of surveyors. The MCC survey forms filled at the site were brought to the office where the enumerators manually entered traffic count data into computer spreadsheets. The data was then processed and brought in usable form. Specialized traffic survey counting forms were used by the surveyors to record the traffic data. All the traffic surveyors were trained prior to the start of work, and the work was supervised on-site by experienced staff.

The classified counts covered all the possible vehicle categories plying on the project road. A Manual Classified Count survey was conducted at 4 major intersections and 2 Cordon Points within the city in order to analyze the present condition of traffic. The schedule of MCC survey of Intersection is given in shows the locations of intersections where MCC surveys were performed.

Table 3-9 Details of Intersections MCC surveys

Sr. No	Junction Name	Roads Intersecting	Date	Day	Survey Method	Survey Duration
1	Headquarter Chowk	Orakzai-Agency Road & Kalaya Headquarters Road	21/08/24	Wednesday	Manual Classified Count	24 hours
2	Mirai Chowk	Orakzai Agency Road & Zera Check post Road	22/08/24	Thursday	Manual Classified Count	24 hours
3	Khuzdara Chowk	Orakzai Agency Road & Peshawar-Orakzai-Agency Road	22/08/24	Thursday	Manual Classified Count	24 hours
4	Shohada Chowk	Kalaya Road & Kalaya Headquarter Road	21/08/24	Wednesday	Manual Classified Count	24 hours



Map 3-3 Intersections' MCC locations

3.2.2.2 Traffic Split

The purpose of carrying out mode-wise (classified) traffic counts is to know the proportion of each mode in the traffic mix. This information helps in segregating heavy and light vehicles to incorporate the effect of vehicles on pavement in the proposed design. Traffic split also helps in converting different vehicle categories into passenger car equivalent units (PCUs). The categories surveyed in traffic counts and the PCU factors used in this report are given in Table 3-10.

Table 3-10 Traffic categories recorded PCUs conversion factor

Sr. No	Vehicle Category	PCU factor
1	Animal Driven Cart	3
2	Bicycle	0.25
3	Motorcycle / Scooter	0.5
4	Rickshaw / Qingqi	0.75
5	Car / Suzuki Pickup / Jeep	1
6	Hiace Wagon	1.5
7	Medium Bus / Flying Coach	2
8	Bus	3
9	Loader Pickup	1.5
10	2-Axle Truck	2
11	3-Axle Truck	3
12	4-Axle Truck	4
13	5-Axle Truck or Above	4
14	Tractor Trolley	3

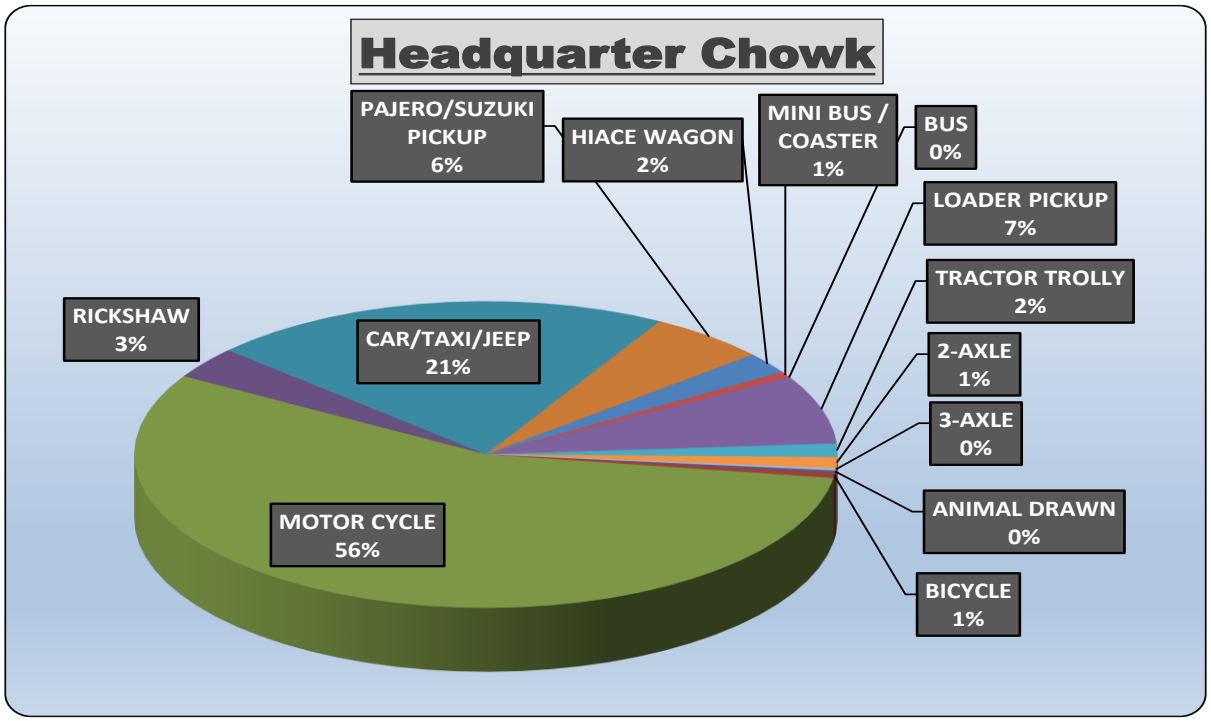
3.2.2.3 Headquarter Chowk

At this intersection, a 1-day, 24-hour directional MCC (Manual Classified Count) was conducted. It is a four-legged, un-signalized intersection, with one leg currently closed. Orakzai Agency Road intersects with Kalaya Headquarter Road. The Kalaya Headquarters, the Assistant Commissioner's office, and other significant government offices are located near this intersection. Below map shows the satellite image of the intersection along with the orientation of intersecting roads.



Map 3-4 : Satellite image and orientation of Headquarter Chowk

Following Graph 3-1 shows the average traffic split on the intersection whereas a summary of the traffic count is shown ADT in all directions of the intersection.



Graph 3-1 Average traffic split at Headquarter Chowk

Table 3-11 ADT on Headquarter Chowk

DIRECTIONS		TOTAL TRAFFIC
FROM	TO	
Zera	Kalaya	947
	Mishti Mela	857
Kalaya	Zera	857
	Mishti Mela	357
Mishti Mela	Zera	743
	Kalaya	421
TOTAL		4182

A summary of traffic results is given in Table 3-123.11

Table 3-12 Traffic summary and LOS for Headquarter Chowk

Headquarter Chowk	
ADT 2024	4,182
Peak Hour 2024	498
Peak Hour Time	15:00-16:00
LOS 2024	A
Peak Hour 2030	599
LOS 2030	A
Peak Hour 2040	767
LOS 2040	A

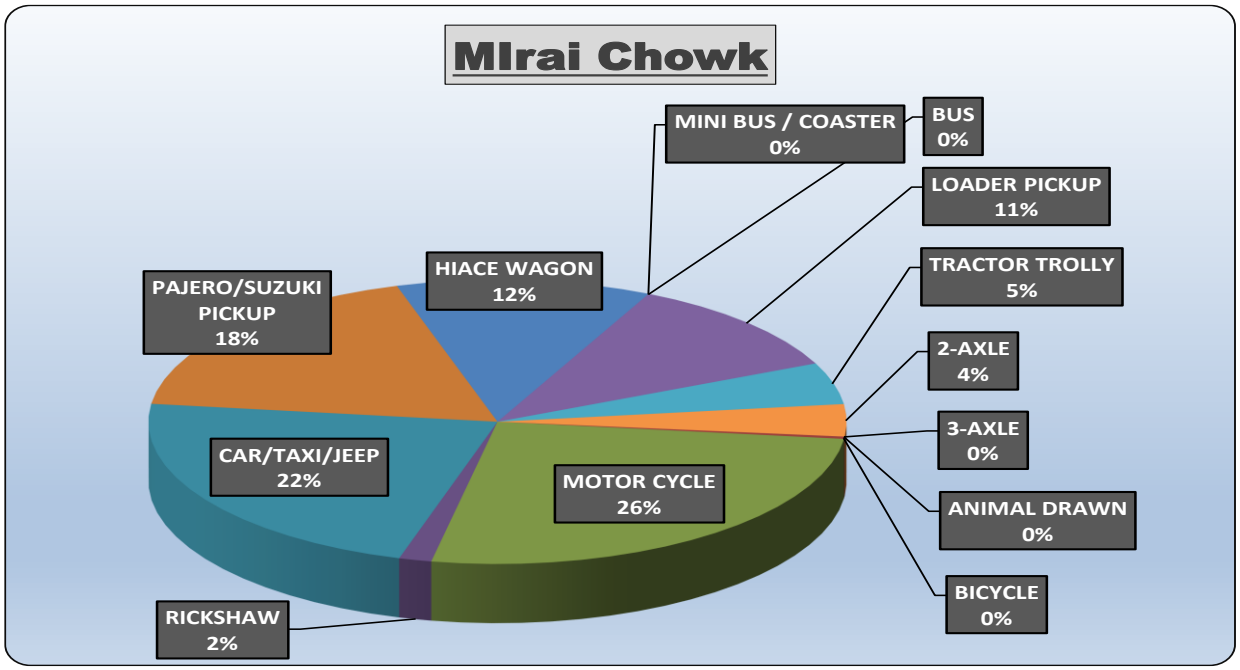
3.2.2.4 Mirai Chowk

At this intersection, a 1-day, 24-hour directional MCC (Manual Classified Count) was conducted. It is a three-legged, un-signalized intersection where Orakzai Agency Road intersects with Zera Check Post Road. The Zera Check Post, serving as an entrance to the Orakzai Agency, is located near this intersection. Map 3.4 shows the satellite image of the intersection along with the orientation of intersecting roads.



Map 3-5 Satellite image and orientation of Mirai Chowk

Following Graph 3-2 shows average traffic split on the intersection table 3.12 shows ADT in all directions of the intersection.



Graph 3-2 Average traffic split at Mirai Chowk

Table 3-13 ADT on Mirai Chowk

DIRECTIONS		TOTAL TRAFFIC
FROM	TO	
Kohat	Zera	665
	Korez	635
Zera	Kohat	515
	Korez	257
Korez	Zera	232
	Kohat	896
TOTAL		3200

A summary of the results is given in table 3.13

Table 3-14: Traffic summary and LOS for Mirai Chowk

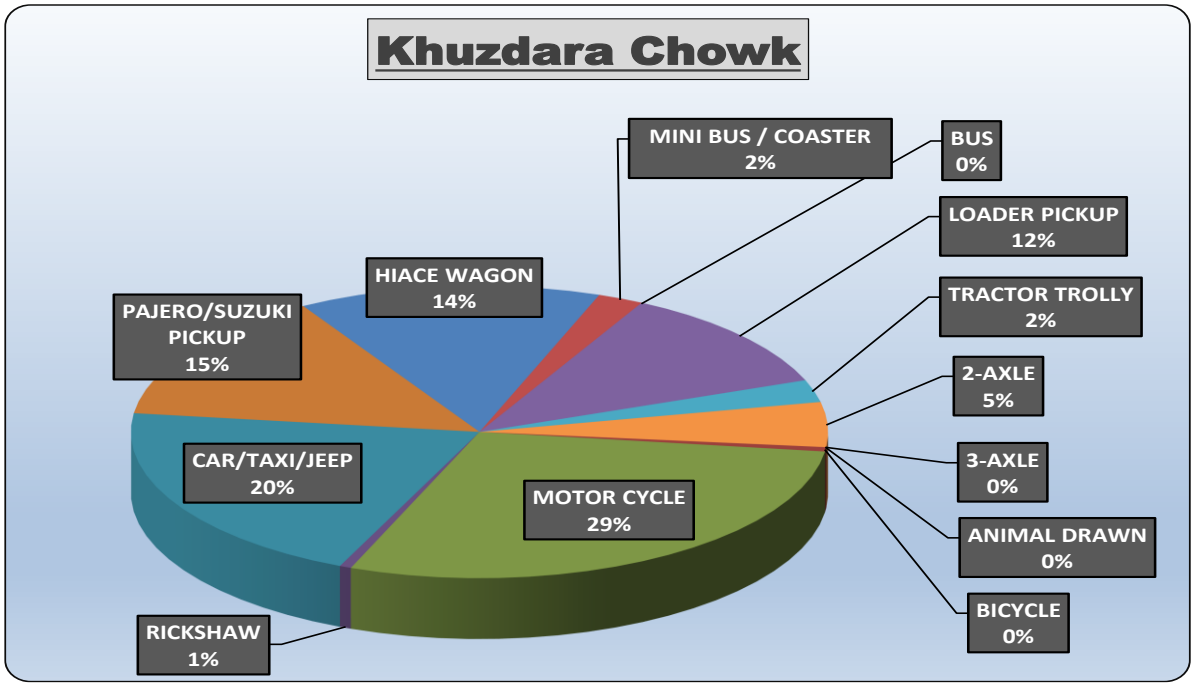
Mirai Chowk	
ADT 2024	3,200
Peak Hour 2024	559
Peak Hour Time	09:00-10:00
LOS 2024	A
Peak Hour 2030	641
LOS 2030	A
Peak Hour 2040	772
LOS 2040	A

3.2.2.5 Khuzdara Chowk

At this intersection, a 1-day, 24-hour directional MCC (Manual Classified Count) was conducted. It is a three-legged, un-signalized intersection where Orakzai Agency Road intersects with Peshawar-Orakzai Agency Road. The Peshawar-Orakzai Agency Road serves as a vital connection between Orakzai and Bara. Map 3.5 shows the satellite image of the intersection along with the orientation of intersecting roads.



Map 3-6 Satellite image and orientation of Khuzdara ChowkThe following Graph 3-3 shows the average traffic split at the intersection with a summary of traffic and Table 3.14 shows ADT in all directions of the intersection.



Graph 3-3 Average traffic split at Khuzdara Chowk

Table 3-15 ADT on Khuzdara Chowk

DIRECTIONS		TOTAL TRAFFIC
FROM	TO	
Zera	Kalaya	526
	Bara	205
Bara	Zera	102
	Kalaya	479
Kalaya	Zera	969
	Bara	348
TOTAL		2629

Table 3-16 Traffic summary and LOS for Khuzdara Chowk

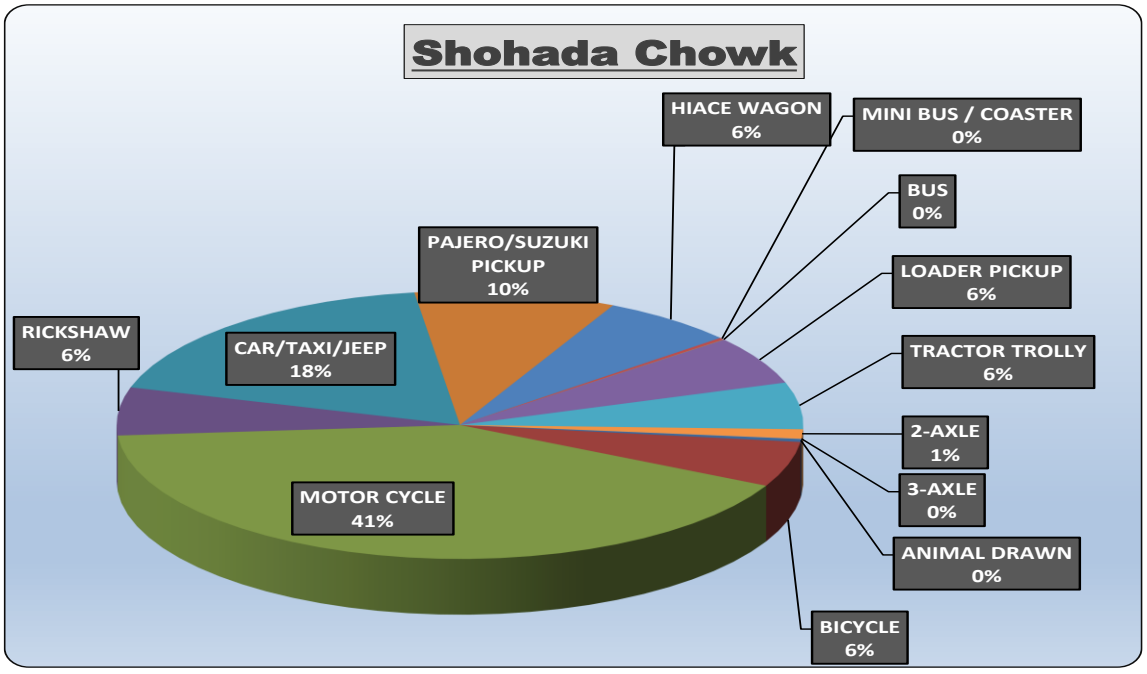
Khuzdara Chowk	
ADT 2024	2,629
Peak Hour 2024	354
Peak Hour Time	13:00-14:00
LOS 2024	A
Peak Hour 2030	406
LOS 2030	A
Peak Hour 2040	491
LOS 2040	A

3.2.2.6 Shohada Chowk

At this intersection, a 1-day, 24-hour directional MCC (Manual Classified Count) was conducted. It is a three-legged, un-signalized intersection where Kalaya Road intersects with Kalaya Headquarters Road. Nearby landmarks include the District Office Akhuwat Orakzai, Kalaya Bazar, and Kalaya Headquarters. map 3.6 shows the satellite image of the intersection along with the orientation of intersecting roads.



Map 3-7 Satellite image and orientation of Shohada Chowk shows average traffic split on the intersection whereas a summary of traffic and table 3.14 shows ADT in all directions of the intersection.



Graph 3-4 Average traffic split at Shohada Chowk

Table 3-17 ADT on Shohada Chowk

DIRECTIONS		TOTAL TRAFFIC
FROM	TO	
Kalaya	Korez	890
	Headquarter Chowk	1120
Headquarter Chowk	Korez	402
	Kalaya	995
Korez	Kalaya	641
	Headquarter Chowk	529
TOTAL		4577

Table 3-18 Traffic summary and LOS for Shohada Chowk

Shohada Chowk	
ADT 2024	4,577
Peak Hour 2024	532
Peak Hour Time	15:00-16:00
LOS 2024	A
Peak Hour 2030	597
LOS 2030	A
Peak Hour 2040	749
LOS 2040	A

Classified directional traffic count results of all points are attached in Annexure-A. The average Daily Traffic of all intersections is attached in Annexure-B. Traffic Projections for all intersections are attached in Annexure-C, Summary of Results & Outcomes of Intersections:

Table 3-19 Summary of Results of Intersections

Intersection Name	Headquarter Chowk	Mirai Chowk	Khuzdara Chowk	Shohada Chowk
ADT 2024	4,182	3,200	2,629	4,577
Peak Hour 2024	498	559	354	532
Peak Hour Time	15:00-16:00	09:00-10:00	13:00-14:00	15:00-16:00
LOS 2024	A	A	A	A
Peak Hour 2030	599	641	406	597
LOS 2030	A	A	A	A
Peak Hour 2040	767	772	491	749
LOS 2040	A	A	A	A

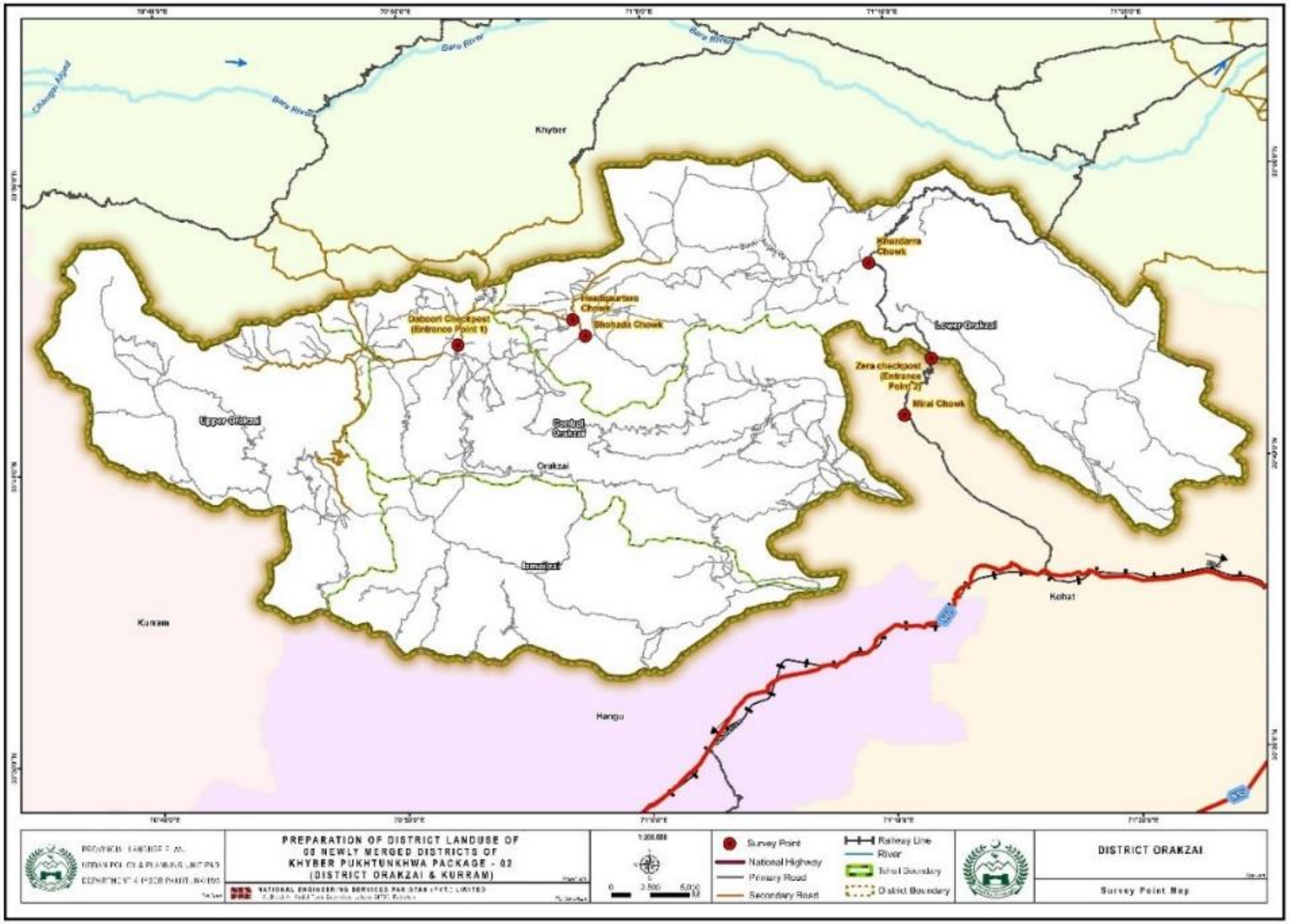
The intersection analysis for Headquarter, Mirai, Khuzdara, and Shohada Chowks shows that all four currently operate at Level of Service (LOS) A, with projected traffic volumes for 2030 and 2040 still maintaining optimal conditions. This indicates that the intersections have sufficient capacity for the near to medium future as compare to demand. However, modal share reveals

important trends that must guide mobility and land use planning. Motorcycles dominate across all intersections, especially at Headquarter Chowk (56%) and Khuzdara Chowk (29%), reflecting a heavy reliance on two-wheelers due to affordability and adaptability in local road conditions. Cars, jeeps, and pickups form the second major category, highlighting growing private and light commercial vehicle ownership. The near absence of public transport vehicles, buses and minibuses under 2%, signals a lack of structured mass transit, which poses long-term sustainability challenges as urban activity intensifies.

Given that intersections like Headquarter and Shohada Chowk have the highest traffic volumes, they likely function as key commercial or administrative points within Orakzai. As local population and vehicle ownership gradually increase, these intersections will become more critical in shaping daily mobility patterns. While current traffic conditions are smooth, planning should still consider basic improvements such as better pedestrian access, space for rickshaws and informal transport modes, and safer turning movements. Introducing small-scale public transport options and improving connectivity to nearby areas can help manage future growth. Aligning such mobility measures with surrounding land use, especially in developing commercial zones, will support safer and more efficient traffic conditions without requiring major infrastructure upgrades.

3.2.3 MCC Surveys at Cordon Points

Cordon line is a virtual boundary of the city marked to define the extent of the study area. Cordon Manual Classified Counts (MCC) and Origin-Destination (OD) interview surveys were carried out at all the entry and exit points of Orakzai District at the cordon line. These surveys developed an understanding of the traffic distribution and attractions within the district for the traffic coming into or moving out of the district boundaries. MCC and OD surveys were conducted on 2 no's Entry / Exit locations of Orakzai District as shown on map 3.7.



Map 3-8 Details of Cordon MCC and OD surveys

The following Table 3.19 shows the traffic survey schedule at both cordon points.

Table 3-20 Traffic survey schedule at cordon points

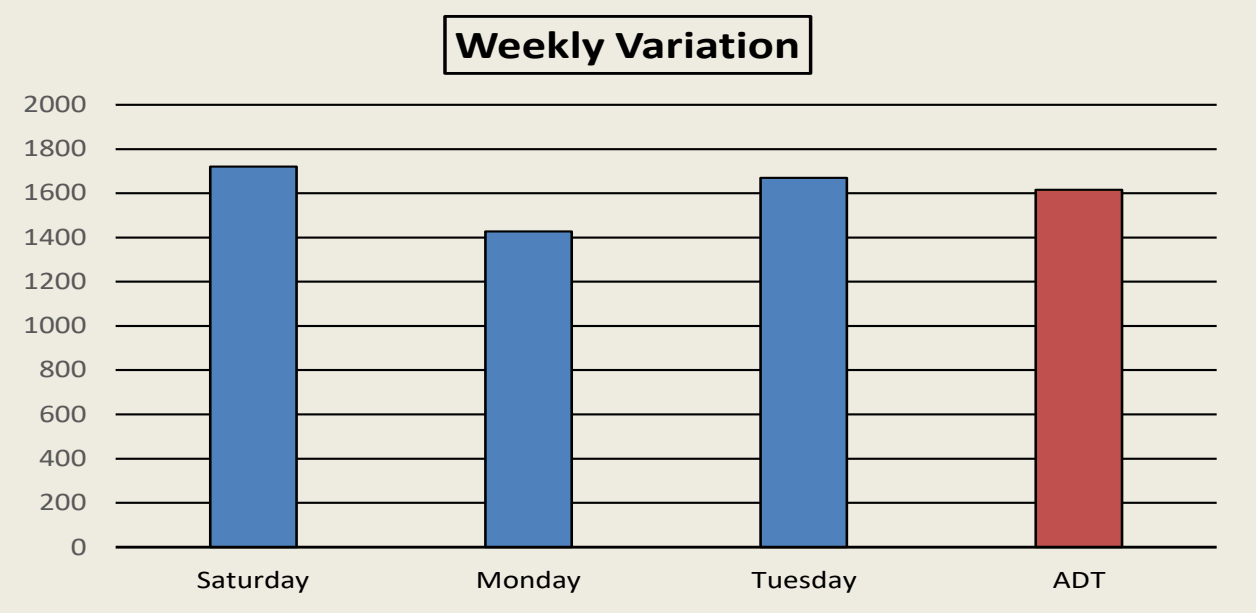
Sr. no.	Location code	Road Name	Location	Date	Day	MCC Duration	O&D Duration
1	C1	Orakzai Agency Road	Daboori Checkpost	17/08/2024	Saturday	24 hours	12 hours
				19/08/2024	Monday		
				20/08/2024	Tuesday		
2	C2	Zera Check post Road	Zera Check post	17/08/2024	Saturday	24 hours	12 hours
				19/08/2024	Monday		
				20/08/2024	Tuesday		

3.2.3.1 Daboori Checkpost

At Daboori Check post, 3-day, 24-hour directional MCC count was conducted on Saturday, Monday and Tuesday to obtain daily traffic variation factors of a normal week. These factors were then applied to other 1-day 24-hour intersection traffic counts of Orakzai to obtain ADT volumes. Classified directional traffic count results of all three days are shown in Table 3.20 and details are attached in Annexure-A.

Table 3-21 Traffic Volume at Daboori Check post for three days

Date/ Day	Directions		Traffic
	From	To	
17/08/2024	Kalaya	Daboori	883
Saturday	Daboori	Kalaya	838
	Total		1721
19/08/2024	Kalaya	Daboori	706
Monday	Daboori	Kalaya	721
	Total		1427
20/08/2024	Kalaya	Daboori	916
Tuesday	Daboori	Kalaya	754
	Total		1670
Adt	Kalaya	Daboori	847
	Daboori	Kalaya	769
	Total		1615



Graph 3-5 Weekly traffic variation at Daboori Check post cordon point

Based on these 3 days' Traffic counts, the Average Daily Traffic (ADT) of intersections has been computed by applying weekly variation.

Table 3.21 shows the multiplying factors thus obtained for each day of the week to be used for other 1-day Cordon MCC in Orakzai.

Table 3-22 ADT multiplying factors obtained from Daboori Check post

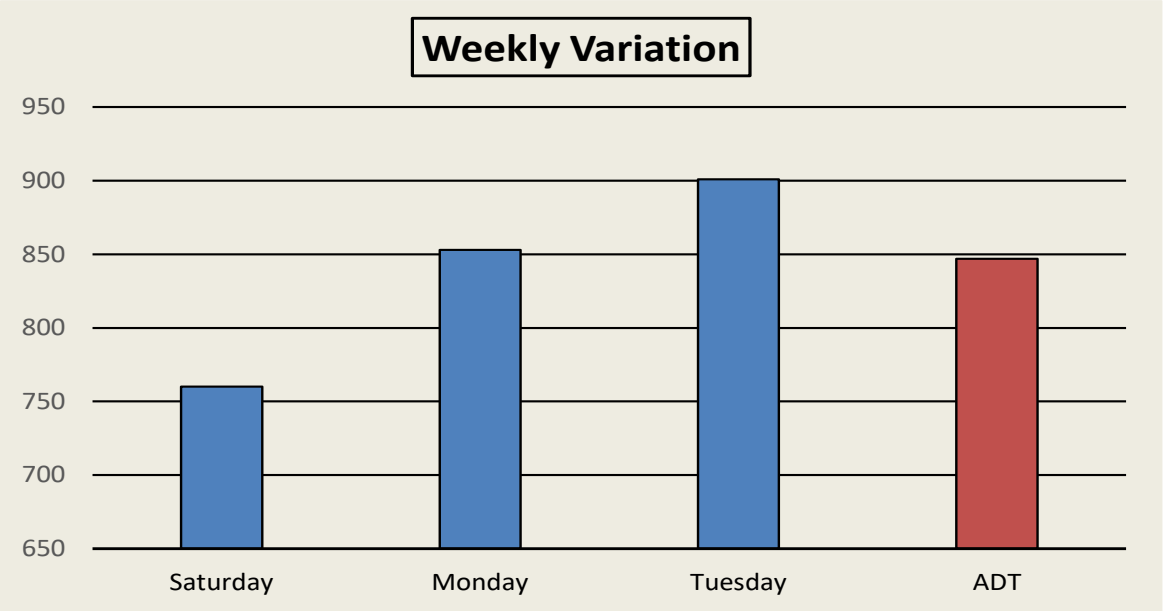
Day	Traffic variation Factor
Monday	0.884
Tuesday	1.034
Wednesday	1.034
Thursday	1.034
Friday	0.884
Saturday	1.066
Sunday	1.066

3.2.3.2 Zera Check Post

On Zera Check post, a 3-day, 24-hour directional MCC count was conducted on Saturday, Monday and Tuesday in order to obtain daily traffic variation factors of a normal week. Classified directional traffic count results of all three days are attached in Annexure-A.

Table 3-23 Traffic Volume at Zera Check post for three days

Date/ Day	Directions		Traffic
	From	To	
17/08/2024	Orakzai	Kohat	421
Saturday	Kohat	Orakzai	339
	Total		760
19/08/2024	Orakzai	Kohat	442
Monday	Kohat	Orakzai	411
	Total		853
20/08/2024	Orakzai	Kohat	429
Tuesday	Kohat	Orakzai	472
	Total		901
Adt	Orakzai	Kohat	430
	Kohat	Orakzai	417
	Total		847



Graph 3-6 Weekly traffic variation at Zera Check post cordon point

Based on these 3 days' Traffic counts, the Average Daily Traffic (ADT) of the cordon has been computed by applying weekly variation.

Table 3.23 shows the multiplying factors thus obtained for each day of the week at Cordon MCC in Orakzai.

Table 3-24 ADT multiplying factors obtained from Zera Check post

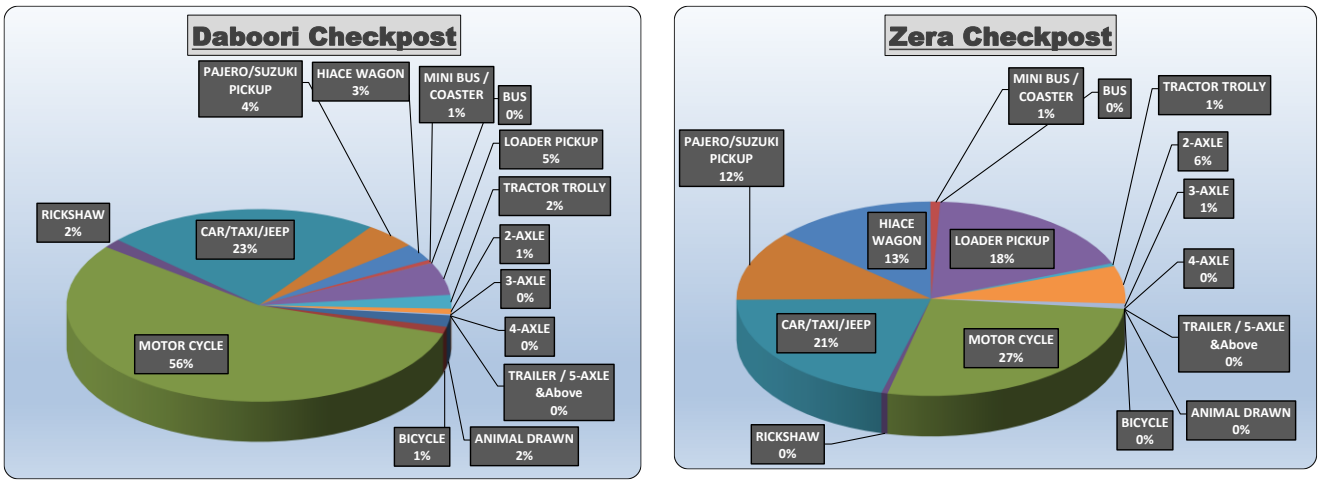
Day	Traffic Variation Factor
Monday	1.007
Tuesday	1.064
Wednesday	1.064
Thursday	1.064
Friday	1.007
Saturday	0.897
Sunday	0.897

Table 3-25 shows the ADT volumes on both entry and exit points at the cordon points of Orakzai. Classified directional traffic count results of both points are attached in Annexure-A. The average Daily Traffic of both points is attached in Annexure-B. Traffic Projections for Both Points are attached in Annexure-C

Table 3-25 Summary of ADTs of all Cordon points

Sr. No	Code	Road Name	Location	Direction	ADT
1	C1	Orakzai Agency Road	Daboori Checkpost	Kalaya to Daboori	847
				Daboori to Kalaya	769
				both directions (total)	**1615**
2	C2	Zera Check post Road	Zeera Checkpost	Orakzai to Kohat	430
				Kohat to Orakzai	417
				both directions (total)	**847**

The following Graph 3-7 shows the modal split of sample locations of cordon points C1 and C2 respectively.



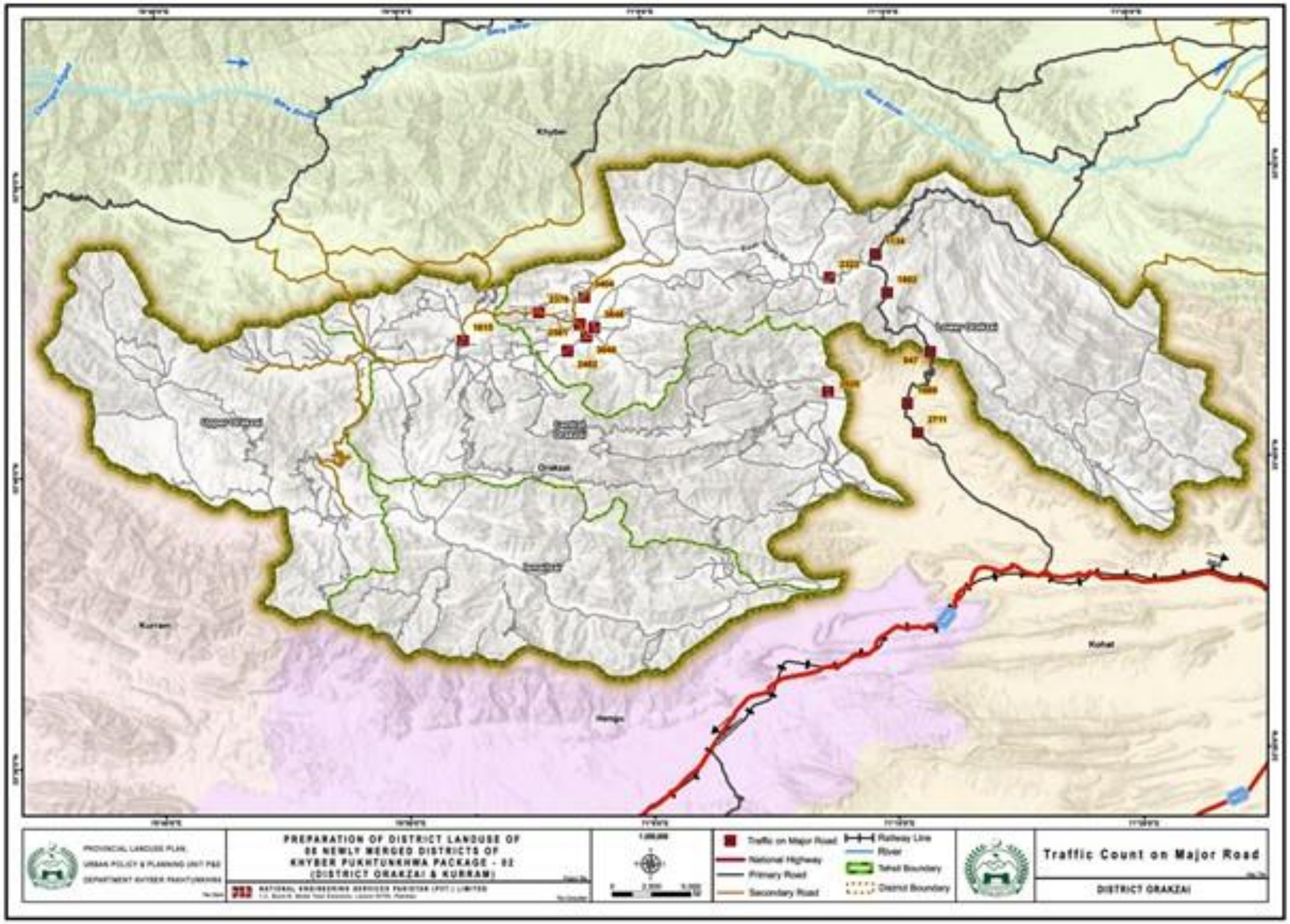
Graph 3-7 Summary of ADTs of both Cordon points

3.2.4 Summary of Traffic on Major Roads

The traffic situation on major roads in Orakzai District reflects the region's current transportation dynamics and infrastructure capacity. These roads serve as crucial links for intra-district connectivity, as well as for connecting Orakzai with neighboring districts. The table below provides detailed insights into traffic patterns (ADT) on major roads in Orakzai District.

Table 3-26 Traffic (ADT) on major Road Sections

Road Name	Nearby Location	Entring	Exiting	Total
Orakzai Agency Road	Daboori Checkpost	769	847	1615
Orakzair Agency Road	Zera Checkpost	417	430	847
Orakzai Agency Road	Near Khan Abad	1164	1214	2378
Headquarter Road	Kalaya Headquarter	1214	1368	2581
Orakzai Agency Road	Near Feroz Khel	1804	1600	3404
Peshawar - Orakzai Road	From Bara	581	553	1134
Orakzai Agency Road	Zera side	731	1072	1802
Orakzai Agency Road	Andh khel Bala	1318	1004	2322
Orakzai Agency Road	Korez	1128	892	2020
Zera Check post Road	Marai Bala	772	897	1669
Orakzai Agency Road	Marai Payan	1300	1411	2711
Kalaya Road	Kadda bazar	1170	1292	2462
Kalaya road	Kallaya Bazar	2010	1636	3646
Headquarter Road	Kalaya Headquarter	1397	1648	3046



Map 3-9 Traffic (ADT) on major road network

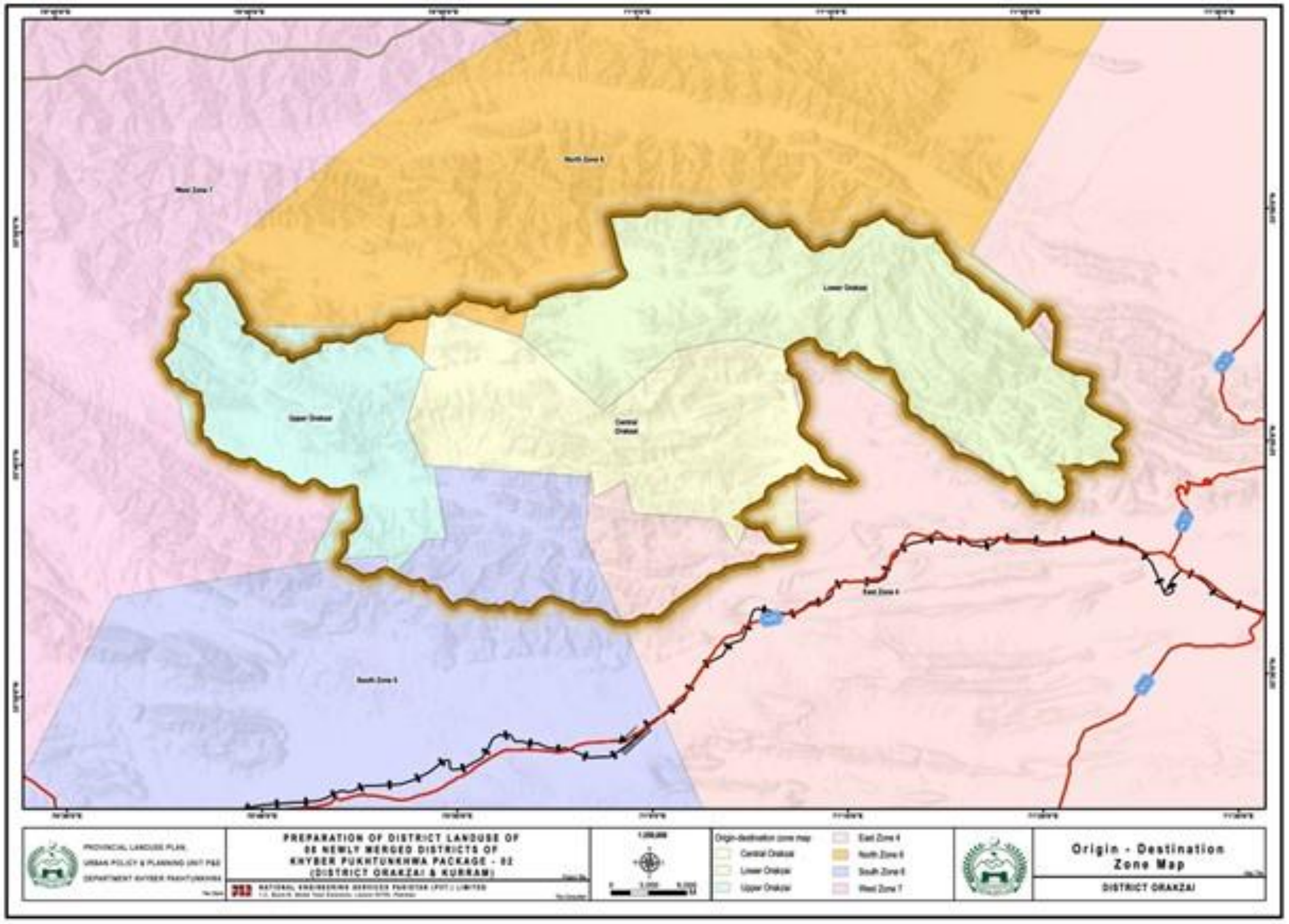
3.2.5 Origin-Destination Survey at Cordon Points

Origin and destination surveys are generally the basis for the preparation of overall comprehensive transportation plans and the preparation of an OD matrix for the study area. During O-D surveys, the drivers were asked simple questions relating to:

- Vehicle type
- Vehicle origin (address or area of start of journey)
- Vehicle destination (address of destination)

The O-D surveys are helpful to estimate the nature, magnitude and characteristics of existing travel and to estimate the potential of traffic diversion within the study area if any future alternative development in the area is expected.

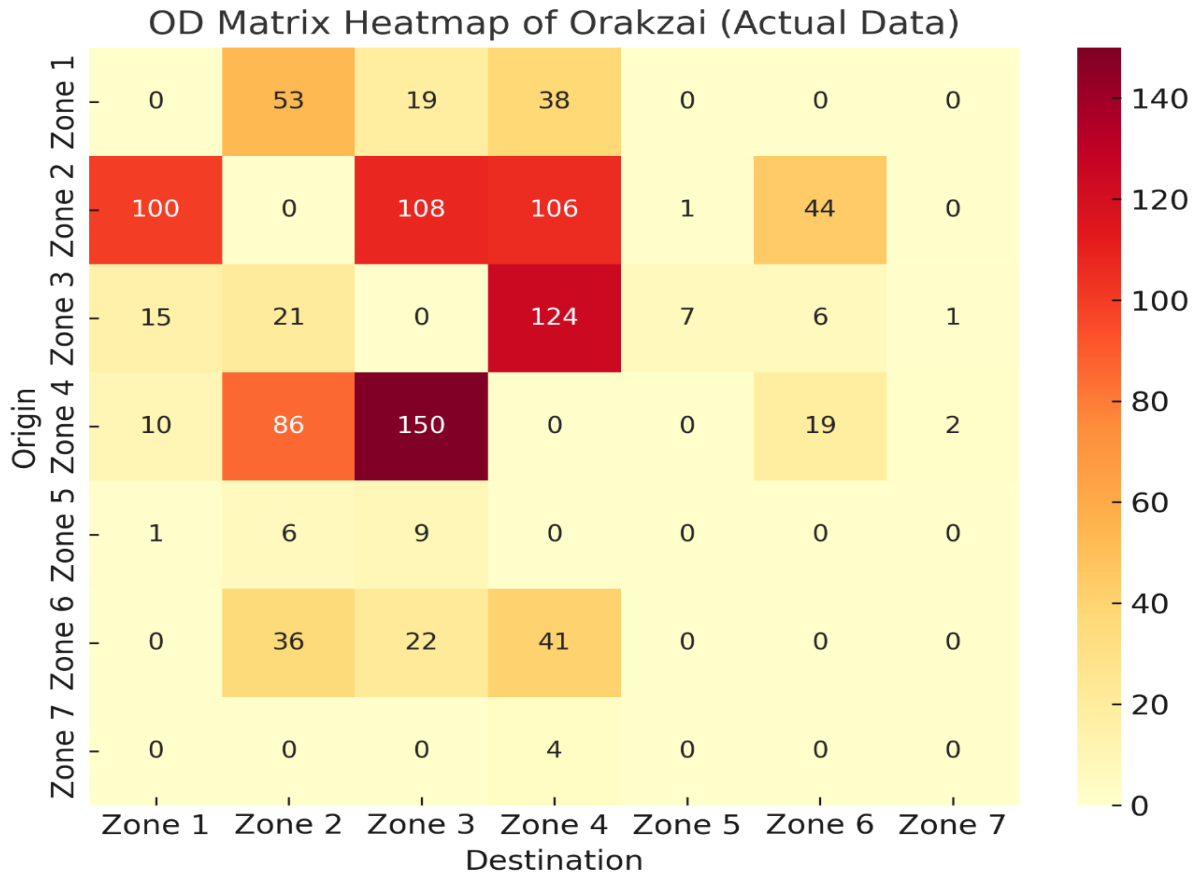
O-D surveys were undertaken using systematic & random e.g., every 3rd, 5th, 7th to avoid traffic congestion, further in OD Surveys, respondents are deriver, passenger who are being interviewed at the above-mentioned cordon points and all the traffic modes were included in the sample. The surveyors were given proper training before the start of work and were monitored during the survey by experienced supervisors. The surveyors were given special instructions for OD to avoid any argument or dispute with drivers, as such interviews asking 'personal' travel information are not taken well by general road users. OD Surveys were carried out at cordon points of the city for 12 hours at each point. The following table 3.26 shows the consolidated Origin-Destination matrix of Orakzai. The following Map 3-9 shows the zone distribution of Orakzai. Whereas Graph 3-8 show the graphical representation of the Origin-Destination Matrix. Annexure D shows the zones and vehicle-wise OD matrix formed from OD survey data at both entrance points of Orakzai.



Map 3-10 Zone distribution of Orakzai

Table 3-27 Consolidated Origin-Destination Matrix of Orakzai

OD Matrix of Orakzai								
ORIGIN	DESTINATION							Grand Total
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	
Zone 1	0	53	19	38	0	0	0	110
Zone 2	100	0	108	106	1	44	0	359
Zone 3	15	21	0	124	7	6	1	174
Zone 4	10	86	150	0	0	19	2	267
Zone 5	1	6	9	0	0	0	0	16
Zone 6	0	36	22	41	0	0	0	99
Zone 7	0	0	0	4	0	0	0	4
Grand Total	126	202	308	313	8	69	3	1029



Graph 3-8 Consolidated Origin-Destination matrix of Orakzai

Summary of Results & Outcomes of Cordon Survey & OD Survey:

The OD matrix highlights that the majority of internal travel takes place among Zones 1, 2, and 3, representing Upper, Central, and Lower Orakzai. High traffic volumes from Zones 2 and 3 to Zone 4 (Kohat side) indicate that eastern Orakzai plays a key role as the main connection point to areas outside the district. Zone 2 appears to be a central activity zone with both high inbound and outbound traffic, possibly due to a concentration of commercial, institutional, or administrative functions. These movement patterns suggest that future land use and mobility planning should prioritize strengthening internal linkages among the central zones while

ensuring that Zone 4 can handle increasing traffic volumes through improved road conditions, junction management, and last-mile connectivity.

Cordon count data shows significantly higher traffic at Daboori Checkpost (1,615 vehicles/day) compared to Zeera (847 vehicles/day), indicating that the Kalaya–Daboori corridor is currently the most active external link, likely serving as the main route toward northern regions such as Maidan, Khyber, or Peshawar. Meanwhile, Zeera, connecting to Kohat, still remains important but comparatively less utilized. The lower volumes to and from Zones 5, 6, and 7 (south, north, and west sides) reflect limited development or accessibility in those directions. These insights suggest that immediate planning efforts should focus on the eastern and central corridors, supporting compact growth, and service-oriented infrastructure where movement is concentrated, while longer-term strategies can gradually improve access to the outer zones as development expands.

3.2.6 Annual Development Programme Projects in Orakzai

The Annual Development Programme (ADP) for Khyber Pakhtunkhwa includes several projects aimed at enhancing the road infrastructure and transportation network in Orakzai District. Notable initiatives are included in Table 3.27

Table 3-28 Annual Development Programme Projects in Orakzai

SR #	Project Name	Status	Cost (Rs. In Million)
1	Integrated Development Package for Orakzai	On-going	1,702.06
2	Construction & Black Topping of Roads in Orakzai Agency.	On-going	133.03
3	Rehabilitation of Road in Lower Sub Division of District Orakzai. (5 kms)	On-going	48.68
4	Improvement / BT of Road from Pacho Pana to Dapar (15 Kms), Orakzai Agency	On-going	198.15
5	Rehabilitation of Marai Zera Road (7.80 Km)-Orakzai	On-going	347.96
6	Construction of Shaboorakhel Road (6 Km)- Orakzai	On-going	240
7	Maintenance and Rehabilitation of Roads in Tribal Districts. (Bajaur, Mohmand, Orakzai & Khyber)	On-going	349.31
8	Improvement & Black Topping of Road from Khwaga Seri to Sarwar Mela (8-KMs) in Upper Orakzai	On-going	129.70
9	Construction & Rehabilitation of remaining portion of Oat Mela to Nakata (13 Km)- Orakzai	On-going	576.49
10	Establishment of 02 Trucking Terminals (Purchase of Land) In Merged Areas	On-going	1,500.00
11	Establishment of Transport Facilitation Centers in 07 Nos Districts in Merged Areas (AIP)	On-going	515.16
12	Establishment of Trucking Terminals in Merged Area [AIP]	On-going	50
13	Rural/Approach Roads in Newly Merged Districts (AIP)	On-going	1,034.38
14	Construction & black topping of roads in District Orakzai.	On-going	186.66
15	Construction of Black Topped Roads in Tribal District Orakzai.	On-going	116.02

3.2.7 National Highway Authority Projects in Orakzai

Currently, there are no specific National Highway Authority (NHA) projects listed for Orakzai District. The NHA oversees numerous infrastructure projects across Pakistan, including road rehabilitation and construction, but none are currently planned for Orakzai.

3.2.8 Rail Network

Orakzai District, part of the Kohat Division in Khyber Pakhtunkhwa (KP) province of Pakistan, does not currently have any railway infrastructure. Here is a detailed explanation of the situation:

Orakzai lies in a hilly and mountainous area, which poses significant engineering and financial challenges for railway construction. Building railways in such terrain often requires tunnels, bridges, and extensive earthworks.

3.2.8.1 Implications of No Railway Connectivity

- The absence of rail connectivity affects the region's ability to trade efficiently, especially in agriculture, livestock, and natural resources.
- Orakzai has great potential for eco-tourism due to its scenic landscapes, high-altitude peaks, and natural springs. Lack of access by rail limits tourist inflow, which could otherwise boost the local economy.
- Railways often serve as a catalyst for social and cultural integration. Without such infrastructure, Orakzai remains relatively isolated from the rest of the country.

3.2.8.2 Potential for Future Development

- Since the 2018 merger into KP, there is a growing push to develop former FATA areas, including transportation and infrastructure.
- Improved infrastructure, such as rail or better roads, could help unlock Orakzai's potential as a tourist destination. The district's natural beauty, tribal culture, and historical significance are assets that could be leveraged.
- Located near important districts like Kohat (which has a railway station), any future extension of railway lines in the region could consider Orakzai, especially for freight and resource transport.
- The rail feasibility study to connect Kohat to Kharlachi is under way. It will connect Kohat, Thall, Hangu etc. with Kharlachi border to increase trade and tourism facility.

3.2.9 Air Network

There are no commercial or domestic airports located within Orakzai District. Due to the region's topography and historical administrative limitations (being part of the former FATA), infrastructure development, including air travel facilities, has been slow. The region is primarily accessible by road transport. There is:

- No domestic or international airport.
- No small airfield or helipad in regular public use.
- No commercial aviation service operating within the district.

This absence is primarily due to:

- The mountainous topography, which makes airport construction challenging.
- Low population density and limited economic activity that would otherwise justify regular air travel.
- Historical neglect in infrastructure development during its time as part of FATA.

While there is no official government plan announced for building an airport in Orakzai, the following may develop over time:

- Helipads for emergency or administrative use.
- Improved road infrastructure under CPEC and KP development programs.
- If tourism or economic activity grows, a small airstrip or domestic air service might be considered.

3.2.10 Telecommunication, Postal Services & Telegraphs

3.2.10.1 Telecommunication Services

The district is served by 4 telephone exchanges, though their operational reach is limited to more populated areas. Approximately 464 landline connections exist, but mobile phones are the primary communication method.
The mobile network coverage is also limited. The lower Orakzai having almost 60% population coverage while Central & Ismail Zai having patchy depending on proximity to towers and town. On the other hand, Upper Orakzai having major connectivity gaps especially in mountainous and remote villages.
The internet facility (3G/4G) is available but unstable, mostly in Lower Orakzai and main towns. Broadband/fiber optic infrastructure is virtually non-existent. Digital literacy is low, and infrastructure constraints prevent reliable online education, e-health, and e-governance services.

Frontier Corps and telecom companies have initiated tower restorations in underserved areas. USF (Universal Service Fund) under the Ministry of IT is working on expanding network reach and fiber optic cable to tribal districts. Community appeals and media coverage are highlighting the communication isolation of areas like Upper Orakzai to prompt government action.

Overall, Orakzai District is in a transitional phase where the demand for better connectivity is growing, but infrastructure is lagging behind, especially in Upper Orakzai and rural belts. The lack of reliable postal and telecommunication services hampers education, economic growth, governance, and emergency response.
Improvements in this sector would:

- Empower local businesses.
- Enhance access to e-learning and healthcare.
- Improve state-society relations through better service delivery.

3.2.10.2 Postal Services

The district has a total of 9 branches of post offices. These branches are unevenly distributed, with some tehsils like Lower Orakzai having relatively better coverage, while Upper Orakzai has none.

The major challenges facing Upper Orakzai residents are lack access to even basic postal services and must travel to neighboring tehsils for mail-related needs. Many offices are under-equipped, offering only basic mailing and parcel services, and lack digitized services like online tracking or e-commerce support. Limited presence of postal banking and money order services due to infrastructure and awareness gaps.
Inaccessibility especially impacts education, employment correspondence, legal matters, and government service delivery. Women, elderly, and persons with disabilities are disproportionately affected due to mobility constraints.

3.2.11 Major transport elements requiring upgradation in Orakzai:

The existing road network in Orakzai District primarily consists of inter-district connectors, secondary and tertiary roads. It comprises key corridors such as the Hangu–Daboori Road, Kalaya Road, Kurram Agency Road, and Marai Zera Road, which connect administrative, commercial, and rural areas and function as lifelines for rural accessibility, agricultural transport, and market access in Kalaya, Daboori, and Ghiljo. Overall assessment indicates that road capacities are generally adequate—major routes are currently able to accommodate traffic volumes and the observed level of service remains LOS A—therefore, capacity enhancement through widening is not the primary requirement.

However, the network's performance is constrained by two critical issues: limited connectivity/accessibility driven by the district's hilly terrain and dispersed urbanization pattern, and poor infrastructure condition due to seasonal khwar flooding and accelerated pavement deterioration. These factors lead to long and unnecessary travel times due to indirect routing and limited link options, along with worn-out surfaces, potholes, edge failures, and erosion, which collectively increase safety risks, operating costs, and disruption to passenger and goods movement. Accordingly, the recommended intervention is a combination of connectivity enhancement (through targeted link improvements and strategic missing links where required) and road rehabilitation/resilience measures (surface renewal, drainage upgrades, and localized structural reinforcement), to improve network continuity and long-term reliability while optimizing the existing road footprint.

1) **Rehabilitation of Orakzai Agency Road (from Mishti Mela – Daboori)**

This project involves the rehabilitation of the Orakzai Agency Road section from Mishti Mela to Daboori, covering a total length of 6.24 km. The scheme is aimed at restoring the functional condition of this important corridor to improve mobility, accessibility, and overall road safety.

Key components/activities

- Upgradation/ rehabilitation of existing road portion
- Improvement of pavement condition and riding quality

Impacts

- Improved connectivity between **Kalaya and Daboori**
- Smoother and safer traffic movement along an important local route
- Better mobility during emergency situations
- Enhanced access for freight and service vehicles
- Improved rural accessibility for villages located along and around the project corridor

Implementation Strategy

Communication & works Department KPK.

2) **Akakhiel Road**

This project involves the rehabilitation of the Akakhieli Road from Sangra (Mishti) to Akakhiel (Tirah), covering a total length of 7.62 km. The project is aimed at upgrading the functional condition of this important corridor to improve mobility, accessibility, and overall road safety between regions.

Key components/activities

- Rehabilitation and upgradation of the existing road section

- Development of a two-lane paved road within the proposed 6.5 m right-of-way / formation width
- Earthwork including cutting, embankment formation, and slope stabilization in hilly terrain, in accordance with the proposed cross-sections

Impacts

- Improved connectivity between remote settlements and surrounding districts
- Better rural accessibility for local communities in the project influence area
- Better access to healthcare, education, markets, and public services for underserved areas
- Reduced travel difficulty and improved year-round usability of the route

Implementation Strategy

Communication & works Department KPK.

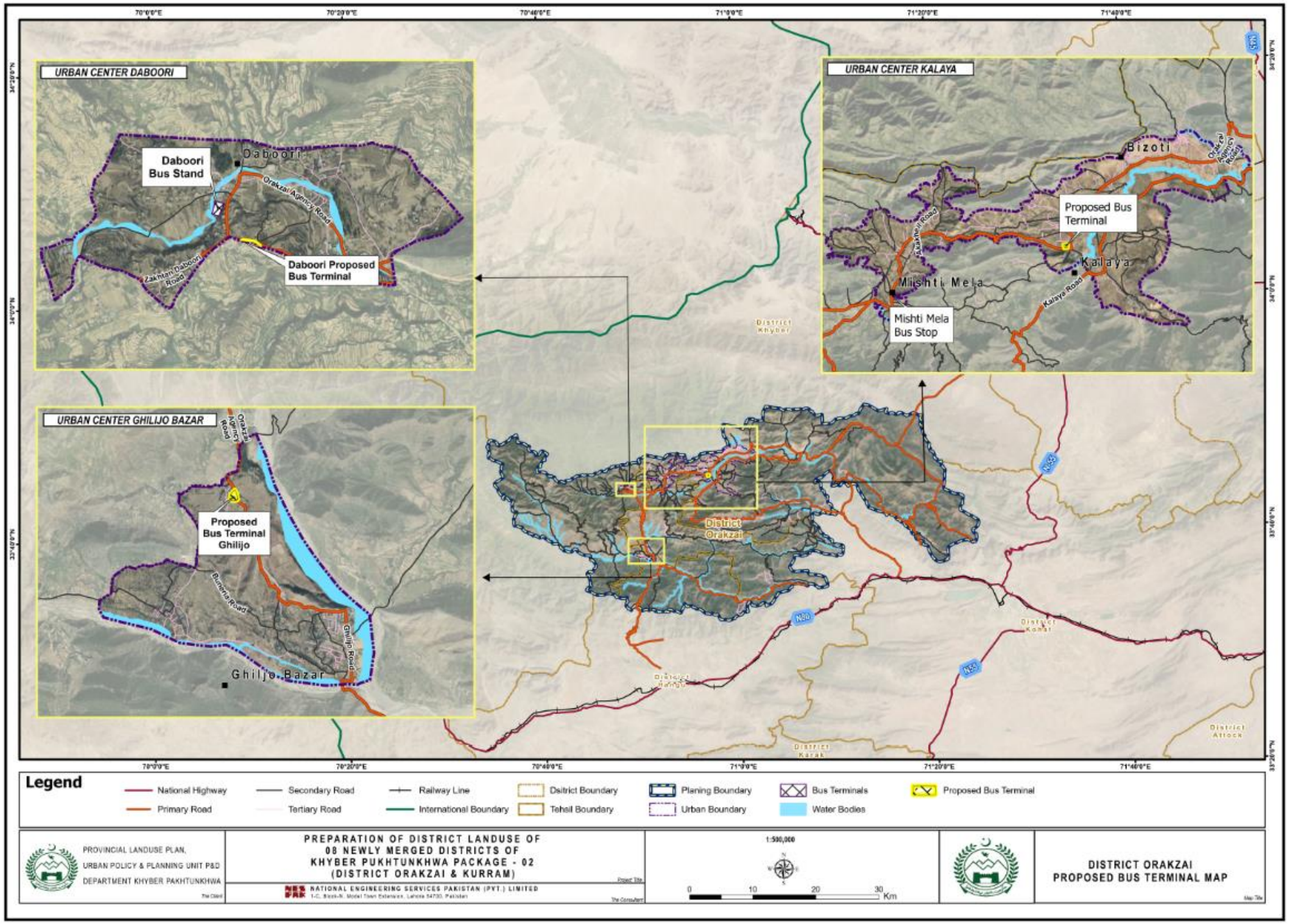
3.2.12 Proposed Bus Terminals

The existing public transport terminal at Mishti Mela is located relatively at the end of the Kalaya Center and has an area of 0.5 acre which is insufficient, although the surrounding area has relatively fair population density. Based on the OD survey results (Table 3.26), the dominant travel movements are concentrated on the corridors Zone 2 → Zone 4, Zone 3 → Zone 4, Zone 4 → Zone 3, Zone 4 → Zone 2, and Zone 2 → Zone 1. In this structure, Zone 2 represents the central area, Zone 3 represents Lower Kurram, and Zone 4 represents external destinations (Kohat, Hangu, and Peshawar). As these movements largely pass through the Kalaya urban centre (western side corridor), most public transport demand and stopping activity occurs along the main road. Consequently, the existing terminal remains insufficient, and passengers frequently board and alight directly on the roadside, creating informal stops, operational disorder, and reduced road efficiency.

To address these issues, a Kalaya proposed public transport terminal (5 acres) is proposed in addition to the existing terminal to better match observed travel demand. The new facility is intended to organize boarding/alighting activities, manage public transport routing patterns, reduce roadside stopping, and improve overall traffic flow and road efficiency through controlled access and designated terminal operations. Location of the new proposed terminal complies with the OD survey.

The OD survey analysis also indicates that travel demand from Central Orakzai to Lower Orakzai and external destinations (Kohat and Hangu) is comparatively high. However, the existing transport terminal in Daboori is located within market areas, where buses must pass through congested commercial streets, resulting in access constraints, operational inefficiencies, and mismanagement of terminal movements. To improve operations and avoid disruption to surrounding activities, a Daboori proposed public transport terminal (2.05 acres) is proposed on the Daboori bypass. This relocation will reduce conflicts within the market core and minimize impacts on nearby commercial functions such as Sabzi Mandi and food markets, while providing a more controlled and efficient terminal environment.

In addition, no formal transport terminal currently exists on the Ghiljo side of Orakzai, despite the fact that connectivity and movement linkages with Kurram and Doaba will be significant through this corridor after the improvement of roads. To support current and future public transport management needs, a Ghiljo Bazar public transport terminal (2.37 acres) is proposed. The terminal will facilitate organized operations, improve passenger handling, and support better route management and service delivery as demand increases. Proposed terminal locations are marked on the map below.



Map 3-11 Proposed Bus Terminals Map

3.2.13 Communication Network Proposals

3.2.13.1 Summary

The existing road network in Orakzai District, located in the hilly northwestern region of Khyber Pakhtunkhwa, mainly consists of inter-district connectors, secondary roads, and tertiary routes that provide access to administrative centres, rural settlements, and local markets. Key corridors such as Hangu–Daboori Road, Kalaya Road, Kurram Agency Road, and Marai Zera Road play a vital role in linking Kalaya, Daboori, Ghiljo, and surrounding areas, supporting daily mobility, agricultural transport, and commercial activity. Although the current traffic demand is relatively low and most major routes operate under acceptable capacity conditions with generally good level of service, the network faces serious challenges related to poor connectivity and weak infrastructure condition. The district's rugged terrain and scattered settlement pattern limit direct access and increase travel time, while seasonal khwar flooding, erosion, pavement damage, and edge failures reduce road reliability and create safety risks. Overall, the road network in Orakzai remains functional but vulnerable, and requires targeted improvements in connectivity, rehabilitation, drainage, and resilience measures to ensure safer and more reliable year-round access.

3.2.13.2 Major Transport Elements Requiring Upgradation in Orakzai:

3.2.13.2.1 Road's Proposals:

Following the road network assessment, it was observed that certain existing roads in the study area are not performing at the desired level due to pavement deterioration, localized surface failures, drainage constraints, and limited effective width on some segments. Therefore, the road proposal places primary emphasis on targeted rehabilitation of critical corridors, including pavement rehabilitation, shoulder/edge restoration, drainage improvements, and road safety measures (e.g., markings, signage, and junction-level spot improvements) to enhance connectivity, travel time reliability, and all-weather accessibility.

In addition, a number of new road links are proposed to address network gaps and improve direct connectivity between key nodes, including bypass connections, major corridors and streets. These new links are intended to improve connectivity between zones, traffic distribution, reduce pressure on inner urban routes, and support future travel demand. The table presents details for both rehabilitation roads and new proposed roads, including key attributes such as road name, starting & ending coordinates, length, existing & proposed ROW, priority/phasing, and proposal type.

After the table, two typical cross-sections are provided for the new road links. The first cross-section represents a cut & fill condition, showing a 6.5 m formation width consisting of a 4.5 m carriageway with 1.0 m shoulders on both sides, designed with a 2% cross-fall. This section also includes typical hillside protection and stability measures where required, such as a breast wall with 150 mm thick mortared riprap, and a retaining wall with weep holes, along with a stable cut slope arrangement.

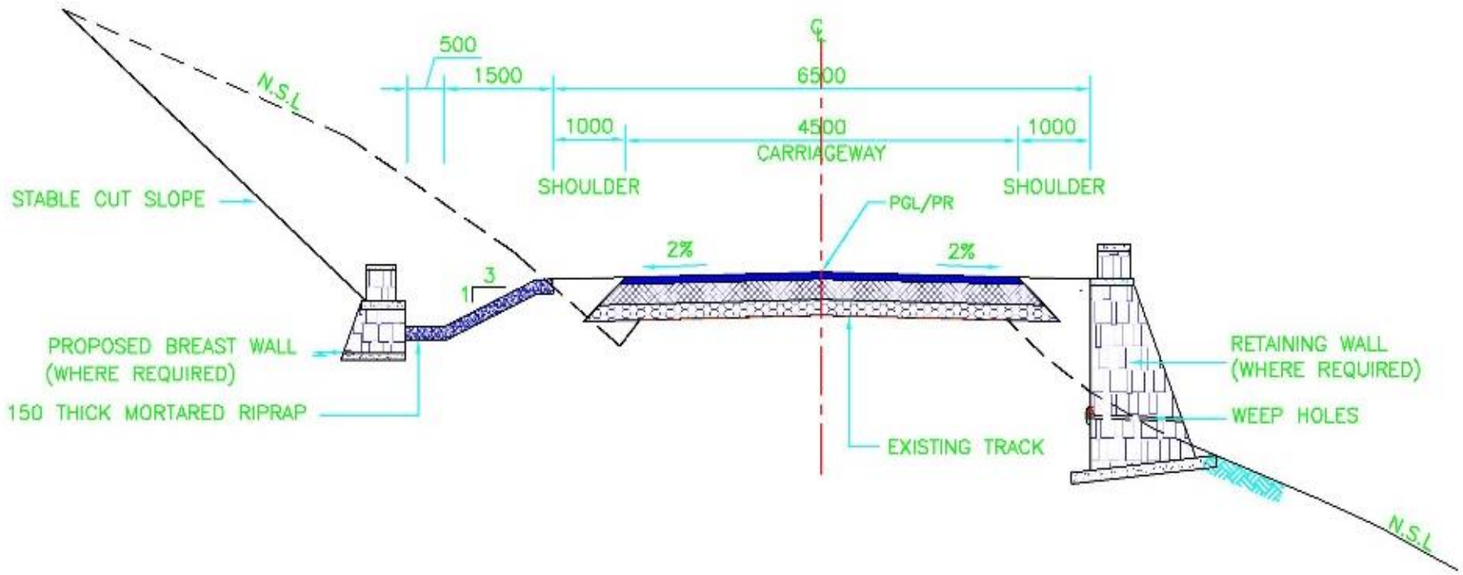
The second cross-section represents a fill condition, also adopting a 6.5 m formation width (4.5 m carriageway + 1.0 m shoulders each side) with 2% cross-fall, and includes edge protection (e.g., parapet wall) and typical side slope treatment. In addition, the cross-section details illustrate how the new pavement ties into an existing pavement section (by removing existing bituminous layers and reconstructing the overlay layers as specified). The pavement layer is just for the sake of illustration. Pavement thickness should be as per the detail design parameterws

Finally, all rehabilitation segments and new proposed road links are marked on the Road Proposals Map to clearly show their locations and overall network integration.

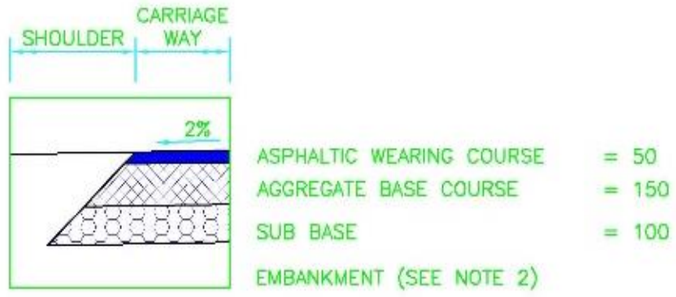
District Orakzai Proposed Roads Stats									
Sr No.	NAME	Proposal Type	Start_XY	End_XY	Length(Km)	Existing ROW (m)	Proposed Paved ROW (m)	Proposed Hierarchy	Phasing
1	Akakheil -Tirah Road	Rehabilitation	33.7710949132077,70.8899010643129	33.7710949132077,70.8899010643129	3.07	5	6.5	Secondary	Short
2	Sangra - Akakheil Road	Rehabilitation	33.771068369074,70.8897863109539	33.771068369074,70.8897863109539	4.55	4.5	6.5	Secondary	Short
3	Pertangi Road	Rehabilitation	33.7341132607258,70.9207969499943	33.7208601706023,70.9247705047421	1.98	4.5	6.5	Secondary	Medium
4	Ali Kheil Road	New Road	33.762698129066,70.9528354192757	33.7598560573413,70.9685670034625	1.56	-	6.5	Secondary	Medium
5	Bizoti / Feroz Khan Road	Rehabilitation	33.7703022303717,70.9809132243905	33.7817096612079,70.9794834258738	1.38	4	6.5	Secondary	Medium
6	Khamal Road	New Road	33.6538935377779,71.0192516681951	33.6653702067012,71.037463049621	3.06	-	6.5	Secondary	Long
7	Arkhi Road	Rehabilitation	33.6586280723489,70.9499528236966	33.6296106550846,70.9449819156318	4.02	7	8	Secondary	Medium
8	Kalaya Road - Central Orakzai	New Road	33.747057575443,70.8144981810039	33.7439661241598,70.8066676333766	1.01	-	6.5	Secondary	Short
9	Khawaja Khadar Road	Rehabilitation	33.7374069000008,70.8302628998235	33.738330400309,70.8178604002955	1.21	5	6.5	Secondary	Medium
9	Dargai Graveyard Road	Rehabilitation	33.6069395000786,70.9234804003175	33.6295549003504,70.9449556995245	4.74	5	6.5	Secondary	Long
10	Dargai Kalaya Road	Rehabilitation	33.6953892002661,71.0324370997932	33.7427829002381,70.9662378003012	13.81	4	6.5	Secondary	Long

11	Orakzai Agency Road (Mishti Mela-Daboori)	Rehabilitation	33.7355034105824,70.8707396725898	33.7312519220503,70.8164499503051	6.24	6	8	Primary	Short

All development along the proposed road corridor shall comply with the building line and setback requirements specified under the National Highways & Strategic Roads (Control) Rules, 1998 (as amended). Construction shall not be permitted within the designated Right-of-Way (ROW) and the area between the ROW and the prescribed building line without approval of the competent authority. Building height restrictions, where applicable, shall be governed by the relevant local planning and building regulations whereas it is prescribed that prior to the approval of any land use other than residential, a Traffic Impact Assessment (TIA) shall be mandatory to evaluate the potential traffic and transportation impacts of the proposed development. The proposed projects may be implemented through both local funding sources and the Annual Development Programme (ADP) scheme, subject to approval by the competent authority



TYPICAL CROSS SECTION IN CUT & FILL

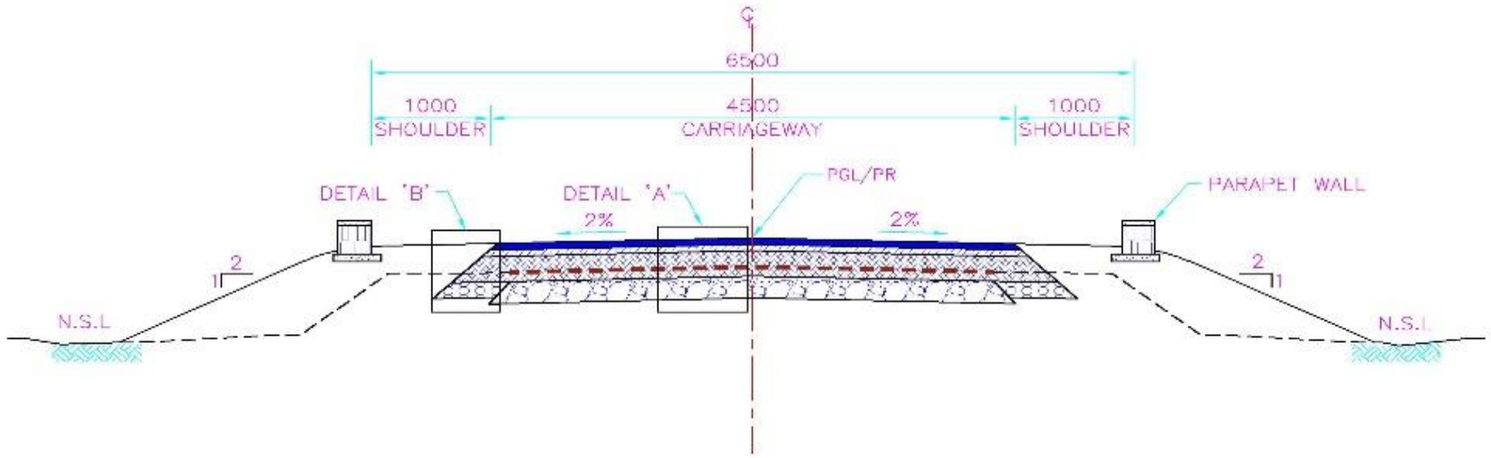


DETAIL 'A'

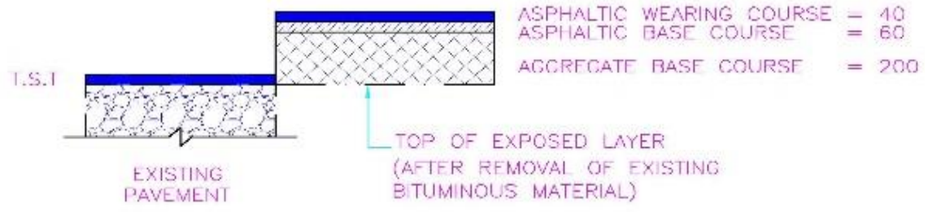
NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. EMBANKMENT SHALL HAVE A MINIMUM SOAKED C.B.R OF 20% AT 95% M.D.D AASHTO T-180.

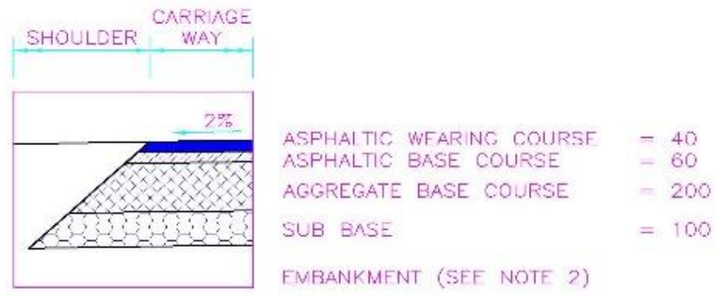
Figure 3-1: Typical Cross-section of Hilly Terrain



TYPICAL CROSS SECTION IN FILL



DETAIL 'A'

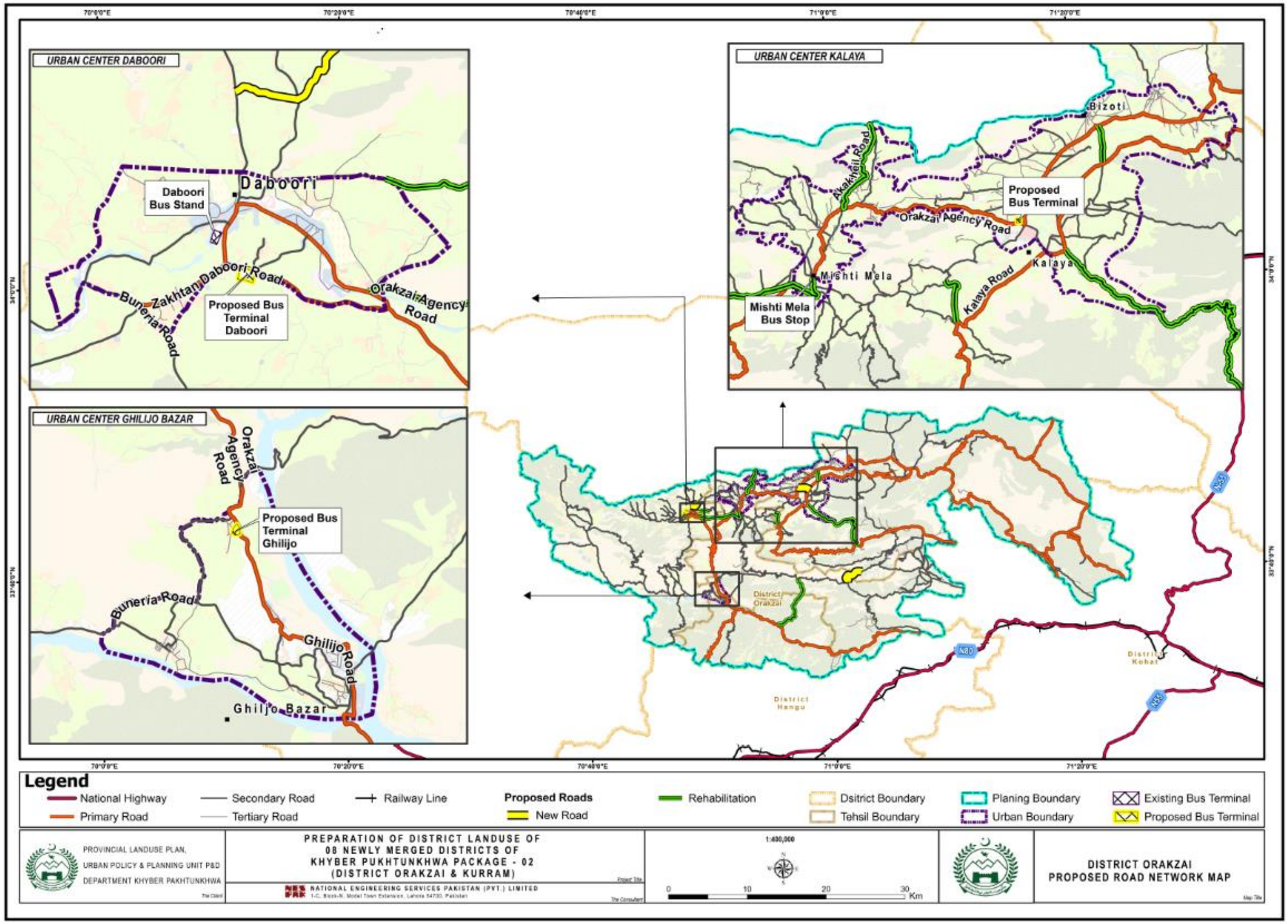


DETAIL 'B'

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. EMBANKMENT SHALL HAVE A MINIMUM SOAKED C.B.R OF 20% AT 95% M.D.D AASHTO T-180.

Figure 3-2: Typical Cross-section of Rolling Terrain



Map 3-12 District Orakzai Proposed Roads Map

3.3 Social Infrastructure

3.3.1 Education

Education serves as a cornerstone of human development, playing a pivotal role in poverty reduction, social equality, and economic progress. It enhances health outcomes, fosters stability, and improves living standards, making investment in education an essential component of sustainable development.

3.3.1.1 Schools

In the settled districts of Khyber Pakhtunkhwa, there are 28,239 government schools, of which 28,054 are functional and 185 non-functional. The majority comprise 22,410 primary schools, including 256 Community Model Schools and 30 JICA Model Schools, most of which (21,073) are located in rural areas. The province also has 5,829 secondary schools, including 2,709 middle, 2,291 high, and 829 higher secondary schools. Among functional schools, 93% have boundary walls, 97% water supply, 92% electricity, and 96% toilets. Additionally, 10,944 private schools operate across the province.

Government schools collectively enroll 5.14 million students, with 66.5% in primary and 33.5% in secondary education. There are 169,064 working teachers against 192,069 sanctioned posts, comprising 106,107 male and 62,957 female teachers. Private schools employ approximately 141,500 teachers.[44]

In the newly merged districts (NMDs), there are 6,394 government schools, of which 6,036 are functional. This includes 5,088 primary schools (4,769 operational, 105 mosque schools) and 1,306 secondary schools, comprising 847 middle, 422 high, and 37 higher secondary schools. Among these, 99% have boundary walls, 81% water supply, 57% electricity, and 90% toilet facilities.

Enrollment in NMD government schools stands at 692,295 students, including 493,571 (78%) in primary, 96,752 (15.3%) in middle, 35,410 (5.6%) in high, and 6,878 (1.1%) in higher secondary education. The districts employ 19,568 teachers against 27,335 sanctioned posts, with 13,236 male and 6,350 female teachers.

Province-wide, according to the Annual Statistical Report (2021–22), Khyber Pakhtunkhwa hosts 34,183 government schools, including 33,405 functional and 778 non-functional, alongside 9,021 private schools. Total enrollment across all government institutions is 5.97 million, including 832,200 in nursery, 3.46 million in primary (67%), and 1.69 million in secondary (33%).

The total teaching workforce in government schools is 174,278, with 111,260 male and 63,018 female teachers, while private schools employ an additional 126,475 teachers across all educational levels.[45]

3.3.1.2 Literacy Ratio

The Pakistan Bureau of Statistics defines a person as literate based on their ability to read a newspaper or a comparable publication and to write a simple letter in any language. Literacy is

[44] Annual School Census Report 2023-24 (http://175.107.63.45/newimusite/images/reports/ASC2023-24.pdf)

[45] Khyber Pakhtunkhwa Education Monitoring Authority (KPEMA). (2023). *Annual Statistical Report of Government Schools 2021-2022*. Executive Summary

quantified as the percentage ratio of the literate population to the total population aged 10 years and older.

3.3.1.2.1 Literacy Ratio from Population Census-2023 for Orakzai

According to the Population Census of 2023 conducted by the Pakistan Bureau of Statistics, the literacy ratio in Orakzai district reveals significant disparities across different age and gender groups. The overall population aged 10 years and above in Orakzai is **249,296** with a literacy rate of **37.43%**. This translates to **68,750 literate individuals** compared to **243,773 illiterate individuals**.

Breaking it down by age group:

Ages 10-14(Middle): Out of 54,009, there are 34,749 literate individuals, resulting in a literacy rate of 64.33%.

Ages 15-19(High): Among 42,921, the literacy rate is 43.13%, with 18,529 literate individuals.

Ages 20-24(Higher Secondary): Of 27,495, 32.02% are literate, totaling 8805 individuals.

Ages 25-29(Higher Studies): The literacy rate drops to 18.41% with 4486 literate individuals out of 24,356.

The trend continues to decline with older age groups; for instance, only **7.91%** of those aged 40 and above are literate.

When analyzing gender-specific data:

For males aged 10 and above (**129,779 total population**), the literacy rate is significantly higher at **38.34%**, with **49759 literate males**.

Conversely, among females aged 10 and above (**119510 total population**), the literacy rate is markedly lower at just **6.31%**, resulting in only **7543 literate females**.

The literacy ratio for transgender individuals aged 10 and above in Orakzai is notably low. Out of a total of **7 transgender individuals**, only **2** is literate, resulting in a literacy rate of **28.57%**. The data indicates that among the transgender population, there are **2 individuals** aged 15-19 who are both literate. The remaining age groups show no recorded literacy among transgender individuals. This highlights a significant educational disparity and underscores the need for targeted initiatives to improve literacy and educational access for transgender individuals in Orakzai.

Table 3-29 Literacy Ratio from Population Census-2023 for Orakzai

SEX/AGE GROUP (IN YEARS)	TOTAL POPULATION	ILLITERATE	LITERATE	TOTAL FORMAL	INFORMAL/NON-FORMAL	LITERACY RATIO (%)
ALL SEXES 10 & ABOVE(Middle)	249296	180885	68411	59078	2544	27.45%
10-14(High)	54009	34749	19260	17956	1279	35.66%
15 – 19(Higher Secondary)	42921	24061	18860	17848	681	43.94%
20 – 24(Under Graduation)	27495	18329	9166	7778	277	33.34%
25 – 29(Post Graduation)	24356	17839	6517	4378	108	26.76%
30 and above (Higher Studies)	23227	18201	5026	3716	76	21.64%

Table 3-30 Orakzai Literacy Ratio by Age and Sex Group from Population Census 2023[46]

Category	Male	Female	Transgender
Total Population (10 and above)	129779	119510	7
Literate Population	56662	11747	2
Illiterate Population	73117	107763	5
Literacy Rate (%)	43.66%	9.83%	28.57%

3.3.1.2.2 Literacy Ratio from Household Information Survey

Data gathered through the Household Interview Survey (HIS) offers a comprehensive overview of educational attainment across the tehsils of Orakzai. The analysis reveals that a substantial proportion of respondents lack formal education, with the "None" category being predominant in all regions. Specifically, the Upper tehsil reports the highest number of individuals without any education, totaling **72 respondents**, which accounts for **36.3%** of the total. This is closely followed by Lower tehsil, with **71 respondents** lacking formal education. Central and Ismail Zai tehsils show lower figures, with **32** and **11 respondents**, respectively, having no education.

The "Below Matric" category constitutes the second-largest group, with Lower tehsil leading at **53 respondents**, followed by Central with **30** and Upper with **22**. Matriculation is most prevalent in Lower tehsil, where **49 respondents** have completed this level of education. However, higher educational qualifications such as FA/FSc/FCS and university degrees are scarce across all tehsils, collectively representing less than **10%** of the population in each area.

[46] https://www.pbs.gov.pk/sites/default/files/population/2023/tables/table_13_kp_districts.pdf

Table 3-31 Education of Respondents (HIS-Orakzai) [47]

Education Level	Central	Ismail Zai	Lower	Upper	Total	Percentage (%)
None	32	11	71	72	186	36.3
Below Matric	30	7	53	22	112	21.8
Matric	16	15	49	24	104	20.3
Technical Diploma	0	2	0	4	6	1.2
FA/FSc/FCS	10	7	23	19	59	11.5
BA/BSc	5	6	9	8	28	5.5
BS/MA/MSc	3	0	8	3	14	2.7
MS/MPhil	0	0	4	0	4	0.8
Total	96	48	217	152	513	100%

3.3.1.3 Existing Educational Institutes

Educational infrastructure is crucial for achieving educational objectives, encompassing the availability of school buildings, qualified teachers, laboratories, playgrounds, and other essential facilities at various educational levels. The structure of education can be visualized as a vertical hierarchy resembling a pyramid, where the base consists of numerous primary schools and the apex includes a limited number of universities that provide specialized education to a smaller group of postgraduate students. It is noteworthy that specialized institutions, such as universities, are predominantly located in metropolitan areas.

As stated in the *National Reference Manual for Planning and Infrastructure Standards*, each unit at a specific level is sustained by a catchment area consisting of 3 to 7 facilities from the subsequent lower level[48]. For universities, this lower level corresponds to degree colleges. The educational infrastructure in District Orakzai comprises various levels of government schools, as well as degree colleges which are essential for providing quality education to the local population. The current statistics for government educational institutions are as follows:

[47] Calculated from the Household Survey conducted by the Consultant in August, 2024

[48] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Section 6.1.2, Page 102.

Table 3-32 Government Schools in District Orakzai [49]

Category	Total Schools (Boys)	Non-Functional (Boys)	Total Schools (Girls)	Non-Functional (Girls)	Total Schools	Non-Functional
Government Primary Schools	272	10	177	17	449	27
Government Middle Schools	34	3	49	0	83	3
Government High Schools	28	2	9	0	37	2
Government Higher Secondary Schools	3	0	2	0	5	0

3.3.1.4 Summary of Findings

3.3.1.4.1 Government Primary Schools

There are a total of 449 government primary schools in Orakzai, with 272 for boys and 177 for girls. Among these, 10 boys' schools and 17 girls' schools are non-functional, indicating a need for improvements in infrastructure and resources.

Government Middle Schools: The district has 83 government middle schools, with 34 designated for boys and 49 for girls. A total of 3 middle schools are currently non-functional.

Government High Schools: There are 37 government high schools, consisting of 28 boys' schools and 9 girls' schools, with 2 non-functional high schools.

Government Higher Secondary Schools: The district includes 5 higher secondary schools, with 3 for boys and 2 for girls, all of which are functional.

These statistics highlight the critical need for targeted interventions to enhance the operational capacity of existing schools and improve educational access for both boys and girls in Orakzai. Addressing the issue of non-functional schools is vital to ensuring that all children in the district have the opportunity to receive a quality education.

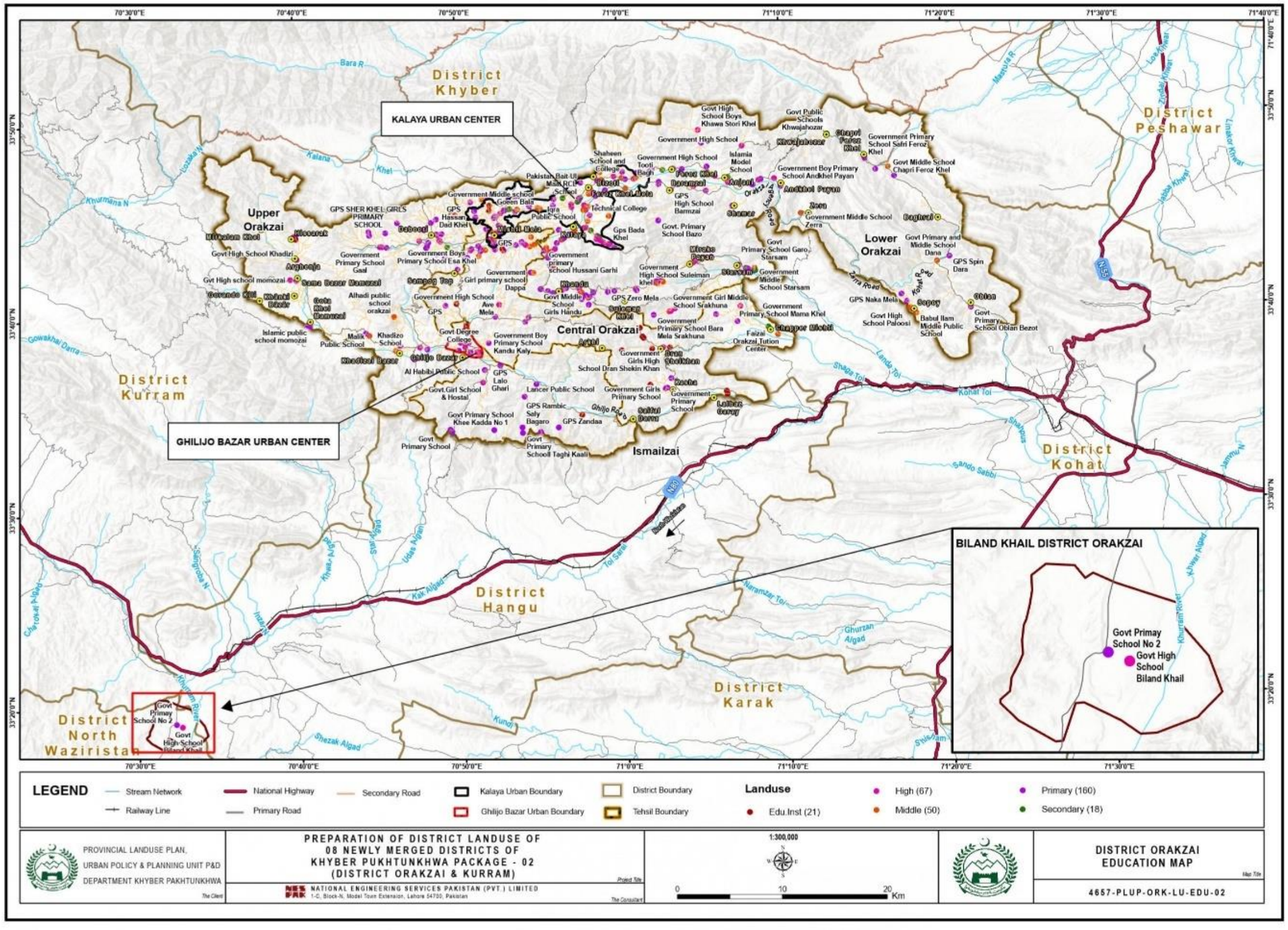
3.3.1.4.2 Degree Colleges in District Orakzai

District Orakzai is home to **6-degree colleges**, which provide higher education opportunities to the local population. The following is a list of these institutions:

- Government Degree College Ghiljo Orakzai
- Government Degree College Kalaya Orakzai
- Government Girls Degree College Starsam Orakzai
- Government Girls Degree College Kalaya Orakzai
- Government Degree College Jalaka Mela Orakzai
- Government Degree College Ghakhe Bar Muhammad Khel Dargai Orakzai

[49] Annual School Census Report 2023-24 (http://175.107.63.45/newimusite/images/reports/ASC2023-24.pdf)

These colleges play a vital role in enhancing educational access and promoting higher learning in the district, contributing to the overall development of the community.



Map 3-13 Existing Education Facilities in District Orakzai

3.3.1.4.3 Private Schools in District Orakzai

According to the Khyber Pakhtunkhwa Private Schools Regulatory Authority (KP PSRA), there are **21 private schools** operating in District Orakzai. These institutions contribute to the educational landscape of the district and provide additional options for students seeking education outside the government school system. The below table of private schools includes:

Table 3-33 Private Schools in District Orakzai[50]

School Name	District	Location
Iqra Public School Feroz Khel Distt. Aurakzai	Orakzai	Rural
Superior School of Modern Sciences	Orakzai	Rural
Al Haider Public High School	Orakzai	Rural
Shaheen Islamia School and College	Orakzai	Rural
Orakzai Model School & College Saam Feroze Khel	Orakzai	Rural
Al Qalam School System	Orakzai	Rural
Islamia Model High School	Orakzai	Rural
Islamia Public School Andkhel Orakzai Agency	Orakzai	Rural
Allama Iqbal Model High School	Orakzai	Rural
The Knowledge Academy Jalaka Mela Orakzai	Orakzai	Rural
Anwaria Public School Kadda Bazar District Orakzai	Orakzai	Rural
Al Hadi Public School and College Mishti Mala	Orakzai	Rural
Sir Syed Public High School Biland Khel Aurakzai	Orakzai	Rural
Collegiate Public School	Orakzai	Rural
Babul Ilm Middle Public School Sepoy	Orakzai	Rural
Collegiate Public School Sangrani Orakzai	Orakzai	Rural
Islamia Collegiate Public School & College	Orakzai	Rural
Al-Mustafa Public School Tazikhel Dagai	Orakzai	Rural
Tribal Institute of Modern Education	Orakzai	Urban
Al Madina Public High School Mishti Mela	Orakzai	Rural
Frontier Children's Academy	Orakzai	Rural

[50] KP PSRA 2024

These private schools play a significant role in enhancing educational access and diversity within the district, providing various curricula and educational opportunities for students in Orakzai.

3.3.1.5 Gross and Net Enrollment Rates

Enrollment statistics serve as key indicators of educational access and participation within Orakzai District. These figures reflect the extent to which children are attending school across primary and secondary levels in government, private, and Deeni Madaris institutions.

The overall Gross Enrollment Ratio (GER) for the 5–9 age group in Khyber Pakhtunkhwa, projected from the 2023 Population Census growth rates, stands at 82.72%. Within this, the GER for government primary schools is 52.51%, while the Net Enrollment Ratio (NER) at the primary level is 67.42%.

For the 10–14 age group, the overall GER for both government and private secondary schools is 45.60%, and for government secondary schools alone, it is 30.04%. The NER at the secondary level is 44.90%.

These statistics highlight existing disparities in educational access between school types and age groups, emphasizing the need for targeted interventions to improve enrollment, particularly at higher grade levels and among female students.

3.3.1.5.1 Gross Enrollment Ratios (GER) at the Primary Level

The Gross Enrollment Ratio (GER) represents total enrollment in primary education, regardless of age, as a percentage of the population eligible for that level. It provides a measure of both access and participation in the education system.

Table 3-34 Gross Enrollment Ratios (GER) at the Primary Level

Institution Type	Boys	Girls	Total	GER (%) Boys	GER (%) Girls	GER (%) Total
Government Schools	17891	11415	29306	72.03 %	50.85 %	61.98 %
Private Schools	8064	285	8351	32.47%	1.27%	17.66
Deeni Madaris	0	0	0	0.00%	0.00%	0.00%
Total	25955	11700	37657	104.49 %	52.13%	79.64%

3.3.1.5.1.1 Observations:

- Government schools dominate primary-level education, enrolling the majority of students, with boys significantly outnumbering girls.
- Private schools contribute modestly, particularly for girls, who form only a small proportion of their total enrollment.
- Deeni Madaris show no enrollment at the primary level in this dataset, indicating minimal participation in formal early education.

3.3.1.5.2 Gross Enrolment Ratios (GER) at the Secondary Level

At the secondary level, the GER reflects similar patterns but with a sharper decline in participation, especially for girls:

Table 3-35 Gross Enrolment Ratios (GER) at the Secondary Level

Institution Type	Boys	Girls	Total	GER (%) Boys	GER (%) Girls	GER (%) Total
Government Schools	8,058	2,682	10,740	43.01%	15.66%	29.95%
Private Schools	4,430	147	4,577	23.65%	0.86%	12.76%
Total	12,488	2,829	15,317	66.66%	16.51%	42.71%

3.3.1.5.2.1 Observations:

- Participation drops significantly at the secondary level compared to primary education.
- Girls face particularly limited access to secondary education, as evidenced by their low GER percentages.
- Private schools, while contributing to boys' education, provide almost negligible support for girls.

3.3.1.6 Gender Parity Index (GPI)

The GPI quantifies gender equality in education:

Table 3-36 GPI quantifies gender equality in education.

Education Level	GER (%) Boys	GER (%) Girls	GPI
Primary	94.00%	60.63%	0.65
Secondary	66.66%	16.51%	0.25

3.3.1.6.1 Observations:

At the primary level, the Gender Parity Index (GPI) indicates moderate gender disparity, showing that while boys' enrollment is higher, girls also participate notably in primary education. However, at the secondary level, gender inequality widens, reflecting significant barriers to girls' educational access.

In 2023–24, the Net Enrollment Ratio (NER) for the 10–14 age group in Orakzai District highlights this imbalance. In government schools, the NER is 34.30% for boys and 11.44% for girls, while in private schools, it stands at 15.26% for boys and only 0.03% for girls. Deeni Madaris show no recorded enrollment for this group.

Collectively, across all institution types, the total NER is 49.57% for boys and 11.46% for girls, yielding an overall district NER of 31.37%. These figures reveal substantial gender gaps and emphasize the need for targeted measures to enhance girls' access to education, improve enrollment retention, and promote gender equity in Orakzai's schooling system.

Table 3-37 Net Enrollment Ratios (NER) in Orakzai (2023-24)

Institution Type	Boys	Girls	Total	NER (%) Boys	NER (%) Girls	NER (%) Total
Government Schools	18,735	17,131	35,866	34.30%	11.44%	23.38%
Private Schools	15,226	0	7,999	15.26%	0.03%	7.99%
Deeni Madaris	0	0	0	0.00%	0.00%	0.00%
Total (Govt., Private, Deeni Madaris)	-	-	-	49.57%	11.26%	31.37%

This table summarizes the Net Enrollment Ratios for boys and girls in Orakzai across different types of educational institutions at the primary level for the year 2023-24.

The enrollment data for Orakzai reveals substantial disparities in educational participation, particularly for girls, at both primary and secondary levels. Government schools play a dominant role in enrollment figures, yet private schools also contribute significantly to boys' enrollment. Efforts to improve gender parity and overall enrollment, especially at higher educational levels, remain critical for advancing educational equity in the region.

3.3.1.7 Dropout Rate, Promotion Rate, and Repetition Rate

The dropout rate, promotion rate, and repetition rate are key indicators used to assess educational outcomes. Together, these indicators should total 100%. The dropout rate represents the percentage of students who enrolled but did not complete their class due to various socioeconomic challenges. In Khyber Pakhtunkhwa, the primary-level dropout rate is 9.26% for boys and 13.94% for girls. Conversely, at the secondary level, the trend reverses, with the dropout rate for boys at 11.27% and for girls at 9.08%.

3.3.1.7.1 Student Flow Analysis in Orakzai at Primary Level (Boys):

The following table summarizes the promotion rate, repetition rate, and dropout rate for boys at the primary level in Orakzai District across different grades.

Table 3-38 Student Flow Analysis in Orakzai at Primary Level (Boys)

Class	Promotion Rate	Repetition Rate	Dropout Rate
Prep	68.1%	4.7%	27.1%
Class 1	90.4%	2.2%	7.4%
Class 2	91.5%	3.0%	5.6%
Class 3	93.3%	2.4%	4.3%
Class 4	91.6%	2.2%	6.2%
Class 5	90.9%	2.0%	7.1%

3.3.1.7.2 Key Observations:

Prep Class Challenges:

The promotion rate is significantly low (68.1%), with a high dropout rate of 27.1%. This indicates challenges in transitioning children from preparatory levels to formal schooling.

Improved Retention in Higher Grades:

From Class 1 onwards, the promotion rate improves significantly, reaching a **peak of 93.3% in Class 3.**

Dropout rates decrease steadily from **7.4% in Class 1 to a low of 4.3% in Class 3**, before slightly increasing in subsequent grades.

Repetition Rates: Repetition rates remain relatively low across all grades, ranging between 2.0% and 4.7%, indicating minimal grade repetition overall.

Dropout Rate Trends: After a sharp reduction in dropouts from Prep to Class 3, there is a slight increase in dropout rates in Classes 4 and 5.

Student Flow Analysis in Orakzai at Primary Level (Girls)

The table below summarizes the promotion rate, repetition rate, and dropout rate for girls at the primary level in Orakzai District across different grades:

Table 3-39 Student Flow Analysis in Orakzai at Primary Level (Girls)

Class	Promotion Rate	Repetition Rate	Dropout Rate
Prep	57.2%	0.5%	42.3%
Class 1	81.9%	0.3%	17.8%
Class 2	86.9%	0.1%	13.0%
Class 3	80.6%	0.0%	19.4%
Class 4	87.6%	0.2%	12.2%
Class 5	71.7%	0.0%	28.3%

3.3.1.7.3 Key Observations:

Prep Class Concerns:

The promotion rate for girls in Prep class is very low (57.2%), while the dropout rate is alarmingly high at 42.3%, suggesting significant barriers to early education access or retention.

Improved Performance in Lower Grades: From Class 1 to Class 2, there is a noticeable improvement in promotion rates, peaking at 86.9% in Class 2, while dropout rates drop to 13.0%.

Fluctuating Trends in Higher Grades:

Class 3 shows a decline in promotion rate (80.6%) and a rise in dropout rate (19.4%) compared to Class 2.

Class 4 records the best figures, with a promotion rate of 87.6% and the lowest dropout rate of 12.2%.

Class 5 sees a sharp decline in promotion rate (71.7%) and a corresponding rise in dropout rate (28.3%).

Repetition Rates: Repetition rates are consistently low across all grades, ranging from 0.0% to 0.5%, suggesting limited instances of students repeating a grade.

Student Flow Analysis in Orakzai at Secondary Level (Boys and Girls)

The following table presents the promotion rate, repetition rate, and dropout rate for students (boys and girls combined) at the secondary level in Orakzai District across Classes 6 to 9:

Table 3-40 Student Flow Analysis in Orakzai at Secondary Level (Boys and Girls from class 6 - 9)

Class	Promotion Rate	Repetition Rate	Dropout Rate
Class 6	84.5%	1.9%	13.6%
Class 7	87.9%	0.5%	11.6%
Class 8	81.6%	0.6%	17.8%
Class 9	95.1%	0.0%	4.9%

3.3.1.7.4 Key Observations:

High Promotion Rates:

The promotion rate remains consistently high across all grades, peaking in Class 9 at 95.1%. This suggests that students who remain in the system are generally progressing successfully.

Minimal Repetition Rates:

Repetition rates are very low throughout, ranging from 0.0% in Class 9 to a maximum of 1.9% in Class 6. This indicates that most students who stay in school advance to the next grade without repeating.

Dropout Rates: Dropout rates are higher in earlier grades, starting at 13.6% in Class 6 and reducing to 11.6% in Class 7.

Class 8 sees a significant increase in dropout rates (17.8%), which may reflect challenges in retaining students as they approach the transition to higher secondary education.

The dropout rate drastically reduces to 4.9% in Class 9, suggesting better retention among students who make it to higher grades.

Student Flow Analysis in Orakzai at Secondary Level (Boys)

The table below summarizes the promotion rate, repetition rate, and dropout rate for boys at the secondary level in Orakzai District across Classes 6 to 9:

Table 3-41 Student Flow Analysis in Orakzai at Secondary Level for Boys (Class 6 - 9)

Class	Promotion Rate	Repetition Rate	Dropout Rate
Class 6	82.8%	2.3%	15.0%
Class 7	85.8%	0.7%	13.5%
Class 8	78.8%	0.8%	20.4%
Class 9	93.6%	0.0%	6.4%

3.3.1.7.5 Key Observations:

Promotion Rates:

The promotion rate for boys remains high throughout the secondary levels, peaking at 93.6% in Class 9. However, there is a noticeable dip in Class 8, where the promotion rate falls to 78.8%.

Repetition Rates: Repetition rates are consistently low, ranging from 0.0% in Class 9 to 2.3% in Class 6, indicating minimal grade repetition among students.

Dropout Rates: Dropout rates show a concerning trend in Class 8, rising to 20.4%, the highest among all grades. The dropout rate decreases significantly in Class 9 to 6.4%, suggesting improved retention among students progressing to higher grades.

3.3.1.7.6 Student Flow Analysis in Orakzai at Secondary Level (Girls)

The following table provides the promotion rate, repetition rate, and dropout rate for girls at the secondary level in Orakzai District across Classes 6 to 9:

Table 3-42 Student Flow Analysis in Orakzai at Secondary Level for Girls (Class 6 - 9)

Class	Promotion Rate	Repetition Rate	Dropout Rate
Class 6	90.4%	0.6%	9.0%
Class 7	94.8%	0.0%	5.2%
Class 8	91.3%	0.0%	8.7%
Class 9	100.3%	0.0%	-0.3%

3.3.1.7.7 Key Observations:

High Promotion Rates:

Promotion rates for girls are consistently high across all classes, peaking in Class 9 at an exceptional 100.3%. This value may reflect data anomalies (e.g., inclusion of overage students re-entering the system).

Minimal Repetition Rates:

Repetition rates are negligible, with a maximum of 0.6% in Class 6 and 0.0% in subsequent grades.

Dropout Rates:

Dropout rates are low across all grades, starting at 9.0% in Class 6 and reaching a negative value in Class 9 (-0.3%). The negative dropout rate suggests that additional students may have joined the system in Class 9, which could be due to late enrollments or re-admissions.

3.3.1.8 Teacher-Student Ratio

The ASC2023-24 report provides detailed insights into the educational landscape in Orakzai, particularly focusing on the challenges and statistics related to primary education. The data indicates a significant gap between sanctioned teaching posts and the actual number of working teachers, which contributes to a high student-teacher ratio.

Table 3-43 Teacher-Student Ratio in Primary Schools

Category	Boys Enrollment	Girls Enrollment	Total Enrollment	Boys Working Teachers	Girls Working Teachers	Total Working Teachers	Student-Teacher Ratio
Orakzai	29,861	23,105	52,966	615	276	891	59.5:1

In the above Table 3-43 in Orakzai, the total enrollment in primary education is approximately 52,966 students, while the number of working teachers is 891. This results in a student-teacher ratio of about 59.5:1, indicating that nearly 60 students are assigned to each teacher.

Table 3-44 Teacher-Student Ratio in Middle, High and Higher Secondary Schools[51]

Category	Boys Enrollment	Girls Enrollment	Total Enrollment	Boys Working Teachers	Girls Working Teachers	Total Working Teachers	Student-Teacher Ratio
Orakzai	9286	1964	11250	444	221	665	16.91:1

Thus, the student-teacher ratio for Middle, High, and Higher Secondary Schools in Orakzai for the year 2023-24 is approximately 16.91:1. This means that there is roughly one teacher for every 17 students in these educational institutions.

3.3.1.9 Education Facilities Satisfaction – Tehsil-Wise Analysis (HIS Orakzai)

The survey results on satisfaction with existing educational facilities in Orakzai District present a mixed perspective. Overall, 57% of households expressed satisfaction, suggesting that more than half of the

[51] ANNUAL SCHOOL CENSUS 2023-24

population feels their educational needs are adequately met. However, a notable 43% of respondents reported dissatisfaction, indicating persistent challenges within the education sector.

At the tehsil level, Central, Lower, and Upper tehsils recorded higher dissatisfaction rates. In Central Tehsil, 43 households were satisfied while 53 were dissatisfied, reflecting a nearly balanced response. Lower Tehsil had 64 dissatisfied households, and Upper Tehsil showed the highest dissatisfaction with 90 households. These findings highlight the need for targeted interventions to enhance educational services, particularly in the Lower and Upper regions.

Improvements such as upgrading school infrastructure, expanding access, and ensuring quality education could help bridge these gaps and promote equitable learning opportunities across all tehsils.

Table 3-45 Education Facilities Satisfaction HIS Orakzai

Tehsil	Satisfied (Yes)	Dissatisfied (No)	Total Responses
Central	43	53	96
Ismail Zai	33	15	48
Lower	153	64	217
Upper	62	90	152
Total	291	222	513

This table summarizes the satisfaction levels regarding existing educational facilities across different tehsils, indicating that a majority (57%) of respondents are satisfied, while a significant portion (43%) expresses dissatisfaction.

The primary reasons for dissatisfaction, summarized in the table below, reveal that 50% of respondents cited the lack of qualified teaching staff as the major concern. Other notable issues include inadequate government and high school facilities, particularly in Central and Lower tehsils, as well as poor road access, which affects school attendance. Although concerns such as limited girls' facilities and substandard education were reported less frequently, they remain relevant for future planning and intervention.

Table 3-46 Reasons of Dissatisfaction- Tehsil-Wise

Reasons for Dissatisfaction	Central	Ismail Zai	Lower	Upper	Total	Percentage
Lack of Govt. School Facility in vicinity	13	5	13	0	31	14%
Lack of High School Facility in Vicinity	5	1	4	5	15	7%
Lack of Proper Road Access	10	5	7	5	27	12%
Lack of Qualified Staff	35	10	56	10	111	50%
Lack of Standard Education	5	5	12	5	27	12%
No middle and high school is there nearby	1	3	1	0	5	2%
No Proper Facility for Girls	2	0	4	0	6	3%
Total	71	29	97	25	222	100%

Regarding the affordability of education, 58% of households considered education affordable, while 42% disagreed. Lower Tehsil recorded the highest number of respondents finding education affordable, whereas Upper Tehsil had the largest share considering it unaffordable. This variation indicates uneven financial accessibility across the district.

Table 3-47 Education Facility Affordability- Tehsil-Wise

Tehsil	Affordable (Yes)	Not Affordable (No)	Total Responses
Central	62	34	96
Ismail Zai	29	19	48
Lower	145	72	217
Upper	60	92	152
Total	296	217	513

Suggestions for improvement, presented below, emphasize the need for qualified teaching staff (53%) as the top priority. The establishment of more schools and colleges (21%) also emerged as a key recommendation, particularly for underserved regions. Other suggestions included providing free books (2%), building boundary walls (1%), and offering scholarships (2%). Interestingly, 20% of respondents believed the education system was already satisfactory, mainly in Ismail Zai and Upper Tehsils.

Table 3-48 Suggestion to Improve Current Education System- Tehsil-Wise

Suggestion to Improve Education Facility	Central	Ismail Zai	Lower	Upper	Total	Percentage
Appoint Qualified Staff (Male & Female)	55	11	139	68	273	53%
More Schools, Colleges for Boys & Girls	35	3	46	24	108	21%
Free Books etc.	0	1	11	0	12	2%
No boundary wall in schools	0	1	0	4	5	1%
No suggestion; already in good condition	5	32	12	53	102	20%
Playground for Students	1	0	0	3	4	1%
Scholarships Facility	0	0	9	0	9	2%
Total	96	48	217	152	513	100%

3.3.1.10 Planning Standards for Establishing New Educational Institutions

According to the National Reference Manual of Planning and Infrastructure Standards, primary schools should be situated within existing or well-planned residential areas to effectively serve their communities. These institutions must be within a reasonable walking distance from homes and positioned away from busy roads. Secondary schools, on the other hand, need to be accessible by vehicles and provide safe pedestrian access, while also being distanced from high-traffic roads. Both primary and secondary schools are considered residential uses, and their optimal locations should be determined during the detailed planning phase of future housing developments. Colleges and universities that offer undergraduate and graduate programs should ideally be located in the Town Center. The following table presents location guidelines for establishing new educational institutions.

Table 3-49 Location Guidelines for New Educational Institutes[52]

Educational Institutions	Locational Guidelines
Primary School	-Proximity to existing and planned housing schemes. -Within walking distance from residences. -Centrally located in residential areas, away from busy roads. -Urban catchment area: 0.55-1 km; Rural catchment area: 2.2 km.
Secondary School	-Good vehicular access and safe pedestrian pathways. -Distance from opposite-gender schools. -Located away from main roads with heavy traffic. -Favorable Road linkages to their catchment area. -Urban catchment area: 1.25-2.45 km; Rural catchment area: 5-10 km.
Intermediate Colleges	-Urban boys' catchment area: 2.75-4 km; Rural boys' catchment area:10-15 km. -Urban girls' catchment area: 3.25-5 km.
Degree College	-Located in large cities.
University	-Situated in metropolitan areas.

The National Reference Manual of Planning and Infrastructure Standards provides a uniform framework for educational planning that takes into account population needs, educational levels, and resource allocation. It outlines land requirements essential for the effective establishment and management of educational facilities at various stages. For optimal planning, primary schools should be allocated 1.5 acres in rural areas and 2 acres in urban areas, middle schools require 2 acres, high schools should occupy 5 acres in urban and 4 acres in rural areas, while colleges should have approximately 15 acres. These allocations ensure sufficient space for infrastructure and essential facilities across all educational levels in both rural and urban contexts.

The Elementary and Secondary Education Department (E&SED) of Khyber Pakhtunkhwa bases its planning criteria for establishing or upgrading government schools primarily on enrollment thresholds, ensuring that schools are developed only in areas with adequate student populations to maintain viability and effective resource utilization.

The following table presents a comparative summary of the planning standards for establishing new educational institutions.

[52] Government of Pakistan, Ministry of Housing and Works, Environment and Urban Affairs Division. *National Reference Manual of Planning and Infrastructure Standards (NRM).* 6.1.6.1 Allocation Criteria

Table 3-50 Planning Standards for Establishing New Education Institutes

Standards	Education Level	Population	Enrollment	Distance from Nearby PS/SS	Land Requirement
National Reference Manual of Planning Standards	Primary (I-V)	7500 (Boys), 8200 (Girls)	-	(Urban) 0.5 Km; (Rural) 2.2 Km	1.5 Acre (Rural), 2 Acre (Urban)
	Secondary School (VI-X)	23,000 (Boys), 31,000 (Girls)	-	(Urban) 1.25 Km; (Rural) 5 Km	2 Acre
	Secondary School (XI-XII)	30,000 - 80,000 (Boys), 70,000 - 350,000 (Girls)	-	-	4 Acre (Urban), 5 Acre (Rural)
	College	0.4 million-1 million (Males); 0.75 million - 3.5 million (Females)	-	10 Km	15 Acre
Elementary & Secondary Education Department Standards for Plain Areas	Primary (I-V)	1000	-	160	Urban (1-2 Kanal), Rural (2 Kanal)
	Secondary (VI-XII)	Boys:50; Girls:40	Feeder Primary School: Boys:35; Girls:25 Feeder Middle School: Boys:150; Girls:100 Feeder High School: Boys:235; Girls:165	5 Km	Urban (4 Kanal), Rural (8 Kanal)
Elementary & Secondary Education Department Standards for Backward and Hilly Areas	Primary (I-V)	800	-	80	Urban (1-2 Kanal), Rural (2 Kanal)
	Secondary (VI-XII)	Boys:50; Girls:40	Feeder Primary School: Boys:25; Girls:20 Feeder Middle School: Boys:150; Girls:100 Feeder High School: Boys:100; Girls:80	2.5 Km	Urban (4 Kanal), Rural (8 Kanal)

The National Reference Manual of Planning and Infrastructure Standards offers a practical framework by considering population dynamics, educational levels, and land requirements for schools. This approach ensures efficient allocation of educational resources tailored to the specific needs of diverse communities, enhancing accessibility and effectiveness in education delivery. By projecting population growth and addressing existing gaps, educational authorities can strategically plan for future needs, thereby preventing shortages in educational resources and ensuring timely establishment of necessary facilities where they are most needed.

3.3.1.11 Need for New Educational facilities in District Orakzai

To evaluate the future requirements for educational infrastructure in District Kurram, a comprehensive assessment has been conducted to determine the adequacy and distribution of existing educational facilities ranging from Primary schools to higher secondary and university.

This evaluation follows the National Reference Manual (NRM) standards ensuring compliance with national benchmarks for accessibility and service delivery. The analysis incorporates demographic data from the 2023 Population Census, with population projections extended to 2025, 2030, and 2045, providing a long-term planning horizon for sustainable educational development.

In order to determine the existing educational gaps and the future demand for school infrastructure in District Kurram, a comprehensive assessment was conducted at the tehsil level. The evaluation covers three tiers of education Primary, Middle/Secondary, and High Schools and is based on demographic projections for the years 2025, 2030, and 2045.

The analysis follows a standardized **normative approach**, employing population-based ratios for boys and girls separately, in line with the recommended planning standards used for educational infrastructure development in Pakistan.

3.3.1.11.1 Methodology and Analytical Approach

The consultant applied a stepwise calculation procedure to estimate both existing backlogs and future requirements of educational facilities across all tehsils. The methodology integrates population projections with gender-based school coverage standards, as outlined below:

Primary Schools

- One Boys Primary School per 7,500 population
- One Girls Primary School per 8,300 population

Middle/Secondary Schools

One Boys Middle/Secondary School per 23000population

- One Girls Middle/Secondary School per 31000 population

For each tehsil, the following steps were undertaken:

1. The total projected population for 2025, 2030, and 2045 was divided by the corresponding gender-based ratios to estimate required facilities.
2. The existing number of schools was subtracted from the calculated requirement to determine the current backlog.

3. The same procedure was repeated for the 2030 and 2045 horizons, identifying the short-term (up to 2030) and long-term (up to 2045) infrastructure needs.
4. Finally, the existing stock of schools was subtracted from the 2045 requirement to derive the additional demand for the plan period.

3.3.1.11.2 Tehsil-Wise Analysis & Requirements

A. Primary Schools

Table 3-51 District Orakzai Primary School Backlog & Requirement

Tehsil	Population (2025)	Population (2030) Short Term	Population (2045)	Existing Primary Schools	Boys	Girls	Gap 2025	Boys	Girls	Boys	Girls	Additional Requirement 2045	Additional Demand	Demand 2045
					Existing Requirements 2025	Existing Requirements 2025		Requirements 2030	Requirements 2030	Requirements2045	Requirements2045	Boys	Girls	
Upper	136796	156373	228432	27	18	17	8	21	19	30	28	12	11	31
Central	96784	107206	143590	39	13	12	-14	14	13	19	18	6	6	-2
Lower	130015	141160	176095	80	17	16	-47	19	17	23	21	6	6	-35
Ismail Zai	40156	43815	49115	13	5	5	-3	6	5	7	6	1	1	0
Overall	403751	448554	597232	159	54	49	-56	60	55	80	73	26	24	-7

B. Middle and Secondary Schools

Table 3-52 District Orakzai Middle/Secondary School Backlog & Requirement

Tehsil	Population (2025)	Population (2030) Short Term	Population (2045)	Existing Middle/Secondary Schools	Boys	Girls	Gap 2025	Boys	Girls	Boys	Girls	Additional Requirement 2045	Additional Demand	Demand 2045
					Existing Requirements 2025	Existing Requirements 2025		Requirements 2030	Requirements 2030	Requirements2045	Requirements2045	Boys	Girls	
Upper	136796	156373	228432	15	6	4	-5	7	5	10	7	4	3	2
Central	96784	107206	143590	26	4	3	-19	5	3	6	5	2	2	-15
Lower	130015	141160	176095	88	6	4	-78	6	5	8	6	2	1	-75
Ismail Zai	40156	43815	49115	6	2	1	-3	2	1	2	2	0	0	-2
Overall	403751	448554	597232	135	18	13	-104	20	14	26	19	8	6	-90

3.3.1.11.3 Proposed Urban Areas Analysis & Requirements

A. Primary Schools

Table 3-53 District Orakzai Urban Areas Primary School Backlog

Urban Area	Population (2025)	Population (2030) Short Term	Population (2045)	Existing Primary Schools	Boys	Girls	Gap 2025	Boys	Girls	Boys	Girls	Additional Demand	Additional Demand	Demand 2045
					Existing Requirements 2025	Existing Requirements 2025		Requirements 2030	Requirements 2030	Requirements2045	Requirements2045	Boys	Girls	
Kalaya	21632	24985	41202	29	3	3	-23	3	3	5	5	3	2	-18
Ghiljo	7338	7888	10637	2	1	1	0	1	1	1	1	0	0	1
Dabori	5223	6308	16068	2	1	1	-1	1	1	2	2	1	1	2
Overall	34193	39181	67907	33	5	4	-24	5	5	9	8	4	4	-16

B. Middle and Secondary Schools

Table 3-54 District Orakzai Urban Areas Middle and Secondary Schools Backlog

Urban Area	Population (2025)	Population (2030) Short Term	Population (2045)	Existing Middle/Secondary Schools	Boys	Girls	Gap 2025	Boys	Girls	Boys	Girls	Additional Demand	Additional Demand	Demand 2045
					Existing Requirements 2025	Existing Requirements 2025		Requirements 2030	Requirements 2030	Requirements2045	Requirements2045	Boys	Girls	
Kalaya	21632	24985	41202	50	1	1	-48	1	1	2	1	1	1	-47
Ghiljo	7338	7888	10637	6	0	0	-5	0	0	0	0	0	0	-5
Dabori	5223	6308	16068	4	0	0	-4	0	0	1	1	0	0	-3
Overall	34193	39181	67907	60	1	1	-57	2	1	3	2	1	1	-55

3.3.1.11.4 Area requirements for Education institutes

3.3.1.11.4.1 Tehsil Wise Area Requirements 2045

The below table presents the projected requirements for primary and middle/secondary educational institutions across the tehsils of District Orakzai by the year 2045. The assessment evaluates the existing educational infrastructure against projected population growth and identifies areas where additional institutions or land allocations may be required.

A. Primary Schools Area Requirements 2045

The analysis of primary school requirements indicates varying levels of demand across the tehsils of District Orakzai. Upper Tehsil shows a requirement for 31 additional primary schools, corresponding to a land requirement of approximately 7.83 acres. This reflects significant population growth and indicates that Upper Tehsil will require expansion of primary educational infrastructure to ensure adequate access to basic education.

In contrast, Lower Tehsil shows a surplus of 2 primary schools, while Central Tehsil reflects a larger surplus of 35 institutions, indicating that the existing educational infrastructure in these areas is sufficient to meet projected demand. Similarly, Ismail Zai Tehsil shows a balanced situation with no additional institutions required. Despite the requirement in Upper Tehsil, the district overall shows a net surplus of 7 primary schools when aggregated across all tehsils. However, due to the localized deficit in Upper Tehsil, an additional 7.83 acres of land will still be required to accommodate the necessary new primary schools in that area.

B. Middle/Secondary Schools Area Requirements 2045

The analysis of middle and secondary schools reveals that most tehsils in District Orakzai have an adequate or surplus supply of institutions. Upper Tehsil requires 2 additional middle/secondary schools, which corresponds to a land requirement of approximately 1.15 acres. This indicates the need for limited expansion to support students progressing from primary education.

However, other tehsils show significant surpluses of middle and secondary institutions. Lower Tehsil shows a surplus of 15 institutions, Central Tehsil shows a surplus of 75 institutions, and Ismail Zai Tehsil shows a surplus of 2 institutions. When combined at the district level, this results in an overall surplus of 90 middle and secondary schools. Despite this overall surplus, a small land allocation of 1.15 acres is required to address the localized deficit in Upper Tehsil.

Combining both primary and middle/secondary school requirements, the total additional land requirement for educational facilities in District Orakzai by 2045 is estimated at 8.98 acres. The majority of this requirement is concentrated in Upper Tehsil, where population growth has created localized demand for additional educational institutions. Overall, the analysis suggests that while District Orakzai has sufficient educational infrastructure in several tehsils, targeted expansion will be necessary to ensure balanced spatial distribution and equitable access to educational services across the district.

Table 3-55 Tehsil Wise Educational Facilities Area Requirements

Primary Schools Requirements		
Tehsil	**Required Institutes 2045**	**Required Area (Acres)**
Upper	31	7.83
Lower	-2	0.00
Central	-35	0.00
Ismail Zai	0	0.00
Overall	**-7**	**7.83**
Middle/Secondary Schools Requirements		
Tehsil	**Required Institutes 2045**	**Required Area (Acres)**
Upper	2	1.15
Lower	-15	0.00
Central	-75	0.00
Ismail Zai	-2	0.00
Overall	**-90**	**1.15**
Total Area Requirements		**8.98**

3.3.1.11.4.2 Urban Areas Requirements

The below table presents the projected requirements for primary and middle/secondary educational facilities in the main urban centers of District Orakzai—Kalaya, Ghiljo, and Dabori—by the year 2045. The analysis compares existing educational infrastructure with projected population demand to determine whether additional institutions or land allocations will be required in these urban areas.

A. Primary Schools Requirements

The assessment of primary school requirements indicates that most urban areas in District Orakzai already possess sufficient infrastructure to meet future demand. Kalaya, which is the primary urban center of the district, shows a surplus of 18 primary schools, indicating that the existing educational facilities are adequate to accommodate projected population growth. Consequently, no additional land allocation is required for primary education in Kalaya.

In Ghiljo, however, a small deficit is projected, with one additional primary school required by 2045. This translates into a land requirement of approximately 0.25 acres. Similarly, Dabori shows a requirement for two additional primary schools, corresponding to a land requirement of 0.50 acres. These modest requirements reflect localized population growth and the need to ensure equitable access to primary education within these urban centers.

Overall, although the district's urban areas collectively show a net surplus of 15 primary schools, a small land allocation of 0.75 acres is still required to accommodate the new primary schools needed in Ghiljo and Dabori.

B. Middle and Secondary Schools Requirements

The analysis of middle and secondary school requirements indicates that existing educational infrastructure in all urban areas of District Orakzai is sufficient to meet future demand. Kalaya shows a surplus of 47 institutions, Ghiljo shows a surplus of 5 institutions, and Dabori shows a surplus of 3 institutions. These surpluses indicate that current middle and secondary schools have adequate capacity to serve the projected population.

As a result, no additional land allocation is required for middle or secondary educational institutions across the urban centers of the district.

Combining both primary and middle/secondary school requirements, the total additional land requirement for urban educational facilities in District Orakzai by 2045 is estimated at 0.75 acres. This relatively small requirement reflects the fact that most urban areas already possess adequate educational infrastructure. Future planning efforts should therefore focus primarily on improving the quality and accessibility of existing schools rather than large-scale expansion, while ensuring that the limited additional requirements in Ghiljo and Dabori are accommodated within urban development plans.

Table 3-56 Urban Area Wise Educational Facilities Area Requirements

Primary Schools Requirements		
Urban Area	**Required Institutes 2045**	**Required Area (Acres)**
Kalaya	-18	0.00
Ghiljo	1	0.25
Dabori	2	0.50
Overall	**-15**	0.75
Middle/Secondary Schools Requirements		
Urban Area	**Required Institutes 2045**	**Required Area (Acres)**
Kalaya	-47	0.00
Ghiljo	-5	0.00
Dabori	-3	0.00
Overall	**-55**	**0.00**
Total Area Requirements		**0.75**

3.3.1.11.5 District-Level Synthesis

Cumulatively, the analysis indicates that by 2045, District Orakzai will require limited expansion in educational infrastructure, as most existing institutions already meet projected demand. At the primary level, a localized requirement of 31 additional primary schools is identified in Upper Tehsil and 3 schools in urban areas, although the district overall reflects a net surplus of 7 primary schools.

At the middle and secondary level, the district shows a significant surplus of approximately 90 institutions, with only 2 additional schools required in Upper Tehsil. Urban areas also demonstrate a surplus of 55 middle/secondary schools, indicating adequate existing capacity.

Overall, the total additional land requirement for educational facilities by 2045 is approximately 9.73 acres, including 8.98 acres at the district level and 0.75 acres within urban areas, mainly to address localized gaps in Upper Tehsil and selected urban centers..

3.3.1.11.6 Planning Implications and Recommendations

1. **Short-Term (2025–2030):**
    - Address the most critical gaps in Primary and Middle Schools, particularly in Central Kurram, where school-to-population ratios fall below provincial standards.
    - Implement gender-sensitive planning, ensuring each tehsil receives an equitable share of girls' schools.
2. **Medium-Term (2030–2045):**
    - Upgrade existing Middle Schools to High Schools based on enrollment trends and catchment population growth.
    - Improve school infrastructure standards, including classrooms, sanitation, boundary walls, and access roads.
    - Establish composite education complexes in remote areas to integrate primary, middle, and high-level education under one management structure.
    - Encourage public-private partnerships (PPP) and community-led school initiatives for sustainable expansion.

3.3.1.11.7 Conclusion

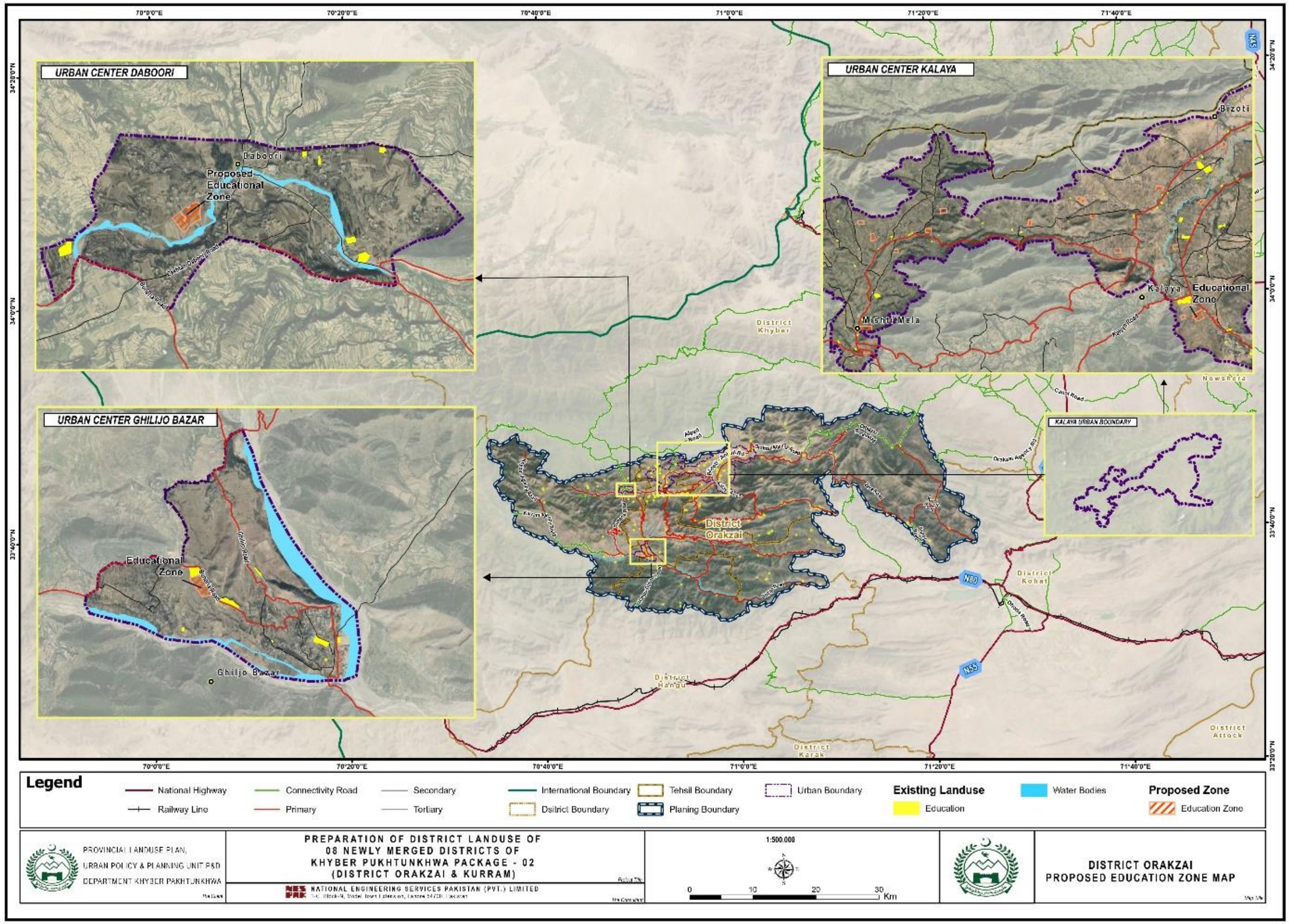
The education sector of District Kurram faces a substantial infrastructure and service delivery deficit that could widen with population growth if timely interventions are not implemented. The outlined plan provides a quantitative roadmap for addressing both gender and spatial disparities through phased investment and capacity enhancement by 2045. Effective implementation of these recommendations will not only improve educational access and quality but also contribute significantly to the district's social development and human capital formation.

3.3.1.12 Constraints

- Low literacy rate (overall 34–38%, female literacy 12–15%).
- High gender disparity; limited access to girls' middle and secondary schools.
- Inadequate school infrastructure (lack of boundary walls, toilets, clean water, electricity).
- Many schools are non-functional or partially functional due to damaged buildings or lack of staff.
- Shortage of qualified teachers, especially in science, English, and mathematics.
- Teacher absenteeism and weak supervision mechanisms.
- Difficult terrain and dispersed settlements limit school accessibility.
- Few middle, high, and higher secondary schools.
- Absence of vocational and technical education institutions.
- Poor coordination between education authorities and district administration.
- Weak data management and monitoring systems.

3.3.1.13 Recommendation

- Establish new schools especially middle and secondary level for girls in underserved areas.
- Rehabilitate and upgrade existing school infrastructure (boundary walls, sanitation, water, electricity).
- Recruit more qualified teachers, with priority for female teachers from local communities.
- Conduct regular teacher training and introduce strict monitoring for attendance and performance.
- Launch incentive programs for girls' education (stipends, uniforms, school meals).
- Set up technical and vocational training centers linked to local employment opportunities.
- Strengthen education governance through a District Education Management Information System (EMIS).
- Enhance coordination between the Education Department, NGOs, and Planning & Development bodies.
- Promote community participation through School Management Committees (SMCs) and awareness campaigns.
- Introduce digital and remote learning initiatives for remote or mountainous areas.
- Encourage public–private partnerships to support infrastructure and skill-based education.



Map 3-14 Proposed Educational Zones Map

3.3.2 Health

While all social sectors in land use planning are important, the health sector deserves particular attention because of its crucial role in sustainability. The link between health and sustainability is so strong that many often overlook how the design, structure, and functionality of communities directly affect human well-being. Land use decisions shape the physical development of communities and profoundly influence the health of residents and workers. There is a clear connection between healthy eating, physical activity, and the growing incidence of obesity, diabetes, heart disease, asthma, and other health issues. Increasing evidence shows that certain development practices and land use patterns contribute to these problems especially when they discourage physical activity, restrict access to nutritious food, or expose neighborhoods to environmental pollutants that aggravate conditions like asthma.

Recognizing this relationship, it is vital to adopt comprehensive policies and strategies that promote healthy community design and sustainable construction practices. Such measures should address challenges related to physical inactivity, poor diet, and environmental risks. Ongoing initiatives to educate policymakers, media, and the public on these issues are gaining strength, while efforts to bridge collaboration between public health experts and planning professionals continue to expand, fostering healthier and more sustainable communities.

3.3.2.1 Existing Health Facilities

Improved human health is directly linked to overall happiness and well-being, playing a vital role in social and economic development. A healthy population is more productive, efficient, and contributes significantly to community progress. The health status of a region depends on multiple factors, including nutrition, access to clean drinking water, sanitation, environmental conditions, sports, education, public awareness, health services, resources, and technology. These elements are essential not only for disease prevention but also for enhancing the overall quality of life.

In Khyber Pakhtunkhwa, the government's health infrastructure has experienced fluctuations in recent years. As of January 2023, there are 192 government hospitals with a total of 22,266 beds, compared to 204 hospitals and 21,267 beds in 2022. The number of dispensaries has remained unchanged at zero for both years, while Rural Health Centers (RHCs) declined from 118 in 2022 to 75 in 2023. Similarly, the number of tuberculosis clinics decreased to 126 in 2023, with 1,835 beds allocated for TB treatment. These figures highlight ongoing challenges in healthcare service delivery, particularly in addressing the needs of the merged areas of the province, as reported by the Director General Health Services, Khyber Pakhtunkhwa, Peshawar.

A health facility is defined as an institution providing both curative and preventive care to the population, serving both outpatients and inpatients. In District Orakzai, these facilities are classified into two main categories: government and private institutions.

3.3.2.2 Government Health Facilities

Orakzai District in Khyber Pakhtunkhwa maintains a structured healthcare system comprising 66 health facilities serving its population. These include 5 hospitals with a total of 270 beds, 30 dispensaries, 1 Rural Health Center (RHC) with 8 beds, 6 T.B. clinics, and 24 Basic Health Units (BHUs) that currently have no designated beds. The health department continues to allocate substantial funds to improve these services and ensure facilities are adequately equipped to meet community needs.

Table 3-57 Existing Government Health Institutions and Bed Strength in Orakzai[53]

Facility Type	Number	Bed Strength
Hospitals	5	270
Dispensaries	30	0
Rural Health Centers	1	8
T.B Clinics	6	0
Basic Health Units	24	0

The above table summarizes the number of government health institutions and their bed strengths specifically in Orakzai District.

Currently, there is no available data on registered private health facilities, indicating a potential service gap outside the public sector. This absence of information suggests limited private healthcare options for residents.

With an estimated population of 387,561, Orakzai faces major healthcare challenges given its limited infrastructure. The 5 government hospitals collectively offer 270 beds, resulting in a population-to-bed ratio of approximately 1,435 people per bed. This figure reflects significant pressure on existing facilities, highlighting the need for expansion to better meet the community's healthcare demands.

Table 3-58 District Wise Population per Government Hospital/Dispensary Bed in Orakzai[54]

Metric	Value
Estimated Population	387,561 (2023)
Total Beds in Government Hospitals	270
Population per Bed	1,435

The above table summarizes the healthcare capacity in Orakzai District, reflecting the challenges faced by the local healthcare system in relation to its population size.

In terms of healthcare personnel, the district has a limited workforce comprising 17 doctors, 1 dental surgeon, 7 nurses, 52 nurse dais, 16 Lady Health Visitors (LHVs), and 226 other paramedical staff, with no radiologists available. This shortage of professionals further challenges effective healthcare delivery within the district.

Table 3-59 Healthcare Professionals in Orakzai District[55]

Profession	Number
Doctors	17
Radiologists	0
Dental Surgeons	1
Nurses	7
Nurse Dais	52
Lady Health Visitors (LHVs)	16
Other Paramedical Staff	226

[53] Development Statistics Khyber Pakhtunkhwa, 2024
[54] Development Statistics Khyber Pakhtunkhwa, 2024 Table No. 108
[55] D.H.I.S, DG Health Services, Khyber Pakhtunkhwa, Peshawar

This table summarizes the available healthcare professionals in Orakzai District, reflecting the need for more trained personnel to enhance healthcare delivery in the region.

3.3.2.2.1 Community Satisfaction Survey

The Household Information Survey (HIS) conducted in District Orakzai provides valuable insights into public perception and the quality of existing healthcare services. According to the findings, 36% of respondents expressed satisfaction with available health facilities, while a significant 64% reported dissatisfaction.

Table 3-60 Town/Tehsil wise Health Satisfactory Survey

Town/Tehsil	Yes (Satisfied)	No (Not Satisfied)	Total Responses	Satisfaction Percentage
Central	27	69	96	28.1%
Ismail Zai	29	19	48	60.4%
Lower	86	131	217	39.7%
Upper	44	108	152	29.0%
Total	186	327	513	36%

The table above summarizes satisfaction levels across the district, showing notable variations between tehsils. Ismail Zai recorded the highest satisfaction rate (60.4%), indicating relatively better service delivery and accessibility. In contrast, Central, Lower, and Upper tehsils show lower satisfaction levels, reflecting gaps in healthcare infrastructure and service quality.

These findings highlight the need for targeted interventions to improve healthcare delivery in areas with low satisfaction rates. Efforts should focus on strengthening medical staffing, enhancing facility infrastructure, and ensuring consistent availability of essential healthcare services.

Overall, the HIS results underline the importance of continuous monitoring and evaluation to address public concerns and improve the overall quality of healthcare across all tehsils in District Orakzai.

3.3.2.2.2 Reason Dissatisfaction

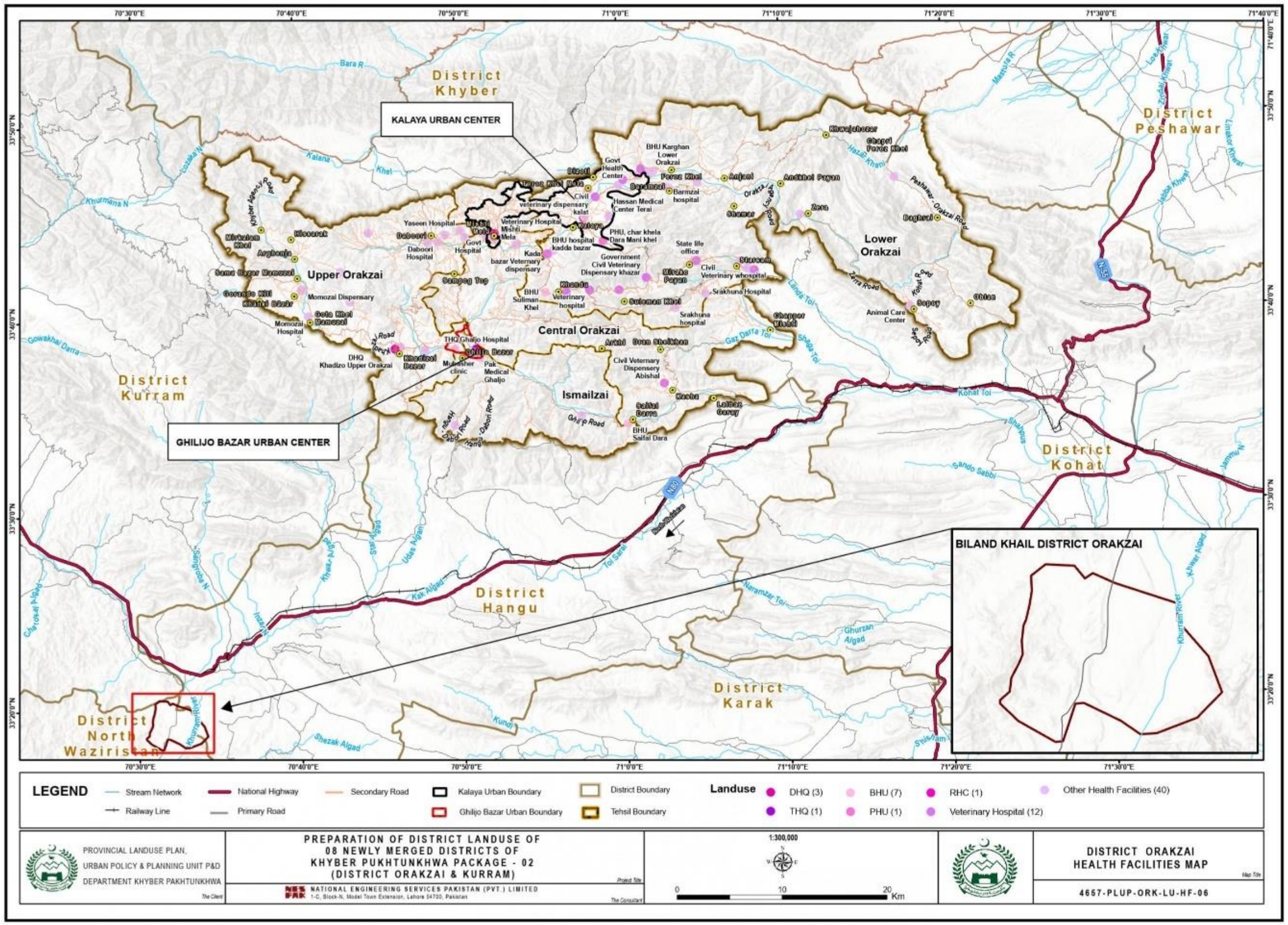
The main cause of dissatisfaction, reported by 48% of respondents, is the lack of professional doctors, modern medical equipment, and proper healthcare facilities. This highlights a major gap in the quality of health services available in the district. Another 16% of respondents mentioned poor road infrastructure, which makes it difficult for patients to reach hospitals on time. Additionally, 36% of respondents pointed out that there are no properly equipped hospitals in their areas, and only small clinics offering basic medicines and limited care are available.

These findings clearly indicate the urgent need to improve healthcare infrastructure in District Orakzai. Priority should be given to hiring skilled medical professionals, providing modern equipment, and improving road access to health centers. Strengthening these areas will help in improving healthcare delivery and ensuring better access to medical services for the local population.

Table 3-61 Reasons for Dissatisfaction of Health Facilities - Tehsil-Wise[56]

Reasons for Dissatisfaction	Central	Ismail Zai	Lower	Upper	Total	Percentage
Lack of professional and skilled doctors, state-of-the-art medical equipment and facilities	29	2	83	44	158	48%
Lack of road infrastructure to reach hospitals in time	9	17	-	25	51	16%
No proper medically equipped hospitals in our area, only small clinics with basic medicine	31	-	48	39	118	36%
Total	69	19	131	108	327	100%

[56] HIS survey (Orakzai)



Map 3-15 Existing Health Facilities, District Orakzai

3.3.2.3 Planning Standards for Establishing New Health Facilities

The allocation of new health facilities varies significantly across provinces and countries, with distinct standards established to address specific regional needs. This divergence is evident in criteria such as population thresholds, bed capacities, land requirements, and proximity to existing health facilities. The following table outlines the standards set forth by authoritative bodies, including the National Reference Manual for Infrastructure and Planning, the Khyber Pakhtunkhwa Minimum Service Delivery Standards (MSDS) Reference Manual, and the Punjab Government Standards. These standards reflect the nuanced considerations governing the establishment of new healthcare infrastructure.

Table 3-62 Planning Standards for Establishing New Health Facilities

Standards	Type of Health Facility	Population	Catchment Area	Number of Beds	Land Requirement
National Reference Manual of Planning and Infrastructure Standards	BHU	5,000 to 10,000		N/A	1,250 - 2,500 m^2
	RHC	50,000 to 73,000		Up to 25	0.6 Hectare
	THQ	1 per tehsil		60	2 Hectares
	DHQ	1 per district		100 - 250	5 - 8 Hectares
	General Hospital	In large cities		100 - 250	3 - 7 Hectares
	Specialized Hospital	In metropolitan city		N/A	55 - 75 m^2/bed
Khyber Pakhtunkhwa Minimum Service Delivery Standards (MSDS) Reference Manual	BHU	Urban: 15000–20000 Rural: 10000-15000	7-10 km	N/A	I. 10.75 Kanals, Availability of Roads, Electricity and Water. II. Distance from other BHU or higher-level health facility should be 7-10 km.
	RHC	45000-60000	25-35 km	50-60 da patients per day per BHU	10.75 kanals, Availability of Roads, Electricity and Water. Education facilities at least

					one college or HSS in vicinity. Distance from other nearest RGC/Civil Hospital in range of 25-35 km. post office
	Category-D	N/A		43	20 - 30 Kanals
	Category-C	N/A		112	40 - 50 Kanals
	Category-B	N/A		222	60 Kanals
	Category-A	1 million		350	70 Kanals

Based on the data presented in the table above, the consultant has chosen to utilize the National Reference Manual (NRM) standards for the allocation of new health facilities. These standards delineate specific criteria, including population thresholds, required bed numbers, and necessary land area tailored to meet the unique needs of respective regions. The consultant's approach extends beyond numerical considerations; it also incorporates a thorough review of the accessibility of first aid units to nearby population centers. By integrating established NRM standards with accessibility considerations, the consultant aims to ensure a comprehensive and well-informed decision-making process in allocating new health facilities.

This strategic planning is essential for improving healthcare access and ensuring that health services are effectively distributed across regions, ultimately contributing to better health outcomes for the population.

3.3.2.4 Need for New Health Facilities in District Orakzai

To evaluate the future requirements for healthcare infrastructure in **District Orakzai**, a comprehensive assessment has been conducted to determine the adequacy and distribution of existing health facilities ranging from Basic Health Units (BHUs) to hospitals and specialized healthcare centers.

This evaluation follows the National Reference Manual (NRM) standards and the Khyber Pakhtunkhwa Minimum Service Delivery Standards (MSDS), ensuring compliance with national benchmarks for accessibility and service delivery. The analysis incorporates demographic data from the 2023 Population Census, with population projections extended to 2025, 2030, and 2045, providing a long-term planning horizon for sustainable healthcare development.

3.3.2.4.1 Tehsil Wise Health Facilities Gap and Demand as per the NRM (National Reference manual)

District Kurram is administratively divided into four tehsils, namely Upper Orakzai, Lower Orakzai, Central Orakzai and Ismail Zai. A detailed gap analysis was carried out for each tehsil based on the NRM population-to-facility ratio, where:

- One BHU serves 10,000 people
- One Rural Health Centre (RHC) serves 73,000 people

Using these standards, the consultant identified the existing service gaps and projected short-term (2030) and long-term (2045) requirements. The procedure involved dividing the projected population by the NRM-defined threshold for each facility type and then subtracting the number of existing facilities to determine the backlog and demand.

The results indicate significant disparities in facility distribution and highlight the urgent need for capacity enhancement, especially in Central Kurram, which demonstrates the largest service gap due to a growing population base and limited infrastructure.

Table 3-63 Tehsil Upper Orakzai Health Facilities Backload and Requirements 2045

Type of Health Facility	Existing Health Facility	Population (2025)	Backlog 2025	Population (2030)	2030 Requirement (Short Term)	Population (2045)	Demand 2045 (long term)
BHU	6	136796	8	156373	16	228432	15
RHC	0		2		2		3
THQ	0		1		0		Upgradation
Specialized Hospital	0		0		0		0

Table 3-64 Tehsil Central Orakzai Health Facilities Backload and Requirements 2045

Type of Health Facility	Existing Health Facility	Population (2025)	Backlog 2025	Population (2030)	2030 Requirement (Short Term)	Population (2045)	Demand 2045 (long term)
BHU	0	96784	10	107206	11	143590	13
RHC	0		1		1		2
THQ	0		1		0		Upgradation
DHQ	1		0		0		Upgradation
Specialized Hospital	2		0		0		0

Table 3-65 Tehsil Lower Orakzai Health Facilities Backload and Requirements 2045

Type of Health Facility	Existing Health Facility	Population (2025)	Backlog 2025	Population (2030)	2030 Requirement (Short Term)	Population (2045)	Demand 2045 (long term)
BHU	6	130015	7	141160	14	176095	10
RHC	1		1		2		1
THQ	0		1		0		Upgradation
Specialized Hospital	10		0		0		0

Table 3-66 Tehsil Ismail Zai Health Facilities Backload and Requirements 2045

Type of Health Facility	Existing Health Facility	Population (2025)	Backlog 2025	Population (2030)	2030 Requirement (Short Term)	Population (2045)	Demand 2045 (long term)
BHU	1	40156	3	43815	4	49115	4
RHC	1		0		1		0
DHQ	0		1		0		Upgradation
Specialized Hospital	0		0		0		0

3.3.2.4.2 Urban Area Wise Health Facilities Gap and Demand as per the NRM (National Reference manual)

A detailed gap analysis was carried out for each Urban Area based on the NRM population-to-facility ratio, where:

- One BHU serves 10,000 people
- One Rural Health Centre (RHC) serves 73,000 people

Using these standards, the consultant identified the existing service gaps and projected short-term (2030) and long-term (2045) requirements. The procedure involved dividing the projected population by the NRM-defined threshold for each facility type and then subtracting the number of existing facilities to determine the backlog and demand.

The results indicate significant disparities in facility distribution and highlight the urgent need for capacity enhancement, which demonstrates the largest service gap due to a growing population base and limited infrastructure.

Table 3-67 Kalaya Urban Canter Health Facilities Backload and Requirements 2045

Type of Health Facility	Existing Health Facility	Population (2025)	Backlog 2025	Population (2030)	2030 Requirement (Short Term)	Population (2045)	Demand 2045 (long term)
BHU	2	21632	0	24985	2	41202	2
DHQ	1		0		0		0
THQ	1		0		0		Upgradation

Table 3-68 Dabori Urban Canter Health Facilities Backload and Requirements 2045

Type of Health Facility	Existing Health Facility	Population (2025)	Backlog 2025	Population (2030)	2030 Requirement (Short Term)	Population (2045)	Demand 2045 (long term)
BHU	2	5223	-1	6308	1	16068	-1
THQ	1		1		0		Upgradation
Specialized Hospital	0		0		0		0

Table 3-69 Ghiljo Urban Canter Health Facilities Backload and Requirements 2045

Type of Health Facility	Existing Health Facility	Population (2025)	Backlog 2025	Population (2030)	2030 Requirement (Short Term)	Population (2045)	Demand 2045 (long term)
BHU	3	7338	-2	7888	1	10637	-2
THQ	1		1		0		Upgradation
Specialized Hospital	0		0		0		0

3.3.2.5 Area Requirements for Health Facilities

3.3.2.5.1 Tehsil Wise Area Requirements

The table presents the projected requirements for health facilities across the tehsils of District Orakzai by the year 2045. The analysis focuses on three key categories of healthcare infrastructure: Basic Health Units (BHUs), Rural Health Centers (RHCs), and higher-level hospitals (THQ/DHQ). The

projections are based on population growth and service standards to ensure adequate healthcare coverage throughout the district.

A. Tehsil Upper Orakzai

In Upper Orakzai, the projections indicate the need for 18 additional healthcare institutions by 2045. This includes 15 Basic Health Units (BHUs) requiring approximately 11.25 acres of land and 3 Rural Health Centers (RHCs) requiring 4.50 acres. Instead of constructing a new Tehsil Headquarters (THQ) hospital, the plan proposes upgradation of the existing facility, suggesting that the current infrastructure can be improved to meet future healthcare demands without requiring additional land. Overall, Upper Orakzai will require 15.75 acres of land to accommodate the proposed expansion of primary and secondary healthcare services.

B. Tehsil Central Orakzai

Central Orakzai shows the second highest requirement for healthcare facilities. A total of 15 additional institutions are required, including 13 BHUs with a land requirement of 9.75 acres and 2 RHCs requiring 3.00 acres. The existing THQ and DHQ hospitals are proposed for upgradation rather than expansion, which indicates a focus on improving the capacity and quality of existing higher-level healthcare facilities. The total land required for health infrastructure expansion in Central Orakzai is estimated at 12.75 acres.

C. Tehsil Lower Orakzai

In Lower Orakzai, the healthcare projections indicate the need for 11 additional institutions, including 10 BHUs requiring 7.50 acres and 1 RHC requiring 1.50 acres. Similar to other tehsils, the THQ hospital is proposed for upgradation rather than new construction. The overall land requirement for healthcare facilities in Lower Orakzai is 9.00 acres.

D. Tehsil Ismail Zai

Ismail Zai Tehsil shows relatively lower healthcare infrastructure requirements compared to the other tehsils. The projections indicate the need for 4 additional BHUs, which will require approximately 3.00 acres of land. No additional RHCs are required in this tehsil, and the existing THQ hospital is proposed for upgradation. The total land requirement for healthcare expansion in Ismail Zai is therefore 3.00 acres.

At the district level, the projections indicate the need for a total of 48 additional healthcare institutions across District Orakzai by 2045. The majority of these are Basic Health Units, reflecting the planning emphasis on strengthening primary healthcare services at the community level. The total additional land required for these facilities is estimated at 40.50 acres.

The strategy also emphasizes upgradation of existing THQ and DHQ hospitals rather than constructing new higher-tier facilities, ensuring that existing institutional infrastructure is strengthened while expanding primary healthcare coverage. This approach promotes improved accessibility to healthcare services, particularly in rural and remote areas of the district.

Table 3-70 Tehsil Wise Health Facilities Area Requirements

Tehsil Upper Orakzai		
Facility	**Required Institutes 2045**	**Required Area (Acres)**
BHU	15	11.25
RHC	3	4.50
THQ	Upgradation	
Overall	**18**	**15.75**
Tehsil Central Orakzai		
Facility	**Required Institutes 2045**	**Required Area (Acres)**
BHU	13	9.75
RHC	2	3.00
THQ	Upgradation	0.00
DHQ	Upgradation	0.00
Overall	**15**	**12.75**
Tehsil Lower Orakzai		
Facility	**Required Institutes 2045**	**Required Area (Acres)**
BHU	10	7.50
RHC	1	1.50
THQ	Upgradation	
Overall	**11**	**9.00**
Tehsil Ismail Zai		
Facility	**Required Institutes 2045**	**Required Area (Acres)**
BHU	4	3.00
RHC	0	0.00
THQ	Upgradation	
Overall	**4**	**3.00**
Total Area Requirements		**40.50**

3.3.2.5.2 Urban Area Requirements

The table below presents the projected healthcare facility requirements for the major urban centers of District Orakzai Kalaya, Dabori, and Ghiljo by the year 2045. The analysis focuses primarily on the provision of Basic Health Units (BHUs) to strengthen primary healthcare coverage, while higher-level hospitals such as District Headquarters (DHQ) and Tehsil Headquarters (THQ) are proposed for upgradation to improve service capacity and quality.

A. Kalaya Urban Area

In Kalaya Urban Area, which serves as the principal urban and administrative center of District Orakzai, the projections indicate a requirement of 7 additional Basic Health Units (BHUs) by 2045. These facilities will require approximately 5.25 acres of land. Instead of establishing a new district-level hospital, the plan proposes upgradation of the existing DHQ hospital, which will allow the facility to accommodate increased demand for specialized healthcare services without requiring additional land allocation. This approach emphasizes strengthening the existing healthcare infrastructure while expanding primary healthcare access.

B. Dabori Proposed Urban Area

For Dabori Urban Area, the projections indicate the need for 8 additional BHUs, requiring approximately 6.00 acres of land. In addition to expanding primary healthcare services, the existing THQ hospital is proposed for upgradation, ensuring improved healthcare service delivery for the growing urban population. This strategy will enhance both primary and secondary healthcare accessibility within the urban center and surrounding areas.

C. Ghiljo Proposed Urban Area

In the Ghiljo Proposed Urban Area, which is expected to experience future urban development, the analysis identifies a requirement for 4 additional BHUs, corresponding to a land requirement of 3.00 acres. The table also indicates the presence of a THQ hospital, although no additional land allocation is proposed for this facility, suggesting that the existing infrastructure may be sufficient or planned within the broader urban development framework.

Overall, the projected healthcare development across the urban areas of District Orakzai requires a total of 19 additional BHUs by the year 2045, with a combined land requirement of approximately 14.25 acres. The proposed strategy focuses primarily on strengthening primary healthcare services through BHUs, while enhancing the capacity of higher-tier hospitals through upgradation rather than new construction. This approach ensures improved healthcare accessibility, efficient use of existing infrastructure, and better service coverage for the growing urban population

Table 3-71 Urban Centers Health Facilities Area Requirements

Kalaya Urban Area		
Facility	**Required Institutes 2045**	**Required Area (Acres)**
BHU	7	5.25
DHQ	Upgradation	
Dabori Urban Area		
Urban Area	**Required Institutes 2045**	**Required Area (Acres)**
BHU	8	6.00
THQ	Upgradation	
Ghiljo Proposed Urban Area		
Urban Area	**Required Institutes 2045**	**Required Area (Acres)**
BHU	4	3.00
THQ		
Total Area Requirements		**14.25**

3.3.2.6 Constraints and Challenges in Healthcare for District Orakzai

Limited Healthcare Infrastructure: The existing healthcare facilities in District Orakzai are insufficient to meet the needs of the population, with only **5 hospitals** providing a total of **270 beds** for an estimated population of **387,561**, resulting in a high population-to-bed ratio of approximately **1,435 people per bed**. This indicates a significant strain on available resources.

Shortage of Healthcare Professionals: The district has a limited number of healthcare professionals, including only **17 doctors**, **7 nurses**, and **1 dental surgeon**, which is inadequate for addressing the healthcare needs of the community effectively. This shortage contributes to longer wait times and reduced quality of care.

Inadequate Access to Essential Medicines: There is a lack of access to essential medicines in primary healthcare facilities, which hampers the ability to provide comprehensive care and manage both communicable and non-communicable diseases effectively.

Poor Road Infrastructure: The lack of adequate road infrastructure poses challenges for patients trying to reach healthcare facilities, particularly in emergencies, which can lead to delays in treatment and increased morbidity.

High Prevalence of Non-Communicable Diseases: The district faces a concerning level of non-communicable diseases, with normal blood pressure prevalence at **69%** and normal blood sugar at **39%**, indicating an urgent need for preventive health services and health education.

Low Health Service Coverage Index: The Universal Health Coverage (UHC) index for District Orakzai stands at **39.52**, ranking it **100th nationally** and **24th provincially**, highlighting significant gaps in health service delivery compared to other regions.

3.3.2.7 Recommendations for Improvement

Enhance Healthcare Infrastructure: Increase the number of hospitals and expand existing facilities to accommodate more beds and services. This could involve constructing new hospitals or upgrading current ones to meet the growing healthcare demands.

Recruit More Healthcare Professionals: Implement recruitment drives and training programs to increase the number of qualified healthcare providers in the district. This could include incentives for medical professionals to work in underserved areas.

Improve Access to Essential Medicines: Ensure that primary healthcare facilities are stocked with essential medicines by establishing supply chains that facilitate regular deliveries and inventory management.

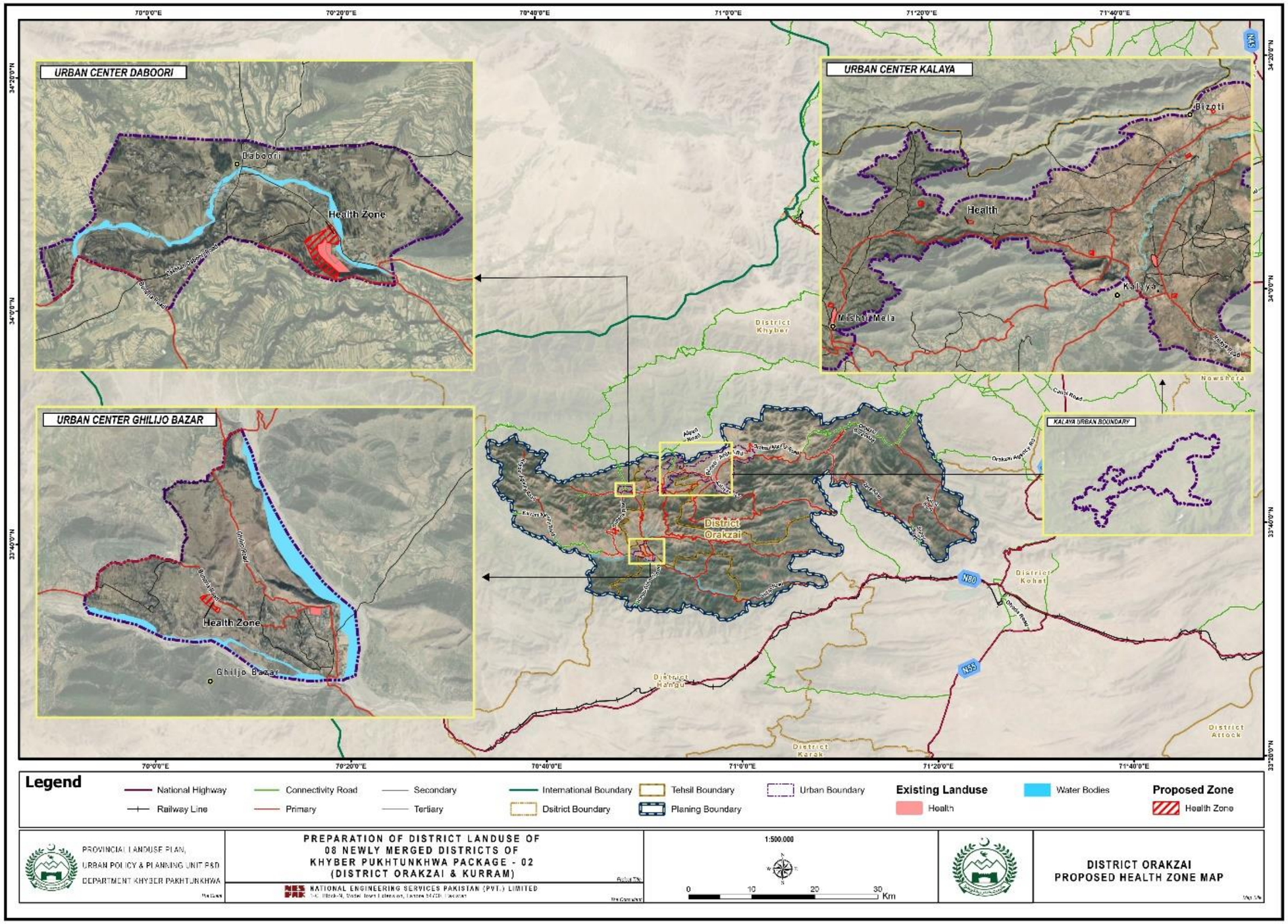
Invest in Road Infrastructure: Collaborate with local government authorities to improve road access to healthcare facilities, ensuring that patients can reach hospitals quickly, especially during emergencies.

Focus on Preventive Health Services: Launch community health education programs aimed at promoting healthy lifestyles, nutrition, and regular health screenings to address the rising prevalence of non-communicable diseases.

Strengthen Data Collection and Monitoring: Establish robust systems for collecting data on health service utilization, disease prevalence, and patient outcomes to inform policy decisions and resource allocation effectively.

Engage Community Stakeholders: Involve community leaders and stakeholders in health planning processes to ensure that local needs are addressed and that health initiatives are culturally appropriate and well-received.

By addressing these constraints and implementing the recommended strategies, District Orakzai can significantly improve its healthcare delivery system, ultimately enhancing health outcomes for its residents.



Map 3-16 District Orakzai Proposed Health Zones

3.3.3 Recreation

The connection between the built environment and community health spanning physical, social, and economic well-being is deeply significant. Over the past few decades, urban planning has largely centered on vehicle-dependent development, which has unintentionally led to problems such as obesity, poor health outcomes, social isolation, and rising infrastructure costs. This car-oriented growth pattern has changed travel behaviors, reduced physical activity, and increased healthcare expenses for individuals and the community as a whole.

In contrast, the inclusion of parks and recreational facilities in planning plays a vital role in encouraging active lifestyles, fostering healthier communities, and reducing healthcare and transportation costs. Recreational facilities form an essential part of human life, taking different forms based on individual preferences and environmental conditions.

A wide range of recreational activities includes:

- **Sports:** Facilities for team sports, individual sports, and fitness activities.
- **Hotels and Hill Resorts:** Spaces offering leisure, relaxation, and scenic enjoyment.
- **Historical and Religious Places:** Sites preserving cultural and spiritual heritage.
- **Libraries:** Centers promoting literacy, learning, and community interaction.
- **Museums:** Institutions conserving artifacts and offering educational experiences.
- **Zoos:** Facilities emphasizing wildlife education and conservation.
- **Open Spaces:** Areas for outdoor activities and community gatherings.
- **Parks:** Green spaces designed for recreation, relaxation, and environmental balance.
- **Playgrounds:** Safe spaces encouraging children's physical activity and play.

Prioritizing the development of these recreational amenities enhances quality of life, encourages social cohesion, promotes physical well-being, and supports environmental sustainability. Moreover, investment in recreation not only improves individual and community health but also drives local economic growth through tourism and related services.

3.3.3.1 Sports Facilities

Sporting events play a crucial role in fostering healthy communities worldwide. As interest in health and longevity continues to rise, the popularity of contests that push physical limits has surged. Governments and businesses increasingly view sporting events as sound investments with lasting impacts on community well-being. Sports can significantly contribute to shaping a vigorous society, promoting physical activity, social cohesion, and overall health.

3.3.3.1.1 Sport Facilities in District Orakzai

District Orakzai is home to several important sports facilities that promote physical activity and community engagement. The Kalaya Sports Complex and the Ghundakai Sports Complex are two key venues serving the recreational needs of the local population.

The Kalaya Sports Complex, located near Kalaya Headquarters, is currently under construction. It features a main pavilion for sporting events, an adjoining cricket ground for local and regional matches, a hostel facility for players and visitors, and shops beneath the stadium steps for public convenience. The complex, named Colonel Amanullah Khan Orakzai Stadium, is set against a backdrop of scenic mountains, adding to its visual appeal.

The Ghundakai Sports Complex, located in Upper Orakzai, also serves as a major venue for sports and recreational activities, though detailed information about its facilities is limited.

The establishment of these complexes is significant as they promote physical activity, provide spaces for community events and youth engagement, and create economic opportunities through sports-related activities.

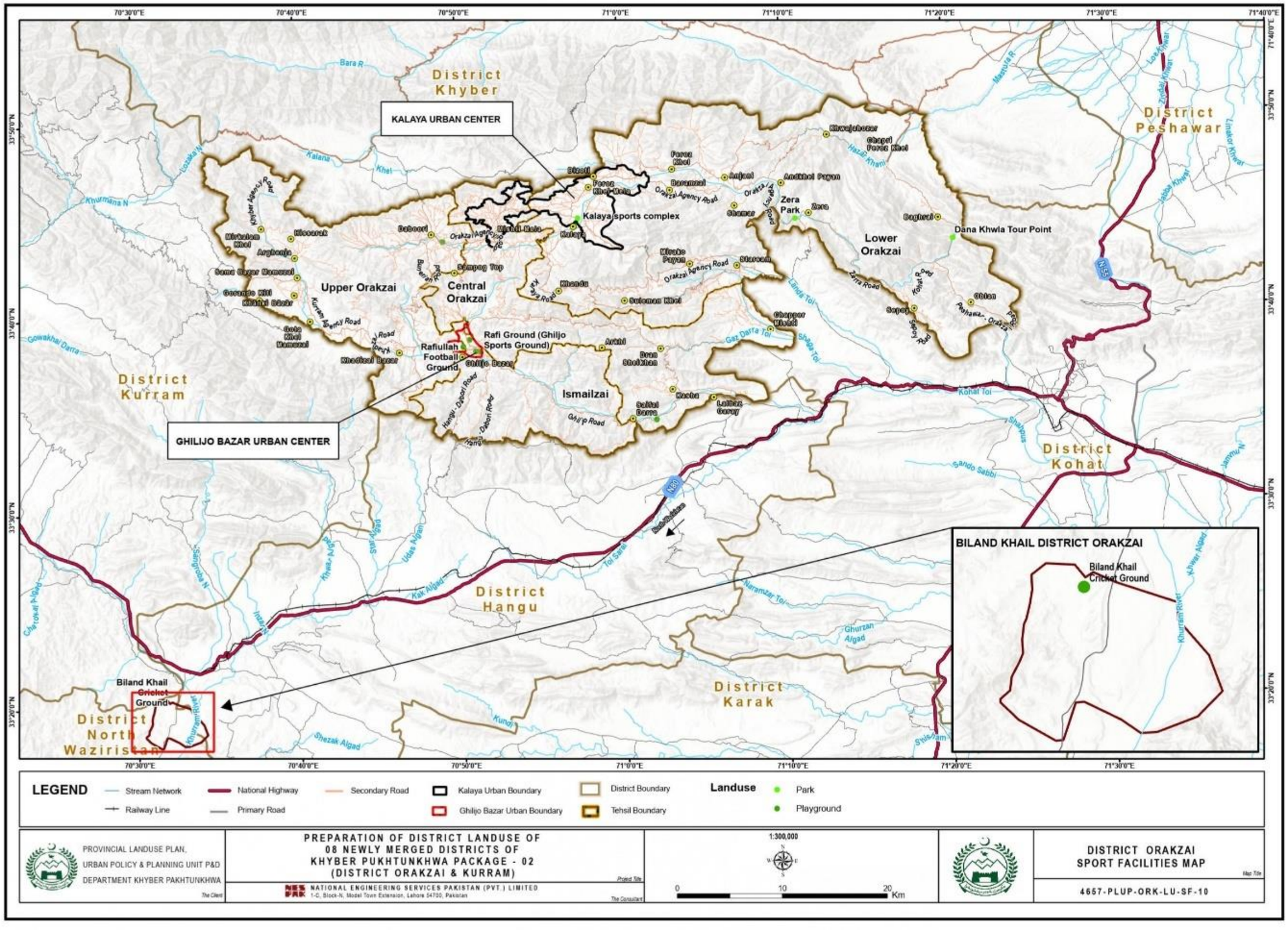
In conclusion, the development of the Kalaya and Ghundakai Sports Complexes represents an important step toward improving community health and well-being in District Orakzai. Prioritizing these projects will enhance recreational opportunities, promote active lifestyles, and strengthen community spirit.



Figure 3-3 Stadium pavilion at sports complex Kalaya



Figure 3-4 Construction of Sports Complex at Ghundaki Orakzai District



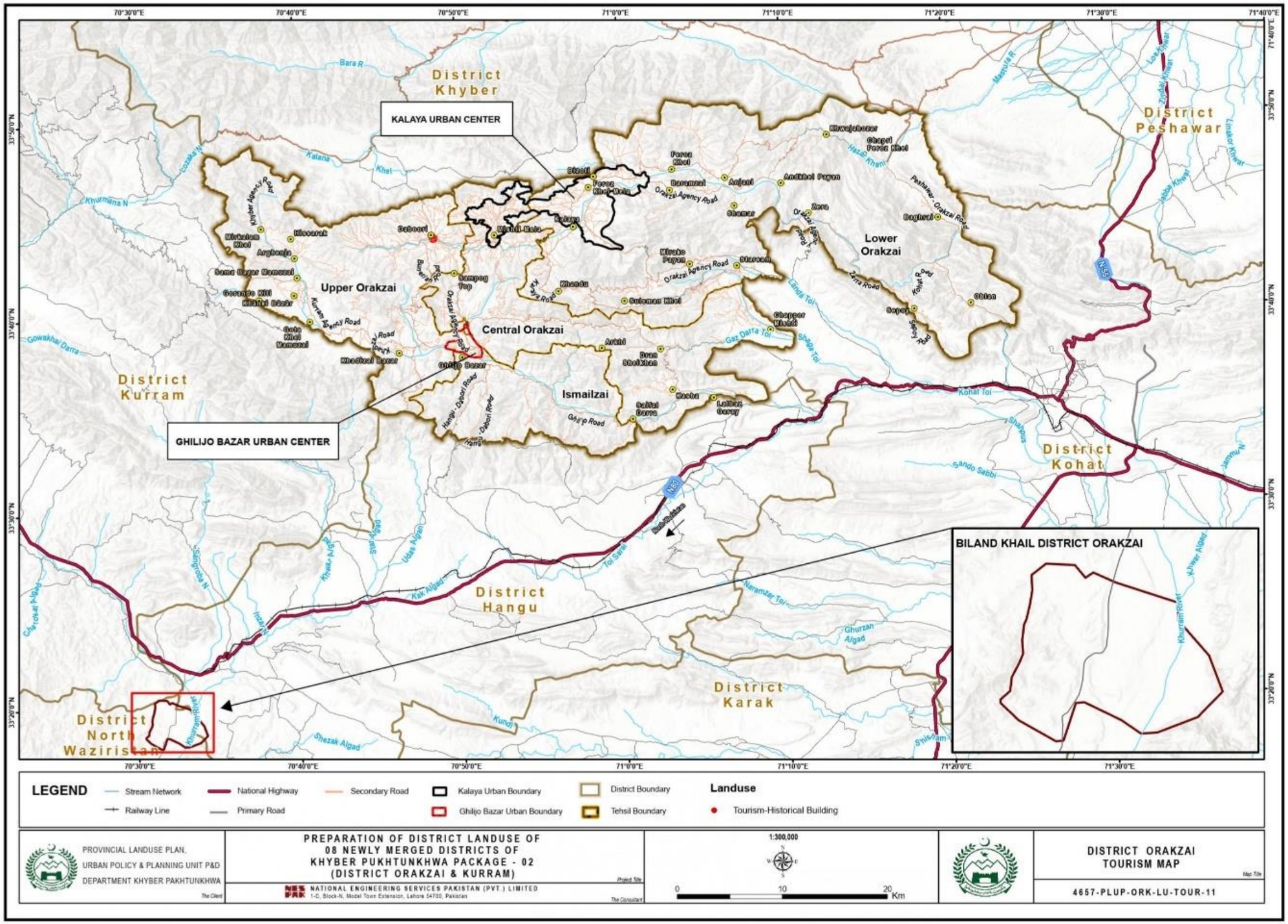
Map 3-17 Existing Sports Facilities Map

3.3.3.2 Entertainment and Tourism

The tourism and entertainment industries are inherently interconnected, as tourism seeks to enhance the attractiveness of destinations through various offerings. Often, the core tourism experience must be complemented by entertainment elements to increase its appeal. For example, a heritage tourism site can benefit from additional resources such as documentaries and films, which help make the product more marketable and engaging.

Integrating entertainment into the tourism experience is believed to play a vital role in preserving both natural and cultural resources. Given the district's challenges with limited resources and sustainability issues, developing entertainment options can diversify tourism offerings. Furthermore, entertainment activities can provide a much-needed respite for natural and cultural resources that are frequently over-exploited in the region.

District Orakzai presents a range of diverse entertainment and tourism opportunities, which are discussed in detail below.



Map 3-18 Existing Sports Facilities in District Orakzai

3.3.3.3 Recommendations

To address these challenges and unlock the tourism potential of District Orakzai, several recommendations can be implemented:

Enhance Security Measures: Collaborate with local law enforcement agencies to improve safety in tourist areas, thereby boosting visitor confidence. Establishing a visible security presence can help reassure tourists.

Invest in Infrastructure Development: Prioritize the construction and maintenance of roads leading to tourist sites. Improving transportation options will facilitate easier access for visitors and enhance their overall experience.

Expand Accommodation Facilities: Encourage private investment in hospitality services by providing incentives for building hotels, motels, and guesthouses near popular tourist destinations. This will help accommodate more visitors and improve their stay.

Promote Sustainable Tourism Practices: Implement eco-friendly practices in tourism development to protect natural resources. This includes creating guidelines for sustainable tourism activities that minimize environmental impact while promoting conservation efforts.

Increase Marketing Efforts: Develop a comprehensive marketing strategy to promote Orakzai's tourist attractions through digital platforms, social media, and travel agencies. Highlighting unique features such as natural beauty, cultural heritage, and recreational opportunities can attract more visitors.

Engage Local Communities: Involve local communities in tourism planning and development processes to ensure that their needs are met while fostering a sense of ownership over local resources. Training programs can be established to equip residents with skills related to hospitality and tourism management.

Develop Tourist Packages: Create attractive tour packages that combine visits to various sites within Orakzai, including cultural experiences, adventure activities, and nature exploration. This can enhance the appeal of the region as a comprehensive travel destination.

By addressing these constraints through targeted strategies, District Orakzai can enhance its tourism sector, promote economic growth, and improve the quality of life for its residents while preserving its rich natural and cultural heritage.

3.3.3.4 Historical and Cultural Heritage

Samana Fort / Lockhart Fort

Constructed in 1891, Samana Fort, also known as Lockhart Fort, is located in the Samana Range of the Hindu Kush Mountains at an altitude of 6,743 feet above sea level. The small rectangular structure features fourteen-foot-high stone walls with bastions at diagonal corners equipped with loopholes. The fort can accommodate two companies and overlooks the Tirah Valley to the west and Hangu Valley to the east. After the partition, it was partially occupied by the Frontier Constabulary. During the Russian invasion of Afghanistan, the fort served as a base for the 100 Light Air Defense Regiment (October 1984–December 1986). Later, in 1997, the 9 Division Battle School was relocated here and began operations on June 8, 1998.

However, visitors face several challenges:

- The fort is under Pakistan Army control, and civilian visits are restricted due to sensitive defense installations.
- A communication gap between civil and military leadership complicates access.
- There is no proper signage; most locals speak Pashto, and very few understand Urdu or English. Installing information boards would greatly help visitors.

Saragarhi Fort

Saragarhi was a small village in the border district of Kohat on the Samana Range in Orakzai. On April 20, 1894, the 36th Sikhs Regiment was established under Colonel J. Cook, consisting entirely of Jat Sikhs. In August 1897, five companies of the regiment were stationed in the Samana Hills and Saragarhi to secure the frontier. Despite partial British control, local Pashtun tribes resisted their presence after the War of Independence (1857). Several forts built by Ranjit Singh, including Lockhart Fort and Gulistan Fort, were consolidated, and Saragarhi was created as a heliographic communication post. The fort was destroyed in the Battle of Saragarhi, but a cenotaph near Lockhart Fort commemorates the bravery of 21 Sikh soldiers.

Visitors encounter key issues:

- The fort's ruins are deteriorating and require preservation along with informative boards.
- Access roads are in poor condition.
- Public awareness about these forts should be promoted along the Kohat–Samana Road and Ghiljo–Samana Road.

Gulistan Fort / Cavagnari Fort

Similar to Lockhart Fort, Gulistan Fort served as a signaling point to Kohat using mirrors and lamps. After partition, it was occupied by the Frontier Constabulary and has witnessed several battles between British forces and local Orakzai and Afridi tribes. Though open to visitors, the fort's condition is deteriorating. Challenges include:

- Limited accessibility due to lack of government transport.
- No food courts or restaurants nearby; only a few shops with basic items.
- Preservation efforts are needed to prevent further damage.
- Limited parking and no shaded areas or gazebos for relaxation.

Shrine of Hazrat Mir Anwar Shah Syed

Hazrat Mir Anwar Shah Syed, a renowned Sufi and Pashto poet from Kalaya, has followers mainly from the Shia sect across Pakistan. Despite past sectarian tensions, both Shia and Sunni communities live harmoniously in Kalaya. The shrine holds strong potential for religious tourism, particularly during Urs events when large crowds visit.

However, access is difficult due to:

- Lengthy verification processes restricting visitors.
- Lack of rest houses or communal kitchens.
- Absence of public restrooms.
- Poor road conditions from the main Kalaya Road to the shrine.
- Lack of nearby parks and open spaces for visitors.

3.3.3.5 Parks and Zoos in Orakzai

District Orakzai has significant potential for developing parks, playgrounds, and zoos, which can enhance the quality of life for residents and promote community engagement. These recreational facilities play a crucial role in fostering physical activity, social interaction, and environmental awareness among local populations.

3.3.3.5.1 Parks

Orakzai currently features two notable parks that serve the community:

Zerai Children Park: Located near the Zerai area, this park is maintained by the Orakzai Scouts. It provides a safe and enjoyable environment for children to play and engage in recreational activities.

Shuhada Park: Situated in the Khadizai area of Upper Orakzai, this park serves as another vital green space for residents, offering opportunities for relaxation and community gatherings.

Parks are essential green spaces that provide residents with areas for relaxation, recreation, and community gatherings. They serve as vital components of urban planning, contributing to the overall health and well-being of the community.

Potential Benefits:

Physical Activity: Parks encourage outdoor activities such as walking, jogging, and sports, contributing to improved physical health.

Social Interaction: They serve as communal spaces where families and friends can gather, fostering social ties within the community.

Environmental Awareness: Parks can be designed to include educational components about local flora and fauna, promoting conservation efforts.

3.3.3.5.2 Zoos

Currently, there are no zoos in District Orakzai. The establishment of a zoo would not only serve as an attraction for tourists but also promote wildlife conservation and education about biodiversity. A zoo could provide an opportunity for residents to learn about various species and the importance of protecting their habitats

Potential Benefits of a Zoo:

Wildlife Conservation: Zoos play a critical role in conservation efforts by educating the public about endangered species and their ecosystems.

Educational Programs: They can offer educational programs for schools and community groups to raise awareness about wildlife preservation.

Tourism Attraction: A well-managed zoo could attract visitors from neighboring districts and provinces, boosting local tourism.

The development of parks in District Orakzai presents an opportunity to enhance community well-being while promoting physical activity, social interaction, and environmental awareness. While there is currently no zoo in the district, establishing one could further enrich the recreational landscape. By investing in these facilities, local authorities can create vibrant spaces that contribute positively to the quality of life for residents and attract visitors to the region. Prioritizing these developments will not

only foster a healthier population but also strengthen community ties and support economic growth through increased tourism.

3.3.3.6 Existing Recreational Facility Satisfaction Tehsil-Wise

3.3.3.6.1 Satisfaction Levels

Based on the field data, satisfaction levels with the existing recreational facilities in District Orakzai show that out of a total of 513 respondents, 172 (34%) expressed satisfaction, while the majority, 341 (66%), indicated dissatisfaction. This indicates a significant opportunity for improvement in the recreational amenities available in the area.

Table 3-72: Tehsil wise Recreation Satisfaction Level

Satisfaction Level	Central	Ismail Zai	Lower	Upper	Total
Yes	3	17	126	26	172
No	93	31	91	126	341
Total	96	48	217	152	513

3.3.3.6.2 Reasons for Dissatisfaction

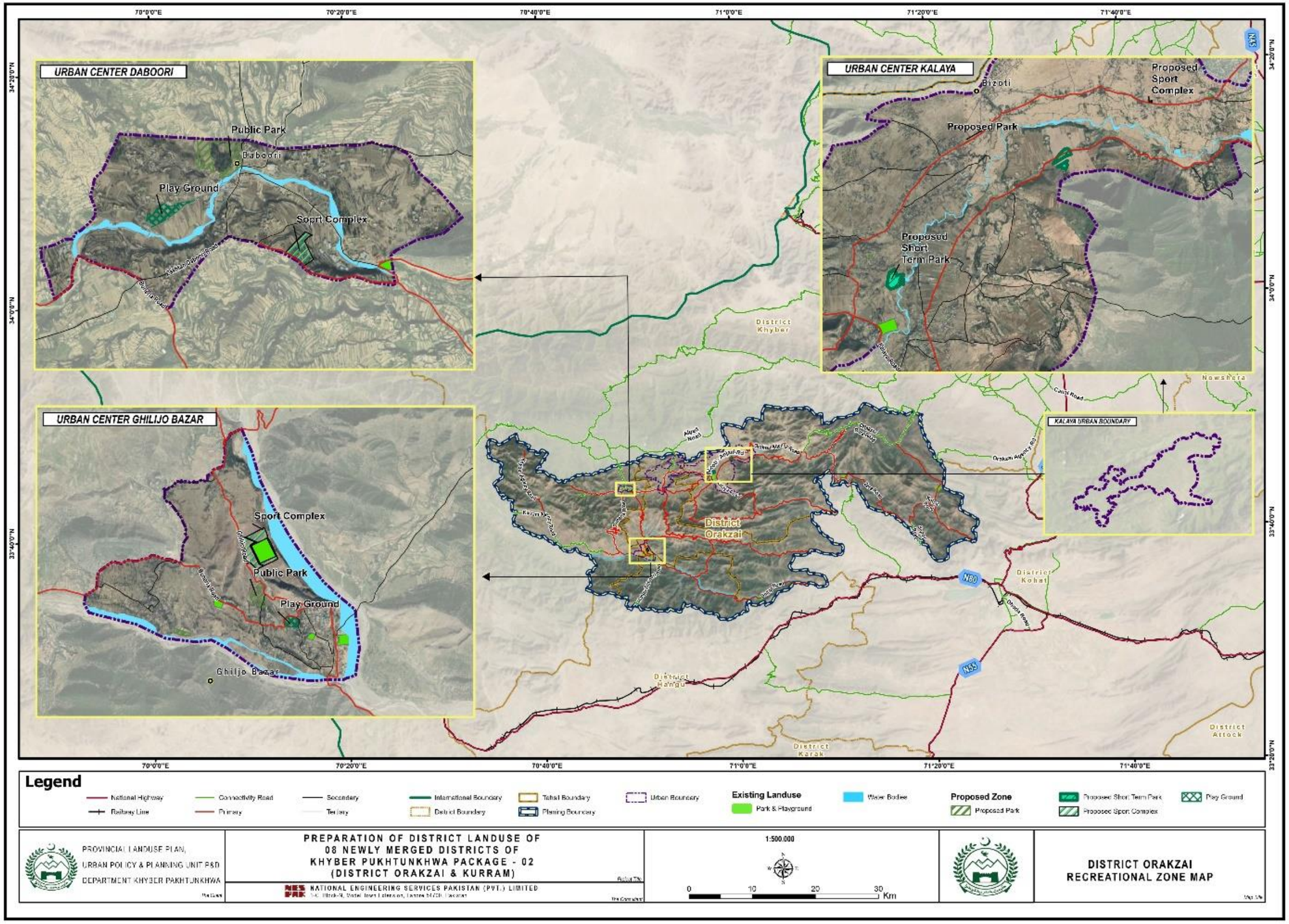
The major reasons for dissatisfaction among respondents regarding sports and recreational facilities are outlined in the table below:

Table 3-73:Tehsil wise Recreation Dissatisfaction Level

Major Reasons for Dissatisfaction	Central	Ismail Zai	Lower	Upper	Total
Lack of road infrastructure, water, electricity, and internet	-	-	-	5	5
The government has not provided any recreational facilities for entertainment purposes (e.g., sports complex)	91	6	72	7	176
The unstable law and order situation is a primary reason for underdevelopment	2	24	8	81	115
Lack of proper management organizations for beautification and uplifting of areas	-	-	14	1	15
Not Shared Information	3	18	123	58	202
Total	96	48	217	152	513

The primary reasons for dissatisfaction with sports and recreational facilities include inadequate infrastructure, a lack of available facilities, insufficient management plans, and limited beautification efforts in the district. Notably, a significant number of respondents (202) reported that they had not shared information regarding these issues. Furthermore, a considerable number of respondents (176) expressed dissatisfaction due to the absence of essential facilities such as sports complexes and playgrounds. Additionally, an unstable law and order situation, reported by 115 respondents, remains a critical barrier to enhancing recreational opportunities in the area.

These findings underscore the need for targeted improvements in recreational amenities to better serve the community's needs and enhance overall satisfaction.



Map 3-19 Proposed Reactional Zones

3.3.3.7 Planning Standards for Establishing New Park and Playgrounds

Traditional standards that allocate 10% of the gross area for parks and playgrounds have become outdated and impractical. The development of recreational facilities should instead be linked to actual demand rather than fixed ratios. Space allocation must be tailored to community needs and population thresholds to ensure effective and sustainable use.

Recreational space standards should depend on facility size and specific local demand. For passive recreation areas, flexible sizing is essential and should reflect community characteristics. For instance, a tot-lot can be as small as 250 square meters, but it must be integrated into a larger Mohalla open space to function effectively. These Mohalla spaces should ideally be located within 200 meters of residential areas and have an average size of 4,000 square meters (about one acre).

Neighborhood parks should support activities like brisk walking and jogging for up to two hours, requiring 8–10 acres of land. In high-density areas, they may utilize up to 7.5% of the gross neighborhood area. Community parks, which include picnic facilities, are also vital but require greater capital investment compared to smaller recreation spaces.

The following table outlines the National Reference Manual standards for passive recreation facilities at various settlement levels based on population thresholds:

Table 3-74 Passive Recreation Facilities Allocation Criteria

Type of Facility	Description	Allocation Criteria (Population)	Area (Hectares)	Hectare/1000 Pop
City Park	Wide range of amusement facilities, fountains, lakes, landscaping, etc.	400,000	12 to 15	0.03 to 0.037
Community Park	Selected amusement facilities, fountains, lakes, landscaping, etc.	100,000	4 to 5	0.04 to 0.05
Neighborhood Park	Wide range of child play fixtures, walking & jogging paths.	25,000	3.25 to 4	0.13 to 0.16
Mohalla Parks (3-8 per Mohalla; average size 0.45 ha each)	Tot lots with slides, swings, seesaws; other spaces with some turf	6,250	1.6 to 3.6	0.26 to 0.58

By adopting these updated planning standards, communities can create recreational spaces that are not only functional but also responsive to the needs of their residents.

3.3.3.8 Area Requirements and Proposal for Reactional Facilities

The planning of recreational facilities for the urban areas of District Orakzai has been carried out using population-based planning standards and recreational facility allocation criteria. According to the adopted standards, recreational land provision is guided by a hierarchy of facilities including City Parks, Community Parks, Neighborhood Parks, and Mohalla Parks, each serving different population thresholds. Community parks generally serve a population of approximately 100,000 people with an allocation standard of 0.04–0.05 hectares per 1,000 population, while neighborhood parks and mohalla parks provide smaller-scale recreational spaces at the local level.

Using the average standard of 0.045 hectares per 1,000 population (equivalent to approximately 0.11 acres per 1,000 population), population-based recreational land requirements were calculated for each urban center for the planning horizon of 2045. The analysis indicates that the minimum recreational land requirements derived from population standards are comparatively lower than the allocations proposed under the recreational class of the NRM (Natural Resource Manual / Recreational Land Use category). Therefore, additional areas are proposed to enhance the diversity and functionality of recreational spaces, including parks, playgrounds, and sports complexes.

A. Kalaya Urban Area

Kalaya Urban Area is projected to have a population of 41,202 by 2045. Based on the community park standard of 0.045 hectares per 1,000 population, the estimated recreational land requirement is approximately 1.85 hectares, equivalent to about 4.57 acres. The existing recreational area in Kalaya already amounts to 13.36 acres, which exceeds the minimum population-based requirement. However, to improve recreational accessibility and provide specialized recreational facilities, additional land has been proposed. The development plan includes 21.69 acres for parks and 0.18 acres for a sports complex, resulting in a total proposed addition of 21.87 acres. With these additions, the total recreational area in Kalaya will increase to 35.23 acres, ensuring a well-distributed and multifunctional recreational environment.

Table 3-75 kalaya Reactional Area Requirements and Proposals

Type	Population 2045	Required Area (Acres)	Existing area (Acres)	Proposed Area (Acre)	Sub Total
Parks	41202	8-10 acres	13.36	21.69	**Sub Total**
Playground		5.28 Acres			
Sport Complex				0.18	
Total		**10.58**	**13.36**	**21.87**	**35.23**

B. Ghiljo Proposed Urban Area

The projected population of Ghiljo by 2045 is 10,637. Based on the same planning standard, the minimum recreational land requirement is approximately 0.48 hectares, equivalent to around 1.18 acres. The existing recreational area in Ghiljo is already 21.67 acres, significantly exceeding the minimum requirement. Despite this surplus, further recreational development is proposed to support future urban growth and to provide organized recreational facilities. The proposed allocations include 12 acres for parks, 5.16 acres for playgrounds, and 21.57 acres for a sports complex, totaling 38.73 acres of additional recreational space. Consequently, the total recreational area will reach 60.4 acres, establishing Ghiljo as a key recreational node within the district.

Table 3-76 Ghiljo Reactional Area Requirements and Proposals

Type	Population 2045	Required Area (Acres)	Existing area (Acres)	Proposed Area (Acre)	Sub Total
Parks	10637	8-10 acres	21.67	12	
Play Ground		5.28 Acres		5.16	
Sport Complex				21.57	
Total		**10.58**	**21.67**	**38.73**	**60.4**

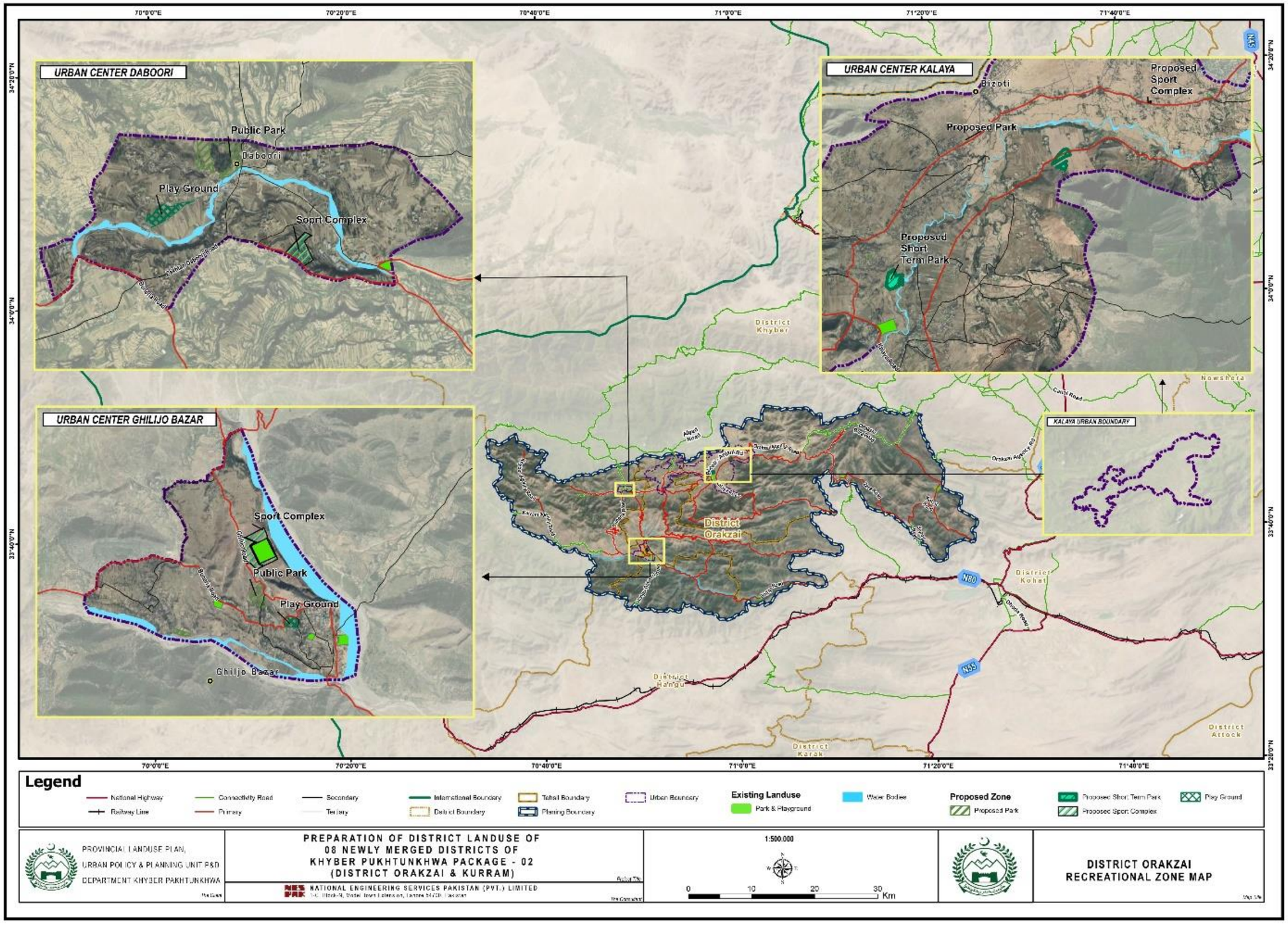
C. Dabori Proposed Urban Area

Dabori is projected to have a population of 16,068 by 2045. Based on the community park allocation standard, the minimum recreational land requirement is approximately 0.72 hectares, equivalent to about 1.78 acres. Currently, the existing recreational land in Dabori is only 1.11 acres, which is below the minimum requirement and indicates a deficiency in recreational infrastructure. To address this gap and to support planned urban development, 20.5 acres of additional recreational land have been proposed. This includes 10 acres for parks, 5 acres for playgrounds, and 5.5 acres for a sports complex. Following these additions, the total recreational area will increase to 21.61 acres, significantly improving the availability and quality of recreational facilities for residents.

Table 3-77 Dabori Reactional Area Requirements and Proposals

Type	Population 2045	Required Area (Acres)	Existing area (Acres)	Proposed Area (Acre)	Sub Total
Parks	16068	8-10 acres	1.11	10	
Playground		5.28 Acres		5	
Sport Complex				5.5	
Total		**10.58**	**1.11**	**20.5**	**21.61**

The population-based calculations indicate that the minimum recreational land requirements for the urban areas of District Orakzai are relatively modest when compared with the recreational allocations proposed under the NRM recreational land-use category. As a result, the proposed recreational areas exceed the minimum standards to ensure improved spatial distribution, provision of diverse recreational amenities, and long-term urban sustainability. The inclusion of parks, playgrounds, and sports complexes in each urban center aims to promote active lifestyles, community interaction, and environmental quality, thereby enhancing the overall livability of the district's urban settlements.



Map 3-20 District Orakzai Proposed Reactional Zones

3.3.4 Security Facilities

The institutional capacity of the District Police refers to its overall ability, resources, and infrastructure to perform duties effectively. It includes personnel, infrastructure, collaborations, and training. Personnel strength, professional skills, and specialization in investigations, community policing, and traffic management are essential. Infrastructure covers police stations, posts, vehicles, communication tools, and other operational resources.

Collaboration with other law enforcement agencies, government departments, and communities is vital for crime prevention and maintaining public order. Regular training ensures officers remain updated on modern policing techniques and laws.

The Central Police Office (CPO) in Peshawar, headed by the Provincial Police Officer (PPO/IGP), manages key branches such as Operations, Investigation, Finance, Welfare, Legal Affairs, IT, and Training. For the Newly Merged Districts (NMDs), an Assistant Inspector General of Police oversees service and welfare matters.

The Khyber Pakhtunkhwa Police is divided into seven regions Peshawar, Malakand, Mardan, Hazara, Bannu, Kohat, and Dera Ismail Khan each led by a Regional Police Officer (RPO). Every district, including NMDs, is headed by a District Police Officer (DPO). Specialized units such as the Special Branch, Elite Force, Counter Terrorism Department, Traffic Unit, and Special Security Unit (SSU) further strengthen law enforcement capacity across the province.

3.3.4.1 Standards for Establishing New Police Stations

The criteria for determining the locations of new police stations are influenced by the specific needs, priorities, and policies of the governing authority responsible for law enforcement. However, several common factors typically guide the decision-making process. These include population density, crime rates, geographic size and terrain, response times, community needs and concerns, strategic considerations, and resource availability.

By considering these factors alongside local context, data analysis, community feedback, and strategic planning, authorities can develop allocation criteria that prioritize the establishment of new police stations in areas where they are most needed. This approach is essential for maximizing the impact on public safety and security.

The Khyber Pakhtunkhwa Police have established specific regulations regarding the formation of new police stations and check posts. A committee composed of seven senior police officers, chaired by the Additional Inspector General of Police Headquarters (KP), has been formed to oversee this process. Before approval by this committee, the following requirements must be submitted by the relevant Superintendents of Police:

Explanatory Note

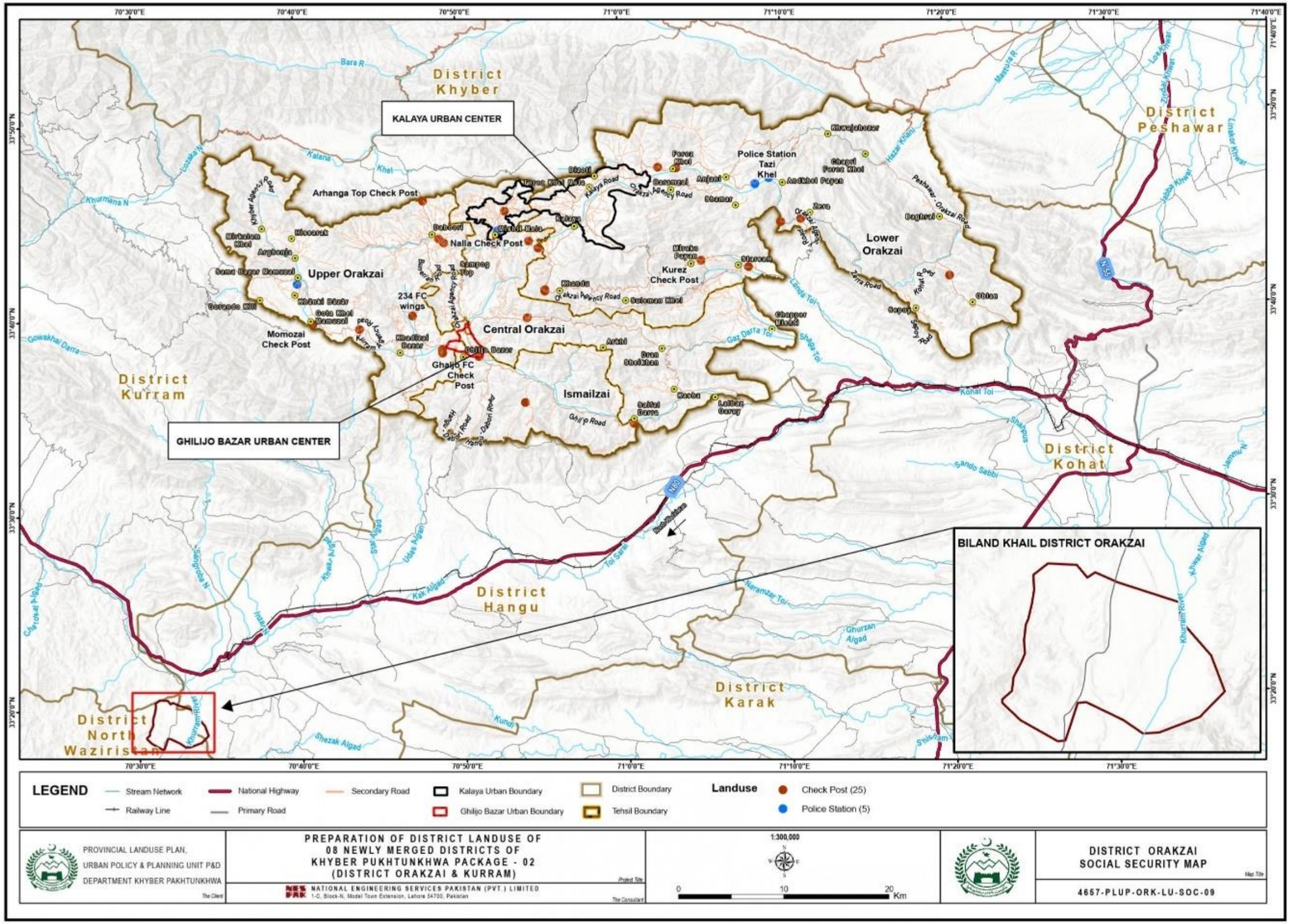
- Five years of crime statistics
- Population data for the area
- List of villages
- Area for attachment and detachment
- Cost estimate
- Required personnel and logistics
- Availability of land along with documentation

The allocation of new police stations varies significantly across provinces and countries, with distinct standards tailored to address specific regional needs. Differences can be seen in criteria such as

required population thresholds, crime rates, land requirements, and proximity to existing police stations.

According to the National Reference Manual for Infrastructure and Planning, it is recommended that one police station with staff quarters/barracks and a judicial lock-up be established for every 50,000 residents. The site area may range from 0.4 to 0.8 hectares depending on the prevailing density in the locality. Additionally, police posts without judicial lock-ups may be established in areas with scattered populations or high crime rates, with a site area not exceeding 500 square kilometers.

By adhering to these standards and criteria, authorities can ensure that new police stations are effectively positioned to meet community needs while enhancing overall law enforcement capabilities.



Map 3-21 Social Security Points in District Orakzai

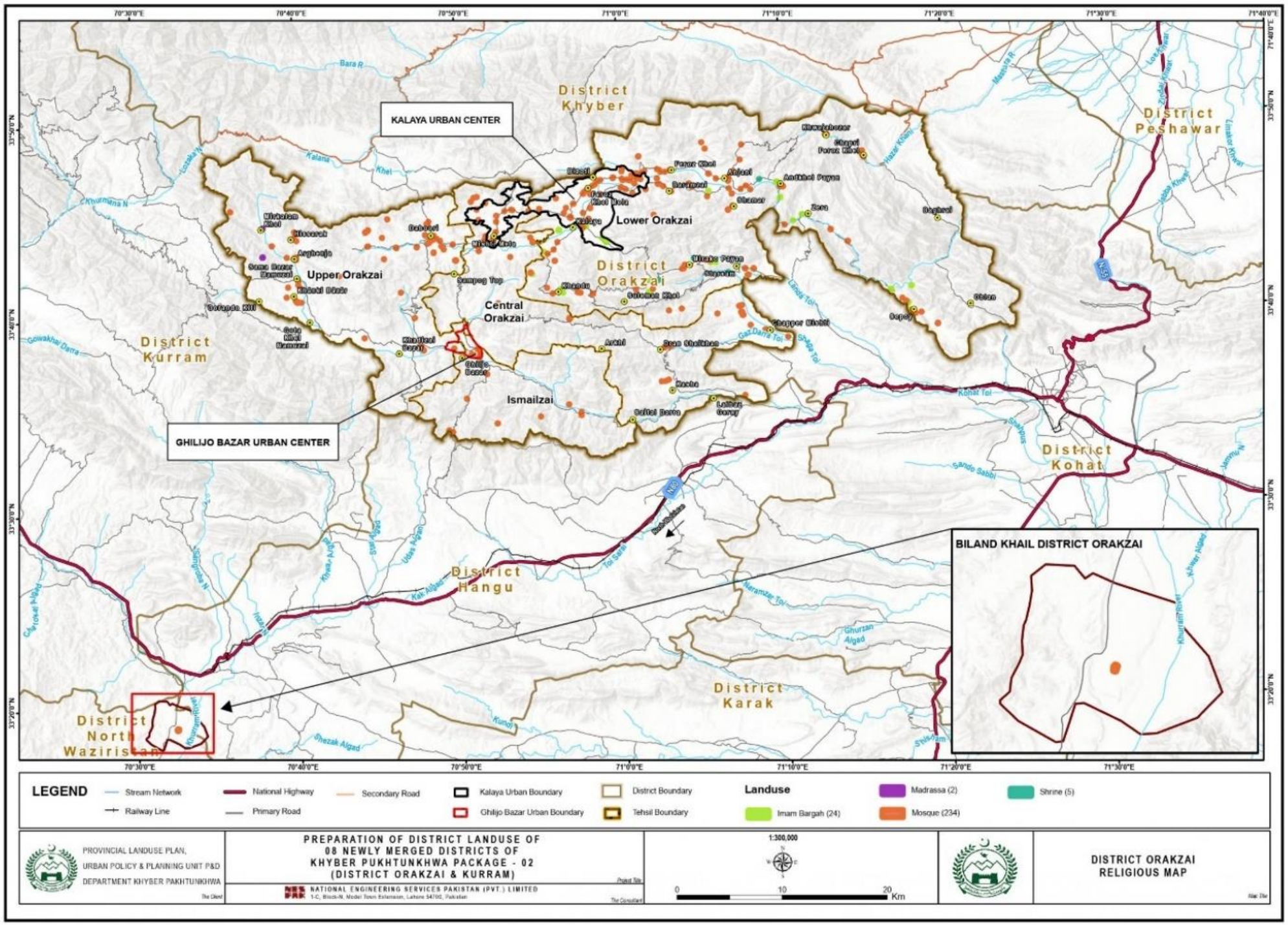
3.3.5 Religious Facilities

Orakzai District is home to 233 mosques and 24 Imam Bargahs, totaling 257 religious facilities that play a significant role in the community's spiritual and cultural life. Mosques serve as centers for daily prayers, educational programs, and community events, while Imam Bargahs are essential for Shia Muslims, especially during religious observances like Muharram. In land use planning, ensuring easy access to these facilities through proper infrastructure like roads, parking, and pedestrian routes is crucial, especially for the rural areas where many mosques are located.

Religious facilities should be integrated into residential areas, schools, and community centers to serve the population effectively. The land use plan must also account for large gatherings during key religious events, providing sufficient space for crowd management. As urbanization increases in the district, planning should include provisions for new mosques and Imam Bargahs in growing urban areas to meet the demands of the expanding population. Additionally, the district's religious diversity should be considered, ensuring adequate spaces for people of different faiths. By addressing these specific needs, the land use plan can enhance the district's religious and community life.

Table 3-78 Existing Religious Facilities

Religious Facilities	Numbers
Mosques	233
Imam Bargah	24
Total	257



Map 3-22 Religious Points Map

3.3.6 Graveyards

Graveyards, also referred to as cemeteries, are designated areas specifically allocated for the burial of deceased individuals. These spaces are treated with respect and reverence across many cultures and societies worldwide, serving as final resting places. Graveyards hold significant cultural, religious, and historical importance and often act as sites for remembrance and reflection, connecting the living with their ancestors and heritage.

Burial practices vary widely among different cultures, encompassing various interment methods (such as burial or cremation), rituals, and grave markers. Graveyards frequently feature distinctive architectural elements, including mausoleums, monuments, tombstones, and landscaped gardens. The design and layout of these spaces often reflect the cultural and religious beliefs of the community, as well as aesthetic considerations.

Ongoing maintenance is essential to ensure that graveyards remain respectful and dignified spaces. This includes groundskeeping, restoration of aging monuments, and conservation efforts to protect historical gravesites. While primarily serving as places for the deceased, graveyards also provide spaces for the living to visit and pay their respects to loved ones. Many individuals find solace in visiting graveyards, particularly during times of mourning or remembrance.

Legal regulations often govern the establishment and maintenance of graveyards, encompassing zoning laws, environmental regulations, and cemetery management guidelines. As societal norms evolve and technology advances, the concept of graveyards is also changing. Alternative burial practices, such as green burials and virtual memorials, are gaining traction in some communities.

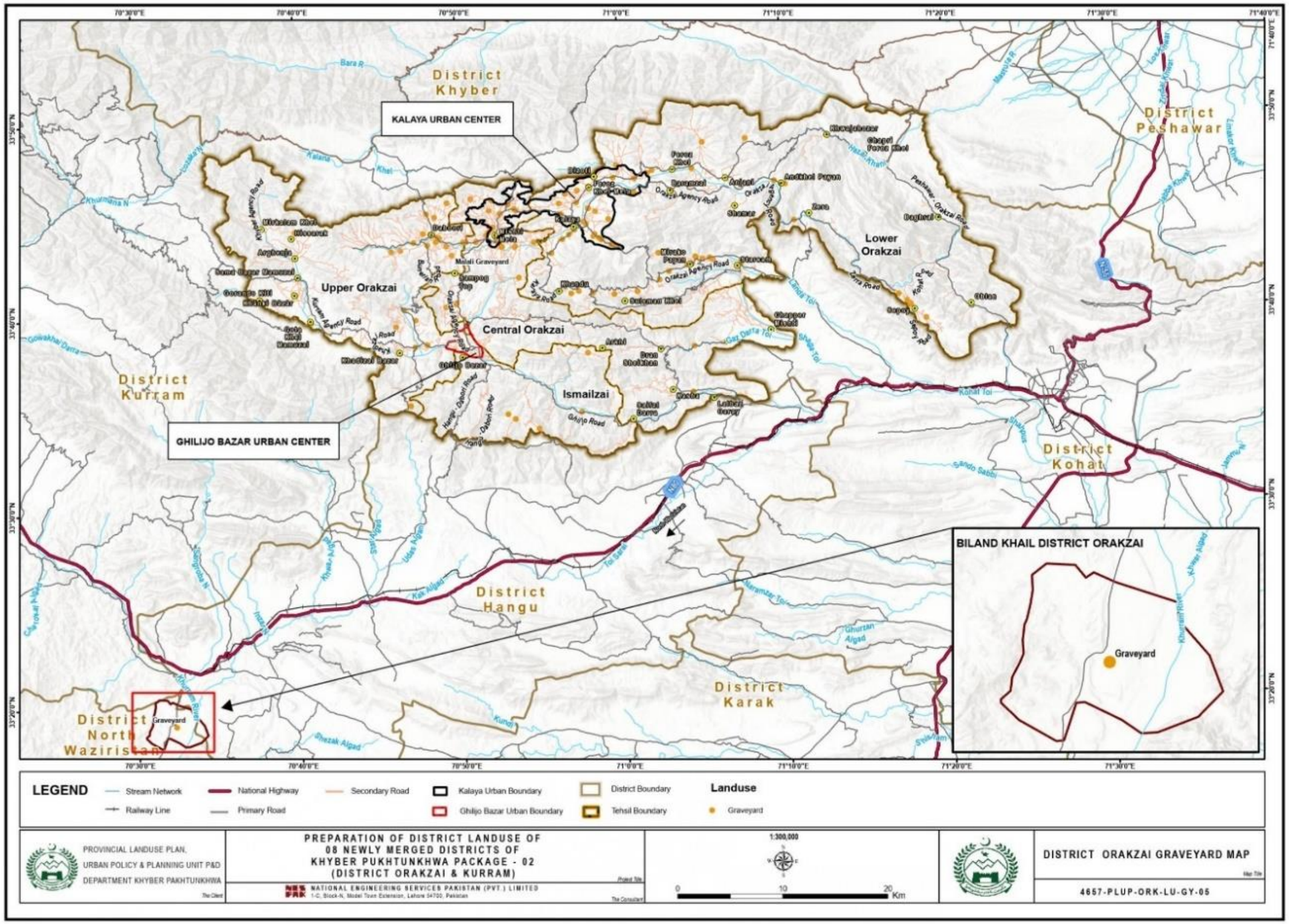
3.3.6.1 Existing Graveyards

Graveyards have a profound historical connection to the local community. They help residents gain a deeper understanding of their past and offer insights into how people in the area once lived.

The data indicates the availability of graveyard facilities across different areas within the town or tehsil. The results show an equal distribution, with 50% of individuals having access to a graveyard facility while the other 50% do not have access in the surveyed areas. This highlights a significant need for improvement in graveyard accessibility and provision in the region.

Table 3-79 Availability of Graveyard Facility

Town/Tehsil	Total	Central	Ismail Zai	Lower	Upper
Graveyard	Yes	70	7	157	23
	No	26	41	60	129
Total		96	48	217	152



Map 3-23 Existing Graveyards in District Orakzai

3.4 Agriculture

Agriculture is the backbone of Pakistan's economy, contributing 24% to the national GDP and employing a large portion of the labor force (Pakistan Economic Survey 2023–24). Ensuring food security and controlling food inflation are major policy priorities, requiring an efficient, competitive, and sustainable agricultural system.

In Khyber Pakhtunkhwa, only 1.82 million hectares are cultivated out of the total cultivable area, while 1.37 million hectares remain culturable waste, highlighting the need to expand cultivation for food security and improved rural livelihoods. The agriculture sector received 4.56% of the provincial development budget for FY 2024–25, which remains inadequate to address low productivity and sustainability challenges.

Agriculture contributes 22.7% to Khyber Pakhtunkhwa's GDP and employs 37.4% of its workforce. However, the sector faces issues such as low productivity, outdated technology, and insufficient research capacity. In District Orakzai, agriculture plays a vital role in the local economy, engaging around 27% of the labor force. Strengthening this sector through increased investment, research, and resource development is essential for improving livelihoods and ensuring long-term food security.

3.4.1 Agriculture Land Utilization

Agricultural land utilization refers to the various ways land is used for farming and related activities. It involves categorizing land based on its current and potential agricultural uses, helping manage land resources effectively.

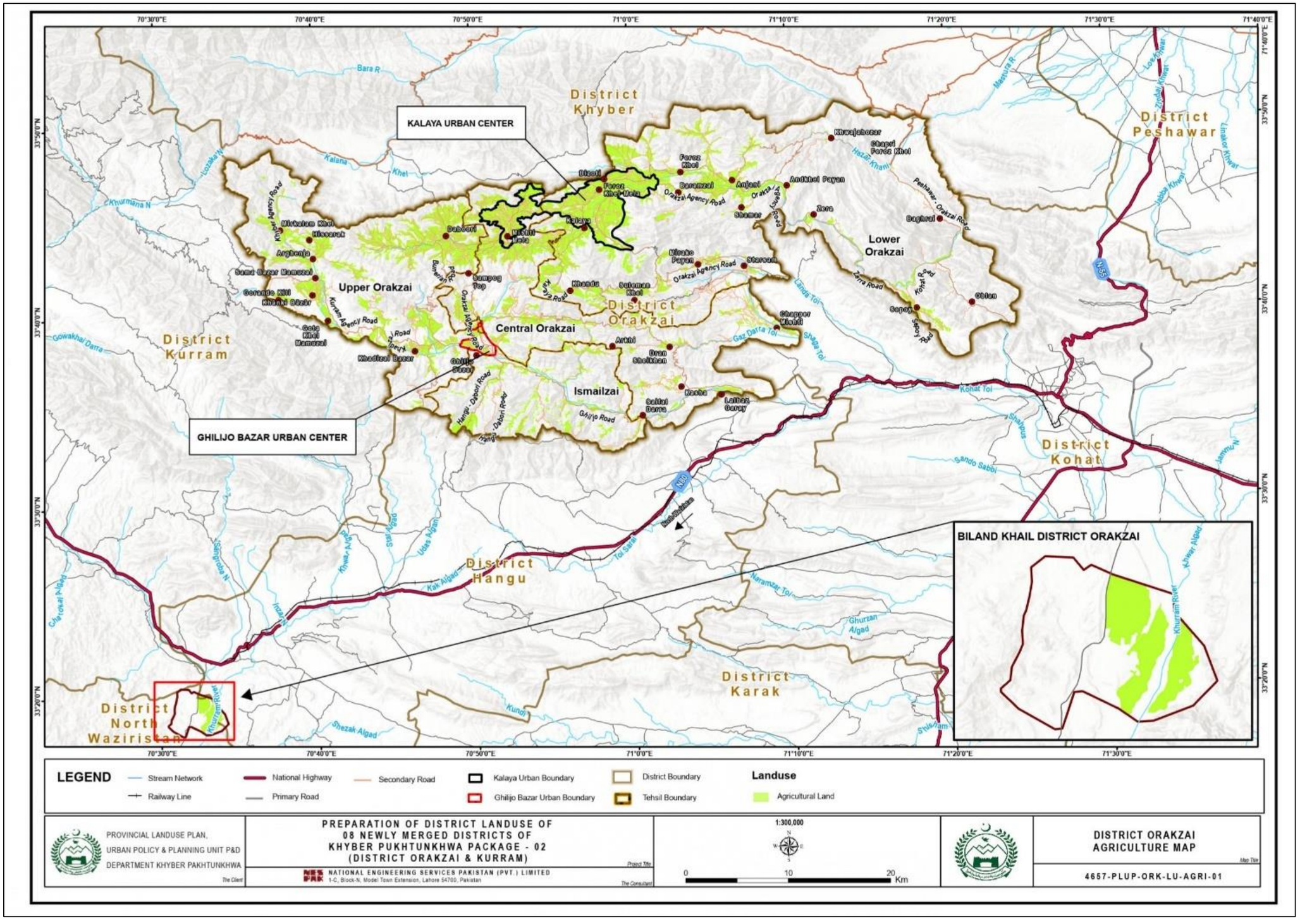
Cultivated areas are actively used for growing crops and divided into irrigated and barrani (rain-fed) zones. Irrigated areas rely on artificial watering systems, while barrani areas depend on natural rainfall. Uncultivated areas are not currently farmed but may have future potential. Cultivated waste refers to land once used for farming but now abandoned, while barren land is unsuitable for agriculture due to its inherent qualities. The "other" category includes land designated for non-agricultural purposes. Forest areas conserve natural vegetation and support environmental balance, whereas culturable waste includes land that could be farmed but remains underutilized.

The total reported area of District Orakzai is 153,761 hectares, of which 17,862 hectares are cultivated and 135,899 hectares remain uncultivated. Irrigation sources cover 4,151 hectares. Uncultivated areas include 2,254 hectares of culturable waste, 128,541 hectares unavailable for cultivation, and 5,104 hectares of forest, constituting 3.32% of the total reported area.

Table 3-80 shows the agricultural land utilization from 2020 to 2023, while Map 3-24 illustrates the agricultural land use of District Orakzai.

Table 3-80: District Orakzai Agriculture Land Utilization From 2020-21 till 2022-23 (In Hectares)

Year	Cultivated			Uncultivated				Total Reported Area
	Irrigated	Unirrigated	Total Cultivated	Culturable Waste	Forest	Not available for cultivation	Total Uncultivated	
2020-21	3,971	13,937	17,908	2,286	5,085	128,482	135,853	153,761
2021-22	4,121	13,748	17,869	2,267	5,098	128,527	135,892	153,761
2022-23	4,151	13,711	17,862	2,254	5,104	128,541	135,899	153,761



Map 3-24: District Orakzai Agriculture Land Us

3.4.2 Production Profile

In District Orakzai, major crops include wheat, barley, and mustard during the Rabi season, and maize, rice, and bajra during the Kharif season. Peach is a key fruit crop that provides high returns to farmers. The district also produces a wide variety of vegetables, including onions, potatoes, brinjal, turnips, carrots, tomatoes, chilies, garlic, and ladyfinger. Reliable irrigation plays a vital role in Orakzai's economic and social development; however, only 22.17% of the cultivated area is currently irrigated.

According to the Crop Reporting Service[57], Orakzai's crop production profile shows positive trends. Wheat production rose from 5,254 tonnes (2020–21) to 5,403 tonnes (2021–22) and further to 8,690 tonnes (2022–23). Maize also increased from 4,915 tonnes to 5,943 tonnes and 5,949 tonnes over the same period. Barley, with comparatively lower yields, recorded 21 tonnes (2020–21), 29 tonnes (2021–22), and 28 tonnes (2022–23), suggesting limited regional suitability. Rice production increased slightly from 641 tonnes (2020–21) to 703 tonnes (2022–23), Jowar production increased slightly from 65 tonnes (2020–21) to 67 tonnes (2021–22) and further to 71 tonnes (2022-23), while mustard rose gradually from 137 tonnes to 143 tonnes in the same timeframe.

Table 3.59 provides data on the area, production, and yield per hectare for various crops from 2020–21 to 2022–23.

Table 3-81: District Orakzai Agricultural Production Profile From 2020-21 till 2021-23

Years	Crops	Wheat	Maize	Rice	Jowar	Barley	Mustard
2020-21	Area (In Hectares)	4,020	4,579	372	122	22	293
	Production (In Tons)	5,254	4,915	641	65	21	137
	Yield per Hectare (In KG)	1,307	1,073	1,723	533	955	468
2021-22	Area (In Hectares)	4,130	5,292	378	119	28	303
	Production (In Tons)	5,403	5,943	696	67	29	140
	Yield per Hectare (In KG)	1,308	1,123	1,841	563	1036	462
2022-23	Area (In Hectares)	4,768	5,335	386	125	27	295
	Production (In Tons)	8,690	5,949	703	71	28	143
	Yield per Hectare (In KG)	1,823	1,115	1,821	568	1037	485

3.4.3 Type of Irrigation and Water Management Issues

The total cultivated area of District Orakzai was 17,869 hectares in 2021-22 and 17,862 hectares in 2022-23. Out of this, 4,151 hectares are irrigated, while the remaining area is dependent on other water sources. Irrigation primarily relies on tube wells the private canal (2,974 hectares), government canals (242 hectares), and other sources such as springs and wells (217 hectares). Table 3.60 presents the irrigated area by source from 2020-21 to 2022-23.

Table 3-82: District Orakzai Irrigated Area by Different Types of Irrigation From 2020-21 till 2022-23

Years	Total	Canal		Tube Wells	Others
		Govt.	Private		
2020-21	3,971	255	2,948	520	248
2021-22	4,121	231	2,956	715	219
2022-23	4,151	242	2,974	718	217

[57] - Bureau of Statistics, Planning & Development Department, Government of Khyber Pakhtunkhwa. *Development Statistics of Khyber Pakhtunkhwa 2024*. Table No. 15, 16, 17, 18, 19, 20, 21, 23, and 25
- Data received from Agriculture Department through letter no. CPO (AD) Gen-04/2024/KC dated June 28, 2024.

District Orakzai's agricultural productivity is significantly impacted by water management issues, particularly the erratic availability of irrigation water during dry seasons and prolonged droughts. Insufficient water supply limits farmers' ability to irrigate their crops adequately, leading to reduced yields and overall agricultural output. The unequal distribution of water resources further exacerbates socio-economic disparities in rural communities. Additionally, water sources are often contaminated by agricultural runoff, improper use of agrochemicals, and inadequate waste management practices. This pollution affects crop health, soil quality, and human health, causing crop damage and reduced yields while posing risks to consumers. The district also faces water management challenges such as limited resources, inadequate infrastructure, and a lack of technical and financial support for modern irrigation technologies. To address these issues, various irrigation techniques, such as efficient water use practices and advanced irrigation systems, could be employed to improve water management and enhance agricultural productivity.

Surface irrigation involves applying water to the soil through channels, furrows, or flooding, and is commonly used for crops such as wheat and rice. Sprinkler irrigation distributes water over crops using pipes and sprinkler heads, making it suitable for areas with low water availability, windy conditions, or uneven terrain. Drip irrigation delivers water directly to plant roots through pipes and emitters, making it ideal for water-efficient crops like vegetables and fruits.

3.4.4 Agriculture Employment

Agriculture employment includes all individuals engaged in farming activities such as crop cultivation, livestock rearing, and related agro-industrial work. It provides livelihood and economic stability in rural areas, contributing significantly to GDP and ensuring food security. Despite its importance, the sector faces challenges like low wages, seasonal work, and limited access to modern technology.

According to the Labor Force Survey (LFS) 2020-21[58], agriculture employs 31.8% of the total workforce in Khyber Pakhtunkhwa, while non-agriculture sectors account for 68.2%. Nationally, agriculture represents 37.4% of total employment. Among provinces, Punjab records 39%, Sindh 36.5%, and Baluchistan 40.1% employment in agriculture, indicating varying levels of dependence on the sector across regions.

In District Orakzai, agriculture plays a vital role in rural employment. Out of a working-age population of 175,000, about 47,250 individuals are engaged in agriculture, forming 27.0% of the rural labor force. The total labor force in the district stands at 55,400, with 51,500 employed and 3,900 unemployed. The refined participation rate is 31.7%, higher in rural areas. Agriculture thus remains a key source of livelihood and economic stability for the district's rural population[59].

3.4.5 Constraints

District Orakzai faces several significant constraints that hinder agricultural productivity and economic growth. Addressing these challenges is essential to unlock the region's potential and improve the livelihoods of its residents.

- The district suffers from water scarcity due to inadequate water management and irrigation systems. This shortage reduces agricultural productivity and limits the potential for crop diversification, making water management a critical priority for sustainable agriculture.
- Climate change poses a growing threat to Orakzai's agriculture, with shifts in temperature and rainfall patterns leading to lower crop yields and increased vulnerability to pests and diseases. More frequent heatwaves, droughts, and floods further exacerbate these challenges, threatening both agriculture and the overall well-being of the community.

[58] Pakistan Bureau of Statistics. (2022). *Pakistan Labor Force Survey 2020-2021*. Chapter-4: Employment

[59] Pakistan Bureau of Statistics. (2022). Pakistan Labor Force Survey 2020-2021. Annexure-I Key Indicators of Labor Market (KILM) at District Level, District Orakzai

- Many small-scale farmers in Orakzai struggle with limited access to credit, preventing them from investing in modern farming techniques and technologies. This limitation constrains their productivity, profitability, and ability to compete in more developed agricultural markets.
- The high costs associated with crop production, including expensive inputs, technology, and market uncertainties, place a significant financial burden on farmers. This results in lower income levels and ongoing financial strain, hindering long-term agricultural growth.
- Soil erosion is a major issue in Orakzai, driven by deforestation, overgrazing, flooding, and improper land use. This has led to declining soil fertility, reducing the productive capacity of the land and threatening sustainable agricultural practices.
- The district's lack of proper roads, storage facilities, and markets limits farmers' ability to transport and sell their produce. This poor infrastructure curbs economic opportunities and reduces the potential for profit, limiting the district's overall agricultural development.
- Rapid urbanization, industrialization, and the conversion of agricultural land for non-agricultural purposes reduce the amount of available farmland. This land use change threatens agricultural growth and food security in the region.
- The lack of an agro-industrial zone in Orakzai represents a missed opportunity for economic development. An industrial zone could stimulate investments, create jobs, and foster infrastructure development, but its absence leaves the district reliant on traditional sectors with limited diversification and growth prospects.
- Projected temperature increases and shifts in precipitation patterns present additional challenges for Orakzai. Rising temperatures may result in more frequent and severe heatwaves, affecting health and agricultural productivity, while altered rainfall patterns could lead to water shortages, increased droughts, and floods, further damaging infrastructure and the local economy.
- The gradual disappearance of local crop germplasm due to the adoption of hybrid varieties is a significant concern. These local strains are valued for their superior taste and disease resistance, making their preservation essential for long-term agricultural sustainability.
- The reliance on outdated farming methods and inefficient practices by untrained farmers negatively impacts future crop production. Poor soil management, improper pest control, and inefficient water usage contribute to reduced crop yields, environmental degradation, and lower income levels.
- Water scarcity continues to harm future crop production in Orakzai by leading to lower yields, stunted growth, and reduced crop quality. This stress on crops exacerbates food security concerns and negatively impacts local economies.
- Urbanization in Orakzai has led to the reduction of productive agricultural land, disruption of traditional farming practices, and increased pollution. It also contributes to water scarcity, changes in climate, and labor shortages, further affecting agricultural productivity and leading to land conflicts.
- While private seed companies in Orakzai can introduce better seed varieties and advanced technology, there is a risk of increased dependency and higher costs for farmers. Competition from these companies may benefit farmers, but market dominance could limit options, making proper regulation essential to protect farmers' rights and prevent negative social and environmental impacts.

To overcome these challenges, a combination of government action and community efforts is necessary. Specific policies focusing on better water management, soil conservation, and access to credit and infrastructure are needed. Encouraging sustainable land use practices, promoting crop diversification, and improving resilience to climate change are also essential to ensuring a prosperous future for Orakzai District. These constraints are not only affecting agricultural productivity but also the livelihoods and well-being of the local community.

3.4.6 Recommendations

District Orakzai with its abundant natural resources and strategic importance, holds vast potential for agricultural development. Improving the livelihoods of the local community requires targeted interventions in various areas. The following recommendations aim to address key challenges and unlock this potential:

- Addressing water scarcity through the construction of well-designed watercourses is essential for enhancing irrigation management. Efficient water distribution systems can significantly reduce water wastage, ensuring that agricultural fields receive adequate water, thus improving crop yields.
- Introducing subsidies for essential inputs like seeds, fertilizers, pesticides, and machinery can alleviate the financial burden on farmers, particularly small-scale and resource-constrained ones. This support will enhance their productivity and income, fostering agricultural growth across the district.
- Setting up dedicated research centers for cereals and stone fruits in District Orakzai could greatly benefit local agriculture. These centers would focus on improving crop varieties, introducing modern farming techniques, managing pests and diseases, and optimizing resource utilization, ultimately boosting the local economy.
- Embracing solar energy for agricultural operations, such as powering offices and tubewells, offers a sustainable solution that can increase productivity and reduce costs. By investing in solar power.
- Establishing value-addition and processing units for fruits will enhance the profitability of local produce. This could involve supporting local entrepreneurs or farmers in setting up processing facilities, offering training and technical assistance, and facilitating access to financing for the establishment of these units.
- Setting up an agro-industrial zone in District Orakzai could stimulate economic growth by attracting investments, creating jobs, and fostering innovation. This zone would provide a platform for agribusinesses to thrive and contribute to the overall development of the region.
- Immediate recruitment of additional staff for agriculture offices in Orakzai is crucial for better farmer support and timely implementation of key agricultural programs. Filling these vacancies will ensure that the district's agricultural sector continues to progress efficiently.

Implementing these recommendations will enhance agricultural productivity, create economic opportunities, and improve the quality of life for the people of District Orakzai.

3.4.7 Proposed Interventions for Agriculture Sector

Orakzai district is enriched area for smart agriculture technology intervention to boost local economy. The following major interventions are proposed for this sector:

- **Climate-Smart High-Value Crop Diversification & Terrace Rehabilitation**
- **Community-Based Water Harvesting & Micro-Irrigation Infrastructure**
- **Olive & Wild Fruit Value Chain Development**
- **Digital Market Linkage & Agri-Logistics Facilitation System**

These proposals are briefly explained in the following section:

- **Climate-Smart High-Value Crop Diversification & Terrace Rehabilitation**

Agriculture in Orakzai District is primarily rainfed, subsistence-based, and low-yielding, with most households cultivating wheat, maize, and barley on small, terraced plots. Due to soil erosion, rainfall variability, and poor access to water, many fields lie underutilized or abandoned. Traditional cereal crops provide little income, forcing communities to rely heavily on livestock or remittances.

However, Orakzai's cool temperate climate and elevation make it highly suitable for high-value horticulture, including:

- **Off-season vegetables** (tomato, capsicum, peas, beans)
- **Garlic, onion, coriander (dried spice crops)**
- **Stone fruits** (apricot, plum, peach, almond, walnut)
- **Medicinal and aromatic plants** (thyme, mint, artemisia)

Neighboring districts like Swat and Dir have successfully boosted income through similar crop diversification programs, yet Orakzai remains left behind due to lack of structured support.

The main objective of the proposed interventions is to transition Orakzai's agriculture from subsistence cereal farming to a resilient, high-value, climate-smart horticulture system that generates year-round income.

The major components are:

Component 1: Terrace Rehabilitation & Soil Conservation

- Stone wall repair, contour bunding, check bunds to prevent erosion
- Farmer-led cash-for-work models for rehabilitation
- Training in mulching, composting, organic amendments

Component 2: High-Value Crop Diversification Packages

- Supply of certified seeds/saplings (tomato, capsicum, garlic, onion, apricot, almond)
- Model plots for farmer-to-farmer learning
- Integrated Pest Management (IPM) training

Component 3: Protected Cultivation (Polytunnels & Low Tunnels)

- 500 locally fabricated polytunnels for off-season vegetables
- Low-cost nursery shelters for women groups

Component 4: Post-Harvest Handling & Market Linkages

- Solar dryers, grading crates, packaging kits
- Formation of Vegetable & Fruit Producer Groups
- Linkages with Kohat, Peshawar, Rawalpindi wholesalers

Expected outcomes:

The major potential outcomes/benefits are:

- Increased cropping intensity
- Increased income (from survival farming to cash-generating horticulture)
- Women Empowerment (engaging nurseries & herb cultivation)
- Youth Employment (Polytunnel installation, nursery raising, packaging)
- Climate Resilience (Terraced soil conservation + drip irrigation)
- Food Security & Nutrition (Wide availability of vegetables & fruit)

Implementation Strategy:

The implementation is proposed to be through Agriculture Extension Department with technical support from FAO with local community engagements (Jirga, farmer cooperatives, women groups) and private collaborators.

- **Community-Based Water Harvesting & Micro-Irrigation Infrastructure**

Orakzai District relies heavily on rainfed agriculture and seasonal streams (torrents), which flow intensely during monsoon but dry up for most of the year. Due to lack of water storage infrastructure, over 70% of rainwater is lost as runoff, causing soil erosion, crop failure, and grazing stress.

Most households cultivate only one low-yield cereal crop annually, leaving fields barren for 8–9 months. Women often walk long distances to fetch water for household use. Orakzai urgently needs a community-based water harvesting revival model built around small-scale, climate-smart infrastructure, NOT large dams that take decades.

The objective of this proposal is to ensure year-round water availability for agriculture, livestock, and domestic use through decentralized water harvesting and efficient irrigation technologies.

The major components are:

Component 1: Construction of Community Water Harvesting Structures

- Mini check dams & percolation bunds across runoff streams
- Lined water ponds for villages
- Roof-top rainwater harvesting tanks for households

Component 2: Solar-Powered Micro Irrigation Systems

- Solar pumps installed with farmer cooperatives (cost-sharing model)
- Drip & sprinkler kits deployed across vegetable plots & orchards
- Training on low-pressure irrigation techniques

Component 3: Water Governance & Maintenance Committees

- Establish Water User Groups (WUGs) for each structure
- Create usage bylaws & contribution mechanisms for repairs
- Female committees oversee household tanks & kitchen gardens

Expected outcomes:

- Increased & reliable water access
- Expanded irrigated farming
- Reduced water conflict
- Women Empowerment (Near-household water tanks eliminate daily burden of water fetching, giving women time for income activities)

Implementation Strategy:

The leading agency for its execution is Public Health Engineering & Agriculture Extension Department while technical support from PCRWR, FAO, GIZ with community partners (Local Jirga, water user committees) and private sectors.

○ Olive & Wild Fruit Value Chain Development

Orakzai's mountainous terrain is naturally rich in wild olive (Olea ferruginea), mulberry, fig, pine nut (chilgoza), and ber (Indian jujube). Much of this wild genetic wealth remains unutilized, as communities lack knowledge, tools, and market linkages to capitalize on it.

Neighboring regions like Waziristan, Dir, and Bannu have unlocked high income through grafting wild olives into oil-bearing cultivars and setting up small-scale cold press extraction units. Similarly, dried mulberries, pine nuts, and figs fetch premium prices in national and export markets — yet in Orakzai, they are mostly consumed raw or wasted.

With minimal investment, Orakzai can transition from subsistence cereal economy to a resilient tree-based perennial economy.

The objective of the proposed intervention is to develop Orakzai as a "Mountain Olive & Dry Fruit District" by upgrading wild fruit resources into structured value chains for sustained income generation and to establish community fruit nurseries and set up oil extraction & drying units.

The major components are:

Component 1: Wild Olive Mapping & Grafting Campaign

- Identify existing wild olive clusters
- Introduce Italian/Pakistani cultivars
- Train local youth as grafting technicians

Component 2: Fruit Nursery & Plantation Drive

- Establish women & youth-led nurseries
- Distribute saplings for orchard development (fig, apricot, almond, mulberry, ber)

Component 3: Processing & Value Addition Units

- Cold press olive oil extraction plants (modular, low-cost)
- Solar or tunnel-based fruit dryers
- Packaging and branding support

Component 4: Collective Marketing & Buyer Linkages

- Form Olive & Dry Fruit Producer Cooperatives
- Facilitate sales to Kohat, Peshawar, Islamabad health markets

Expected outcomes:

- Long term income stability
- Women Inclusion in Value Chains (managing nurseries, drying, packaging)
- Environmental Restoration (increased tree cover)
- Youth opportunities (grafting, oil pressing, logistics)

○ Digital Market Linkage & Agri-Logistics Facilitation System

Despite growing agricultural and livestock potential, farmers in Orakzai remain disconnected from urban markets such as Peshawar, Kohat, Islamabad, and D.I. Khan.

Key Challenges:

- Middlemen exploit price gaps due to lack of direct selling channels.
- Farmers don't know real-time market prices, resulting in weak bargaining power.
- Smallholders cannot transport goods individually, leading to post-harvest loss or local distress sales.
- Zero digital visibility Orakzai produce is sold under other district labels.

A Digital and Physical hybrid market system can bridge this gap by connecting producers directly with buyers, transporters, processors, and exporters.

The objective is to establish an integrated digital-agri market and logistics support system enabling farmers of Orakzai to sell produce at fair market prices with minimal wastage.

The components are:

Component 1: Community Collection & Grading Points

- Set up solar-powered sheds & weighing machines at Union Council hubs
- Farmers drop produce → stored & aggregated → ready for bulk sale

Component 2: Digital Market Platform & Price Alerts

- Develop Mobile App + USSD/SMS system (for non-smartphone users)
- Daily price updates (Peshawar, Islamabad, Kohat markets)
- Buyer posting system — traders place orders online
- Transport sharing portal — farmers co-book trucks

Component 3: Market Linkage Facilitation Desk

- A District Agri Marketing Cell that:
    - Registers farmers & buyers
    - Prepares contracts & receipts
    - Tracks payments & delivery

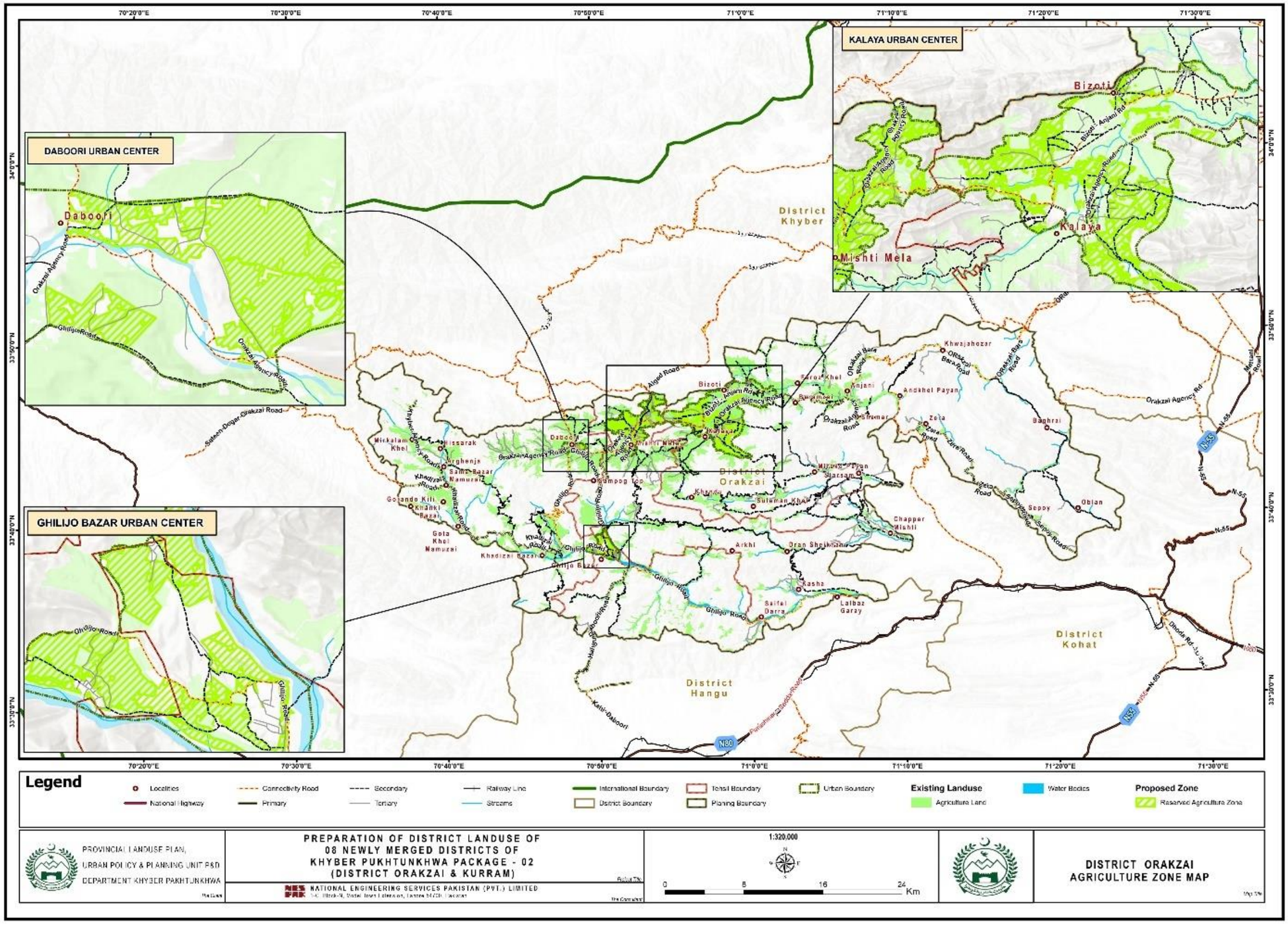
Component 4: Branding & Packaging Support

- Introduce "Orakzai Produce" label for:
    - Red beans, vegetables, olive oil, dry fruits, honey, desi ghee
- Provide eco-friendly packaging kits for premium buyers

Expected Outcomes:

- Reduction in middlemen exploitation and lower post-harvest loss
- Digital integration of rural economy
- Youth Digital Employment

The proposed interventions together form a comprehensive agricultural transformation roadmap for Orakzai District moving from subsistence and fragmented production toward a resilient, market-linked rural economy.



Map 3-25 District Orakzai Proposed Agriculture Zones

3.5 Livestock

Livestock products such as meat, milk, bones, fat, hides, and skin yield substantial profits for investors, especially with the growing demand in the international halal food market, which presents significant export opportunities for the livestock industry. In this context, the district of Orakzai has enormous potential that can be harnessed through appropriate livestock policies. The livelihoods of farmers in the Orakzai district are directly impacted by the livestock sector, which provides food, wool, fuel, and farming resources. This sector offers consistent daily financial support, employment opportunities, and a stable food source. Additionally, it serves as a safeguard against the risks associated with crop failure or other unforeseen events.

3.5.1 Available Livestock

The livestock population in District Orakzai represents a modest portion of the overall livestock numbers in Khyber Pakhtunkhwa. District Orakzai's livestock population is 614,473, which constitutes 1.28% of the overall livestock in Khyber Pakhtunkhwa.[60] Cows and sheep also play a prominent role in the district's livestock sector, with 78,152 cows and 58,003 sheep, contributing 0.88% and 1.37% of the provincial totals, respectively. Goats are similarly well-represented, with 112,989 goats making up 1.12% of the goat population in Khyber Pakhtunkhwa. Buffaloes, while fewer in number, also form a notable part of Orakzai's livestock profile, with 28,877 animals representing 0.84% of the province's buffalo population. The district's camel population stands at 577, making up 0.46% of the provincial total. Other livestock such as donkeys, horses, and mules are present in smaller numbers, 3827, 114, and 614 respectively.

Table 3.72 below, shows the details of the livestock population in District Orakzai and Khyber Pakhtunkhwa.

Table 3-83: District Orakzai Livestock Population Comparison with Khyber Pakhtunkhwa

Livestock	Khyber Pakhtunkhwa	District Orakzai	Percentage of Livestock in District Orakzai w.r.t KP
Cow	8,837,231	78,152	0.88%
Buffaloes	3,402,135	28,877	0.84%
Sheep	4,219,238	58,003	1.37%
Goats	10,041,682	112,989	1.12%
Camel	124,660	577	0.46%
Donkey	502,821	3,827	0.76%
Horse	268,953	114	0.04%
Mule	302,174	614	0.20%
Other	1,112,325	1,895	0.17%

3.5.1.1 Assessment of Poultry and Fisheries

Poultry and fisheries are vital components of the agricultural sector, contributing significantly to food security and income generation. Poultry farming provides a steady supply of eggs and meat, addressing protein needs and offering livelihood opportunities, particularly in rural areas. Fisheries, both inland and marine, are crucial for nutritional balance, providing a rich source of protein, essential fatty acids, and micronutrients. These sectors also support economic development through employment and trade, though they face challenges like disease management, climate change, and resource sustainability that require strategic interventions for long-term growth.

3.5.1.1.1 Fisheries

While the fisheries sector plays a crucial role in providing food, generating jobs, boosting the economy, supporting trade, conserving biodiversity, fostering rural development, and preserving cultural and

[60]. *Livestock Baseline Survey Khyber Pakhtunkhwa 2021.*

recreational aspects, it is regrettable that District Orakzai does not currently contribute to fish production. This absence underscores the untapped potential for the district to benefit from the many advantages the fisheries sector offers. Addressing this gap could bring about positive changes, providing new opportunities for food security, livelihoods, economic growth, and environmental sustainability within the district. Whereas, in the neighboring district of Kohat, in the 2020-21 fiscal year, District Kohat contributed 210 metric tons of non-trout fish, valued at Rs. 53 million. By 2021-22, this production increased significantly to 350 metric tons, with a corresponding value of Rs. 87.53 million and in the 2022-23 fiscal year, District Kohat contributed 255 metric tons of non-trout fish, valued at Rs. 64 million.[61]

Table 3-73 below compares the fisheries production of District Orakzai with District Kohat and Khyber Pakhtunkhwa.

Table 3-84: District Orakzai Fisheries Production Comparison with District Kohat and Khyber Pakhtunkhwa

Years	Production	Type	Khyber Pakhtunkhwa	District Kohat	District Orakzai
2020-21	Production (In Metric Tons)	Trout	603.99	-	-
		Non-Trout	2,899.98	210	-
		Total	3,053.97	210	-
	Value (In Million Rs.)	Trout	603.99	-	-
		Non-Trout	725.00	53	-
		Total	1328.99	53	-
2021-22	Production (In Metric Tons)	Trout	780.00	-	-
		Non-Trout	4,209.96	350	-
		Total	4,989.96	350	-
	Value (In Million Rs.)	Trout	780.000	-	-
		Non-Trout	1052.49	88	-
		Total	1832.49	88	-
2022-23	Production (In Metric Tons)	Trout	795.00	-	-
		Non-Trout	4,435.00	255	-
		Total	5,230.00	255	-
	Value (In Million Rs.)	Trout	1193.00	-	-
		Non-Trout	1109.00	64	-
		Total	2301.00	64	-

3.5.1.1.2 Poultry

The poultry sector in District Orakzai plays a vital role in the local economy. Poultry population of District Orakzai is 329,425 birds, representing 2.05% of Khyber Pakhtunkhwa's total poultry sector.[62] This substantial contribution highlights the district's potential to further expand poultry farming, which is crucial for food security and economic development.

Poultry farming in Orakzai is primarily driven by local demand for poultry products, including meat and eggs, which are staples in the region's diet. The sector provides livelihoods for many families, contributing to income generation and employment opportunities. The growing demand for poultry

[61] Bureau of Statistics, Planning & Development Department, Government of Khyber Pakhtunkhwa. *Development Statistics of Khyber Pakhtunkhwa 2024*. Table No. 53

[62] Directorate General (Ext), Livestock and Dairy Development Department, Khyber Pakhtunkhwa. (2022). *Livestock Baseline Survey Khyber Pakhtunkhwa 2021.* Table 1-1: Livestock Population.

products presents an opportunity for further investment and expansion of the sector, which could lead to increased productivity and profitability.

However, challenges remain, including limited access to modern poultry farming techniques, infrastructure, and veterinary services. Addressing these issues through targeted interventions, such as training programs for farmers, improved access to credit, and better infrastructure, can help unlock the full potential of the poultry sector in Orakzai. With the right support, the district's poultry industry can continue to grow, enhancing food security and contributing to the broader economic development of the region.

3.5.2 Livestock Facilities

District Orakzai has developed a range of facilities to support its livestock sector, reflecting ongoing commitment to animal husbandry and veterinary services. These facilities provide essential infrastructure and services to maintain and improve livestock health and productivity.

3.5.2.1 Veterinary Facilities

In the 2022-23 period, District Orakzai had 60 veterinary facilities, comprising 4 hospitals, 30 dispensaries, and 26 veterinary centers. This shows a slight decrease from previous years (2020-21 and 2021-22), when the district had 65 facilities, including 4 hospitals, 25 dispensaries, and 36 centers. These facilities are vital for providing medical care, diagnostic services, and disease management for local farmers.

During 2022-23, veterinary facilities treated 121,000 animals and protected 109,000 animals and 111,000 birds[63] through vaccination and other preventive programs. Mobile veterinary clinics, although lacking specific data, play an important role in disease prevention and control.

The district also emphasizes breed improvement through artificial insemination, supported by 11 Animal Insemination Centers. This process aids in genetic enhancement and productivity improvements in livestock.

3.5.3 Economic Potential of Livestock

District Orakzai, while contributing a modest portion of Khyber Pakhtunkhwa's overall livestock population, holds significant economic potential due to its diverse livestock sector. The total livestock population in the district is 614,473, representing 1.28% of the provincial total. This includes 78,152 cows, 28,877 buffaloes, 58,003 sheep, 112,989 goats, and 577 camels. Other animals such as donkeys, horses, and mules are present in smaller numbers but still contribute to the district's agricultural landscape.

The cattle sector, consisting of cows and buffaloes, plays a key role in dairy production. Household-level milk production supports local consumption and provides a foundation for further development of the dairy industry.

Sheep and goat populations also add to the district's economic activity by providing meat, wool, and other by-products. With 58,003 sheep and 112,989 goats, the supply of meat and wool is substantial.

Poultry farming is another important contributor, with 329,425 birds representing 1.72% of Khyber Pakhtunkhwa's poultry sector. Poultry supports local demand for meat and eggs and contributes to the economy through income generation and job creation.

Despite these positive aspects, the livestock sector faces challenges including limited access to modern farming techniques, inadequate infrastructure, and the need for enhanced veterinary

[63] Bureau of Statistics, Planning & Development Department, Government of Khyber Pakhtunkhwa. *Development Statistics of Khyber Pakhtunkhwa 2024*. Table No. 2

services. Targeted interventions in these areas can unlock the sector's full economic potential. Investments in veterinary facilities including the 60 existing facilities comprising 4 hospitals, 30 dispensaries, and 26 centers are essential to maintain animal health and improve productivity.

Overall, the livestock sector in District Orakzai has significant potential for economic growth. By addressing current challenges and utilizing available resources, the district can enhance agricultural output, strengthen food security, and support local economic development.

3.5.4 Plans existing/ ongoing and New Schemes[64]

- Ongoing
  - Provision of Mobile Veterinary clinics (Services) Orakzai District.
  - Scholarships for Vets and Para - Vets students in Merged Districts.
  - Establishment and Construction/ reconstruction of Veterinary Facilities and provision of de-wormer Vaccine for all existing regular veterinary institutions in Merged Districts.

- New Schemes
  - Strengthening of Disease preparedness and response mechanism in Merged Areas.
  - Employment Opportunities through climate smart and gender sensitive Livestock Interventions in Merged Areas.

3.5.5 Constraints

- The livestock population in District Orakzai, while contributing to the local economy, represents a small fraction (0.82%) of the total livestock in Khyber Pakhtunkhwa. This limited population constrains the potential for scaling up production and leveraging the sector's economic benefits.
- The district does not currently contribute to fish production, highlighting a significant gap in the fisheries sector. This absence of fish production limits opportunities for enhancing food security, generating income, and supporting economic growth through fisheries.
- The livestock sector in Orakzai suffers from infrastructure challenges, including inadequate veterinary services, limited access to modern farming techniques, and insufficient facilities for livestock processing and marketing. These deficiencies hinder the sector's ability to reach its full potential.
- Despite the presence of poultry farms, the poultry sector in Orakzai faces challenges such as limited access to modern farming techniques, infrastructure constraints, and inadequate veterinary services. These issues restrict the sector's growth and impact on local food security and economic development.
- The livestock sector's potential is constrained by fluctuations in market prices, limited investment, and inadequate support for expanding the industry. Addressing these economic challenges is crucial for unlocking the sector's full potential and enhancing profitability.
- Although there are veterinary facilities in the district, there is a need for continuous improvement and expansion to ensure comprehensive animal healthcare. Limited veterinary services and infrastructure can restrict disease management and overall productivity.
- The management of resources such as grazing lands, fodder, and feed is critical for the sector's sustainability. Suboptimal management practices may lead to inefficiencies and reduced productivity, affecting the sector's long-term viability.

3.5.6 Recommendations

[64] Data received from Directorate General (Ext), Livestock and Dairy Development Department, Khyber Pakhtunkhwa. (2024) through letter No. 10913 15/498 dated August 15, 2024.

To bolster the livestock sector in District Orakzai and enhance its contribution to rural livelihoods and food security, the following recommendations are proposed:

- Implement vocational training programs to educate farmers and herders on advanced livestock management practices. These programs should focus on improved feeding techniques, breeding practices, and healthcare to boost productivity and animal welfare.
- Develop and execute breeding programs aimed at conserving and enhancing the genetic diversity of native livestock breeds. This will help maintain the adaptability and resilience of local livestock populations.
- Invest in problem-oriented research to address specific issues faced by native livestock, such as diseases, pests, and nutritional deficiencies. This research should focus on identifying and applying optimal feeding, healthcare, and husbandry practices.
- Encourage the expansion of backyard poultry farming in rural areas by offering training in poultry management, ensuring access to affordable feed and vaccines, and establishing market linkages to facilitate product sales.
- Conduct targeted research to improve poultry nutrition, disease prevention, and management practices. Addressing these areas will help overcome existing challenges and enhance the overall productivity of the poultry sector.
- Promote national and international cooperation to increase cold-water fish production. Collaboration with governments, international organizations, and local communities can foster sustainable fishing practices and expand fish production.
- Initiate research focused on improving fish health, feeding practices, and husbandry methods. Identifying and addressing challenges in these areas will support the development and sustainability of the fisheries sector.

These recommendations aim to address current constraints, leverage opportunities, and support the sustainable development of the livestock, poultry, and fisheries sectors in District Orakzai.

3.5.7 Future Livestock Development Proposals

Livestock is the largest economic asset for households in Orakzai District. Almost 90% of families own goats, sheep, cattle, or poultry, primarily for:

- Meat and dairy consumption
- Cash needs during emergencies (selling animals)
- Cultural obligations (Eid, weddings, hospitality)

However, the sector faces multiple structural challenges:

- Recurring diseases
- Shortage of fodder & grazing land degradation
- Lack of veterinary infrastructure
- No value addition or proper marketing
- Women contribute silently but are not economically recognized

Given the strong livestock tradition, Orakzai has the potential to become a leading small ruminant (goat/sheep) meat, dairy, and poultry production district if supported with healthcare, fodder, structured markets, and value addition.

The objectives are to build a climate-resilient, disease-free, and economically thriving livestock sector in Orakzai District through integrated animal health, fodder security, breed improvement, women-centered enterprises, and market value chain development.

The components are:

3.5.7.1 Component 1: Animal Health & Disease Prevention System

- Establish Mobile Veterinary Response Units
- Annual vaccination drives for PPR (goats/sheep), FMD, HS, ET
- Community Para-Vet Training

3.5.7.2 Component 2: Fodder Security & Range Management

- Fodder seed & silage training (sorghum, oats, barseem)
- Community Pasture Rehabilitation Committees for rotational grazing
- Fodder Tree Plantation on hilly slopes

3.5.7.3 Component 3: Breed Improvement & Productivity

- Introduce goat buck stations (Beetal, Kamori crossbreeds)
- Artificial Insemination (AI) centers for cattle/dairy promotion
- Growth-based fattening units for Eid & export markets

3.5.7.4 Component 4: Women-Led Dairy & Poultry Micro-Enterprises

- Family dairy kits
- Backyard poultry units
- Training on milk processing (ghee, butter, yogurt, cheese)

3.5.7.5 Component 5: Meat, Dairy & Wool Value Chain Development

- Establish Livestock Collection & Weighing Centers
- Introduce Digital Livestock Trading Platform
- Train youth as Butchery/Meat Hygiene Technicians
- Promote Desi ghee / goat cheese / wool craft branding

3.5.7.6 Component 6: Disaster Preparedness & Climate Resilience

- Develop Livestock Emergency Response Plans (LERP)
- Stockpile fodder banks for winter/drought seasons
- Support insurance & livestock credit schemes

3.5.7.7 Expected Outcomes/Benefits:

- Reduction in mortality rate
- Increased income level
- Women gain economic status (Women-led dairy/poultry)
- Youth Employment

3.5.7.8 Implementing Strategy:

The leading agency to be livestock department, community facilitators, technical partners, women engagement and digital & logistic enterprises.

3.5.8 Proposal: Sustainable Rangelands Development

Orakzai District's rangelands are a critical natural asset supporting pastoral livelihoods, livestock productivity, biodiversity, and climate resilience. This proposal outlines a 5-year, integrated rangelands development program to restore degraded pastures, increase sustainable livestock productivity, diversify incomes, strengthen local institutions and governance, and build climate-adaptive management systems. The program combines community-led restoration, fodder and water infrastructure, adaptive grazing management, animal health and value-chain strengthening, and capacity building. Implementation will be led by district authorities in partnership with provincial livestock/wildlife departments, local communities (Khyber-Pakhtunkhwa tribal structures), NGOs, and potential donors (ADB, FAO, EU, UK FCDO).

- **Geography & livelihood context:** Orakzai District is mountainous with extensive rangelands used for seasonal grazing, transhumance and smallholder livestock rearing. Livestock (goats, sheep, cattle) is a major income source and food security asset.
- **Problems identified:** Overgrazing, shrub encroachment, rangeland degradation, erosion, reduced water availability, weak veterinary services, limited fodder reserves, insecure access rights and conflict over grazing, and limited market linkages.
- **Climate risks:** Increasing frequency of droughts and erratic rainfall reduces pasture productivity and heightens pressure on remaining biomass.
- **Opportunities:** Strong local institutions, traditional grazing rules (which can be revived/adapted), available communal land, and demand for livestock products in nearby urban centers.

Objective is to restore and sustainably manage Orakzai's rangelands to increase livestock productivity, improve household incomes, and strengthen climate resilience.

Other major objectives are:

- Restore productivity
- Increase average livestock productivity
- Establish fodder production
- Strengthen veterinary and extension services
- Formalize community-based grazing management institutions

3.5.8.1 Major Components:

3.5.8.1.1 Component 1: Participatory Rangeland Restoration

Detailed rangeland baseline survey and mapping using participatory GIS. - Identification and prioritization of degraded sites for restoration. - Community mobilization and formation/strengthening of Pasture Management Committees (PMCs). - Restoration techniques: controlled grazing (temporary enclosures), reseeding with native grasses and legumes, shrub management (selective cutting), soil and water conservation (contour bunds, gully plugging, micro-check dams), and planting of palatable shrubs/forage trees. - Demonstration plots and farmer field schools for adaptive learning.

Outputs: Restored pasture hectares; trained PMCs; demonstration sites.

3.5.8.1.2 Component 2: Fodder Security and Improved Water Access

Establishment of community fodder nurseries and seed multiplication (local forage species, drought-resistant varieties). - Promotion of improved fodder systems: silage, hay-making, rotational fodder plots. - Construction/rehabilitation of water harvesting structures: check dams, ponds, spring protection, small gabion structures and solarized pumps for livestock watering points. - Provision of fodder seed kits and simple equipment for hay/silage.

Outputs: Increased on-farm fodder stocks; functional watering points; reduced seasonal fodder gaps.

3.5.8.1.3 Component 3: Sustainable Grazing Management and Land Tenure

Facilitate locally agreed grazing plans (seasonal use maps, stock limits, rotation schedules), integrating transhumant users. - Conflict-sensitive interventions to harmonize grazing across clans/communities; revive/adapt customary institutions. - Support for legal recognition of PMCs where feasible and linkages to district authorities. - Training on by-law development, enforcement mechanisms, and community monitoring.

Outputs: Agreed grazing plans; conflict reduction; recognized PMCs.

3.5.8.1.4 Component 4: Livestock Health, Nutrition and Value Chain Support

Strengthen veterinary outreach: mobile vet camps, cold-chain for vaccines, community animal health workers (CAHWs) training. - Targeted supplementation programs during lean seasons (mineral licks, feed blocks for lactating animals). - Animal breeding and husbandry trainings to improve genetic potential (selective mating, basic record keeping). - Market linkages: organize producer groups, support access to markets, cold storage and aggregation points, value addition (small-scale dairy processing, halal slaughter links), and access to microfinance for livestock enterprises.

Outputs: Reduced mortality, higher productivity, better market access.

3.5.8.1.5 Component 5: Institutional Strengthening, Capacity Building & Knowledge Management

Capacity building for district/provincial livestock, forestry, and rangeland staff. - Training PMCs in governance, finance, M&E, and sustainable management practices. - Establish rangeland monitoring protocol (biophysical indicators, participatory monitoring) and a data portal (simple dashboard). - Knowledge products, best-practice manuals, and outreach campaigns.

Outputs: Institutional capacities enhanced; accessible monitoring data.

3.5.8.1.6 Component 6: Climate Adaptation & Disaster Risk Reduction

Integrate climate-resilient species and practices into restoration and fodder programs. - Early-warning links for drought, contingency fodder reserves, and rapid response protocols for mass mortality events. - Payment for ecosystem services pilots (e.g., watershed protection incentives).

Outputs: Increased resilience; drought contingency plans.

Implementation Strategy:

- **Lead Implementer:** District Government of Orakzai (District Livestock/Forestry Division) with oversight from Provincial departments.
- **Partners:** Local NGOs, community organizations, academic institutions (for monitoring), donor agencies (ADB/FAO/EU/FCDO), and private sector service providers (vets, feed suppliers).
- **Governance:** Project Steering Committee (district level), Technical Advisory Group (rangeland/livestock experts), and Local PMCs.
- **Procurement & Financial Management:** Follow donor or government procurement rules depending on funding source; establish transparent financial management systems.

3.6 FUELS, MINERALS, AND ENERGY OF ORAKZAI DISTRICT

Orakzai District, nestled in the Kohat Division of Khyber Pakhtunkhwa province, Pakistan, is a region of significant geographical and historical importance. Formerly part of the Federally Administered Tribal Areas (FATA), Orakzai attained the status of a district following the merger of FATA with Khyber Pakhtunkhwa. The district, characterized by its mountainous terrain and fertile valleys, spans an area of 1,538 square kilometers and is inhabited by the Orakzai tribe, from whom it derives its name. This chapter delves into the fuels, minerals, and energy resources of Orakzai District, exploring their potential, challenges, and the path towards sustainable development.

3.6.1 Fuels and Minerals

3.6.1.1 Existing and Potential Fuel and Mineral Resources

3.6.1.1.1 Existing Resources:

Coal deposits: Orakzai District holds estimated coal reserves of 8 million tons[65], primarily located in bands south of Dauli and Lwara Mela villages[66] refer Map 3.18 The coal-bearing horizon near Dauli is approximately 50 feet long and 7 to 8 inches thick, with a carbon content ranging from 43.48 to 43.83 percent. At Lowara Mela, coal forms 6 to 8-inch bands in white quartzite sandstone, boasting a higher carbon content of 47.22 percent. While historically significant, current extraction methods remain largely traditional, hindering efficient resource utilization. The annual production of coal in 2004-05 as 5.70 million tons which was mainly extracted in Orakzai District with some share of neighboring Kurram District.

Iron ore: The district possesses iron ore reserves estimated at 0.050 million tons. The ore is scattered throughout the region, with Cretaceous rocks containing approximately 14.38 percent iron and lean deposits averaging around 20 percent. An iron ore bed is exposed near Shimar Killi. Approximate iron ore reserves include 2.3 million tons of low-grade ore at Kurez, 0.4 million tons of low-grade ore at Shimar Killi, and 3 thousand tons of medium-grade ore at Karbogha. These deposits represent a potential source of raw material for local industries and construction, but their low-grade nature necessitates investment in beneficiation technologies.

Oil and gas: Orakzai are considered prospective for oil and gas reserves, and the KPOGCL (Khyber Pakhtunkhwa Oil and Gas Company Limited) is actively engaged in exploration blocks within the district. Exploration is currently taking place in some blocks in Orakzai and Tirah, where high-impact oil and gas discoveries are expected in KP. While the extent of these reserves is yet to be fully determined, successful exploration could significantly alter Orakzai's energy landscape.

Alum: Alum is present near Bar Trangura village within the quartzite sandstone of the Hangu formation. While alum has limited applications compared to other minerals, it could potentially support small-scale industries such as water treatment and textile dyeing[67].

3.6.1.1.2 Potential Resources:

Metallic minerals: Geological surveys have indicated the presence of various untapped metallic minerals within the tribal areas, including copper, manganese, chromite, iron ore, lead, barite, soapstone, dolomite, feldspar, quartz, silica sand, bentonite, marl, emerald, and graphite. A comprehensive geological mapping and resource assessment program is crucial to quantify these reserves and determine their economic viability.

Natural gas/oil: There is a potential for natural gas and oil exploration in sedimentary basins.

[65] https://kpboit.gov.pk/orakzai-district/
[66] https://pdf.usaid.gov/pdf_docs/PNABU536.pdf
[67] https://kpboit.gov.pk/orakzai-district/

The Kohat sub-basin and northern Sulaiman fold belt mostly includes the sedimentary rocks and show promising petroleum exploration targets[68].

3.6.1.2 Economic Impact Assessment

An Economic Impact Assessment (EIA) evaluates the economic effects of a particular project, policy, or resource exploitation on a region. When applied to the context of mineral extraction and resource development in Kurram District, the EIA can have both positive and negative implications.

Here's a breakdown of the positive and negative impacts of Economic Impact Assessment in Orakzai District.

3.6.1.2.1 Positive Impacts:

Employment: Mining activities, particularly in coal and iron ore, provide direct employment for a segment of the local workforce. However, due to the informal nature of many operations, the actual number of employed individuals is often underestimated. Formalizing the mining sector would allow for accurate data collection and better labor protections.

Revenue generation: Royalties and taxes derived from mineral extraction contribute to local and provincial revenue streams. In 2004-05, Rs. 31.5 million of revenues were earned from the auction of mineral check-posts. However, the actual potential for revenue generation remains significantly higher, contingent upon improved extraction methods, formalized operations, and updated royalty rates.

Growth of ancillary industries: Mineral extraction can stimulate the growth of related industries, such as transportation, construction, and equipment supply. Establishing a mineral processing facility in Orakzai would create additional employment opportunities and add value to the extracted resources before they are transported elsewhere.

3.6.1.2.2 Negative Impacts:

Environmental degradation: Unsustainable mining practices, including deforestation, soil erosion, water contamination, and air pollution, pose a significant threat to Orakzai's environment. These impacts can offset the economic benefits of mining in the long term, necessitating the implementation of stricter environmental regulations and responsible mining practices.

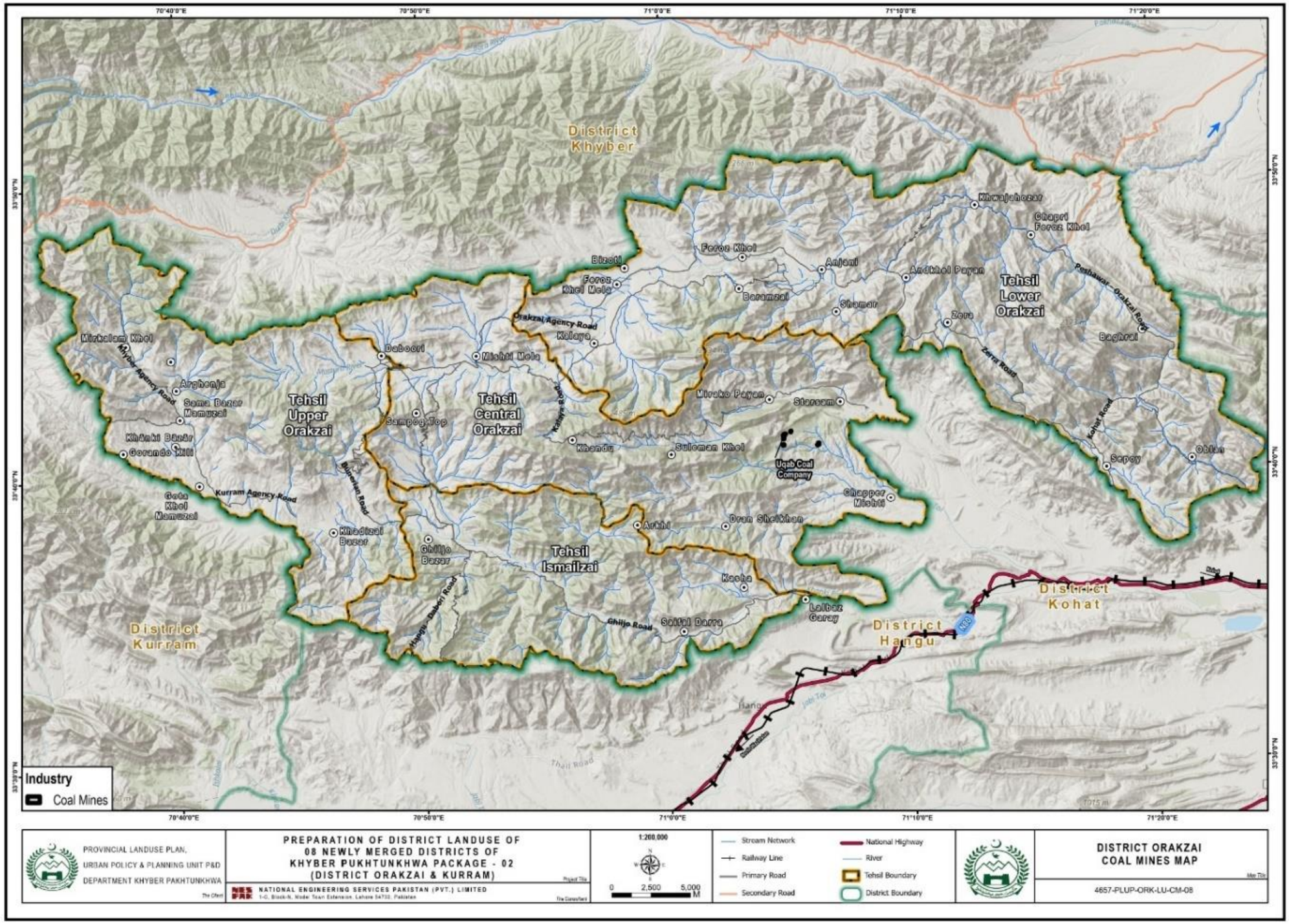
Informal mining sector: The prevalence of informal mining operations leads to revenue leakage, exploitation of workers, and environmental damage. Formalizing these operations through licensing, training, and financial support is crucial for ensuring equitable and sustainable resource management.

3.6.1.2.3 Recommendations:

Formalize artisanal mining: Implement a program to formalize artisanal mining operations through licensing, training, and access to financing. This would improve safety standards, reduce environmental impact, and increase revenue generation.

Invest in value-added processing: Establish a mineral processing facility in Orakzai to add value to extracted resources before they are transported elsewhere. This would create additional employment opportunities and boost the local economy.

[68] http://nceg.uop.edu.pk/GeologicalBulletin/Vol-Special-2013/Abstract22.pdf



Map 3-26: Coal Mines in District Orakzai

3.6.2 Constraints and Recommendations

3.6.2.1 Constraints:

- **Outdated technology:** The use of outdated technology limits productivity, increases costs, and contributes to environmental damage.
- **Illegal mining**: Illegal mining operations undermine legal businesses, evade taxes, and cause significant environmental damage.
- **Limited infrastructure**: A lack of adequate infrastructure, including roads, electricity, and water supply, hinders mining operations and limits the potential for value-added processing.
- **Conflicts over land rights**: Disputes over land ownership and resource distribution can delay or halt mining projects.
- **Non-availability of land records:** The absence of reliable land records complicates land acquisition and contributes to land disputes.

3.6.2.2 Recommendations:

- **Strengthen EPA monitoring:** Increase the capacity of the Environmental Protection Agency (EPA) to monitor mining operations and enforce environmental regulations.
- **Adopt modern extraction techniques:** Promote the adoption of modern, environmentally friendly extraction techniques through training programs, financial incentives, and technology transfer initiatives.
- **Launch awareness campaigns:** Conduct awareness campaigns to educate local communities about sustainable mining practices and the importance of environmental conservation.
- **Develop infrastructure:** Invest in infrastructure development, including roads, electricity, and water supply, to support mining operations and promote value-added processing.

3.6.3 Energy and Power Development

3.6.3.1 Identification of Energy Sources

3.6.3.1.1 Renewable:

Hydro: Orakzai has potential for micro-hydropower projects, particularly in the Mastura and Khanki Toi valleys. These streams could be utilized for irrigation purposes. Micro-hydropower plants (MHPs) have an energy output of no more than 0.15 MW. Pakistan possesses a hydropower potential of up to 60,000 MW, with about 40% of it coming from Gilgit-Baltistan and the Kashmir region.

Table 3-85 Existing Micro Hydle Power Units Orakzai

Name of MPH	Capacity	Location/Village Name
Installation of Micro Hydle Power Unit at Chango Chan Zakhtan Area Upper Orakzai	10-12 KW	Chango Chan Zakhtan Area Upper Orakzai
Installation of Micro Hydle Power Unit at Gota Khel Mamozai Area Upper Orakzai	10-12 KW	Gota Khel Mamozai Area Upper Orakzai

Source: PEDO

Orakzai has potential for micro-hydropower projects, particularly in the Mastura and Khanki Toi valleys. A feasibility study should be conducted to assess the viability of constructing micro-hydropower plants in these areas.

Solar: The high insolation levels in Orakzai make it ideal for solar farms. The government should provide incentives for solar adoption, such as tax exemptions and subsidies.

Table 3-86 Installation of Solar Mini-Grids in Orakzai

S.No	Area	Sector	Scheme Code	Scheme Name	Status	Approved Cost (Million PKR)	District	Capacity of Each Mini-Grid	No. of Allocated Sites
1	Orakzai	Power	191403	Installation of 13 Solar Mini Grids in Merged Areas of Khyber Pakhtunkhwa	Approved	490.2	Orakzai	175 KW	1

Source: PEDO

The Khyber Pakhtunkhwa Energy Development Organization (PEDO) is implementing the installation of solar mini-grids in various merged areas, including Orakzai. The project aims to provide uninterrupted and low-cost electricity through solar power generation, enhancing economic activities in targeted areas, particularly those that are poverty-stricken and have been affected by conflict.

This initiative includes a total of 13 solar mini-grids across the newly merged districts, with each mini-grid having a capacity of 175 kW. The project is expected to significantly improve the energy access for local communities, facilitating business activities and contributing to poverty alleviation.

Current Status

As of now, the project is approved with an estimated cost of PKR 490.2 million for the installation in Orakzai, with work nearing completion in various locations across the region. However, several constraints such as social issues, security concerns, and poor infrastructure remain challenges that need to be addressed for successful implementation.

This table format provides a clear overview of the solar mini-grid project specific to Orakzai while summarizing key details and constraints associated with the initiative.

Wind: While the terrain limits the overall potential for wind energy, specific elevated zones may be suitable for small-scale wind power generation.

3.6.3.1.2 Non-Renewable:

- Coal-fired plants utilizing local coal reserves.
- Limited oil/gas infrastructure, with reliance on imported fuels.

ii. Thermal/Coal/Oil/Gas

- Coal dominates thermal energy production.
- Proposals exist for gas pipeline extensions from nearby regions.

iii. Demand, Generation, and Shortfall

- There is a shortfall in energy, leading to load-shedding.

iv. Review of National/Provincial Policies

- National Power Policy 2021 emphasizes renewables but is skewed toward grid-based projects.
- KP Solar Energy Initiatives include tax exemptions for solar adoption but have limited implementation in Orakzai.

v. Existing/Ongoing/Future Plans

- Ongoing micro-hydropower projects in villages by the Pakhtunkhwa Energy Development Organization (PEDO).
- Proposed solar parks under CPEC (2030 timeline) in specific locations.

3.6.4 Constraints and Recommendations

3.6.4.1 Constraints:

- High upfront costs for renewables and transmission losses.
- Political instability deterring investors.

3.6.4.2 Recommendations:

- Subsidies for solar adoption and hybrid energy systems.
- Upgrade grid infrastructure and promote community-led microgrids.

3.6.4.3 Orakzai District: Challenges and Opportunities in Fuel, Mineral, and Energy Resource Development

Orakzai District presents a complex scenario regarding fuel, mineral, and energy resource development. The district has rich deposits of coal, iron ore, and potential oil and gas reserves, yet these resources remain underutilized due to outdated extraction technologies and insufficient infrastructure. This situation has historically limited the district's ability to fully benefit from its mineral wealth.

Unlike other areas in Khyber Pakhtunkhwa that have received investment in modern mining technologies, Orakzai lags behind, leading to inefficient and unsafe mining practices. Addressing this disparity requires targeted interventions to improve safety standards and enhance productivity in the mining sector.

Despite these challenges, the district has considerable potential to contribute to the province's energy sector. Coal reserves, although currently underexploited, could support thermal energy production if sustainable extraction methods are implemented. Additionally, potential oil and gas exploration could diversify energy sources and reduce dependence on imported fuels.

Bridging the gap between potential and reality requires a multi-faceted approach. Strengthening regulatory frameworks to prevent illegal mining, providing training and resources to local miners, and attracting investment in modern extraction technologies are essential steps. By addressing these challenges and leveraging its natural resources, Orakzai can stimulate economic growth, increase energy output, and ensure long-term prosperity while protecting its environment.

3.6.5 Future Proposed Intervention

To unlock Orakzai District's true economic potential, a holistic and phased development strategy is required one that integrates technological modernization, regulatory reforms, infrastructure development, and community participation. The following proposals are recommended:

3.6.5.1 Institutional and Regulatory Strengthening

There are two major interventions proposed with actions lead stakeholders:

Table 3-87: Proposed Institutional and Regulatory Strengthening

Intervention Area	Proposed Actions	Lead Stakeholders
Formalization of Mining Sector	• Introduce a One-Window Licensing System under KP Mineral Governance Act 2022 to register and regulate all artisanal and small-scale miners. • Link licensing with compliance to safety and environmental standards.	KP Mines & Minerals Dept., Deputy Commissioner Orakzai, Mineral Directorate
Transparent Revenue Governance	• Establish District Mineral Revenue Monitoring Cell to track royalty/tax flows. • Introduce e-payment & GPS-based transport tracking system to prevent revenue leakage.	KP Revenue Authority, Local Govt

3.6.5.2 Technology Upgradation and Value Addition

There is need of dire need for technology upgradation in this sector with value addition to attain maximum benefits. The proposed interventions are:

Table 3-88: Proposed Technology Upgradation

Priority Area	Actions	Medium to Long-Term Actions
Coal and Iron Ore Processing	• Provide shared mechanized equipment (excavators, conveyors) to mining clusters through leasing/credit schemes.	• Establish Coal Washing & Iron Beneficiation Plant under Public-Private Partnership (PPP).
Local Industry Development	• Encourage brick kilns, cement blocks, and re-rolling units based on local coal/iron.	• Develop Mineral-Based Industrial Estate at Kalaya or Hangu Road Corridor.

3.6.5.3 Energy Sector Development

In this sector, the following interventions are proposed for the district:

Table 3-89: Proposed Energy Sector Development

Energy Source	Key Proposal	Estimated Benefit
Solar Mini-Grids	Expand existing PEDO model to **30 additional villages**, prioritizing market centers, hospitals, and schools.	Reduced diesel dependency & women-led microenterprises.
Micro Hydropower (Mastura & Khanki Toi)	Conduct detailed feasibility & community-operated models.	Reliable irrigation + off-grid energy.
Coal-to-Power Pilot (1-2 MW)	Explore **Modular Clean Coal Gasification Units** instead of outdated combustion.	Localized power for small industries.
Oil/Gas Exploration Incentives	Offer risk-sharing contracts with KPOGCL and private drillers.	Strategic diversification of KP's fuel mix.

If implemented in a phased and inclusive manner, these proposals could generate 5,000–8,000 new jobs, increase district revenues by muti times, and establish Orakzai as a model for mineral-led green development in former FATA regions.

3.7 Industry

3.7.1 Categorization of Industrial Establishments

Industries are fundamental for economic development, and their classification by type and scale helps understand the industrial landscape and guide growth policies. District Orakzai, located in southern Khyber Pakhtunkhwa, is predominantly hilly but has fertile agricultural land, natural resources, and potential for industrial development.

Industrial establishments can be categorized based on industry type, production process, end-use products, ownership, market orientation, size, and environmental impact. Such classifications clarify their economic roles and operational dynamics.

3.7.1.1 Categorization by Size

Industries are classified by workforce size into small, medium, and large categories:

- **Small industries:** fewer than 50 employees.
- **Medium industries:** 50–250 employees.
- **Large/heavy industries:** more than 250 employees.

3.7.1.1.1 Light Industries

In District Orakzai, small-scale or light industries dominate the local economy, providing employment and promoting entrepreneurship. There are 10 crush plants operating in the district, each employing fewer than 50 people. These industries support livelihoods and enhance economic resilience (refer Map 3.19 Industries in Orakzai District).

Table 3-90: District Orakzai Industries Categorization by Size[69]

Industrial Sector	Light Industries	Medium Industries	Heavy Industries	Total Units
Crush Plants	10	-	-	10

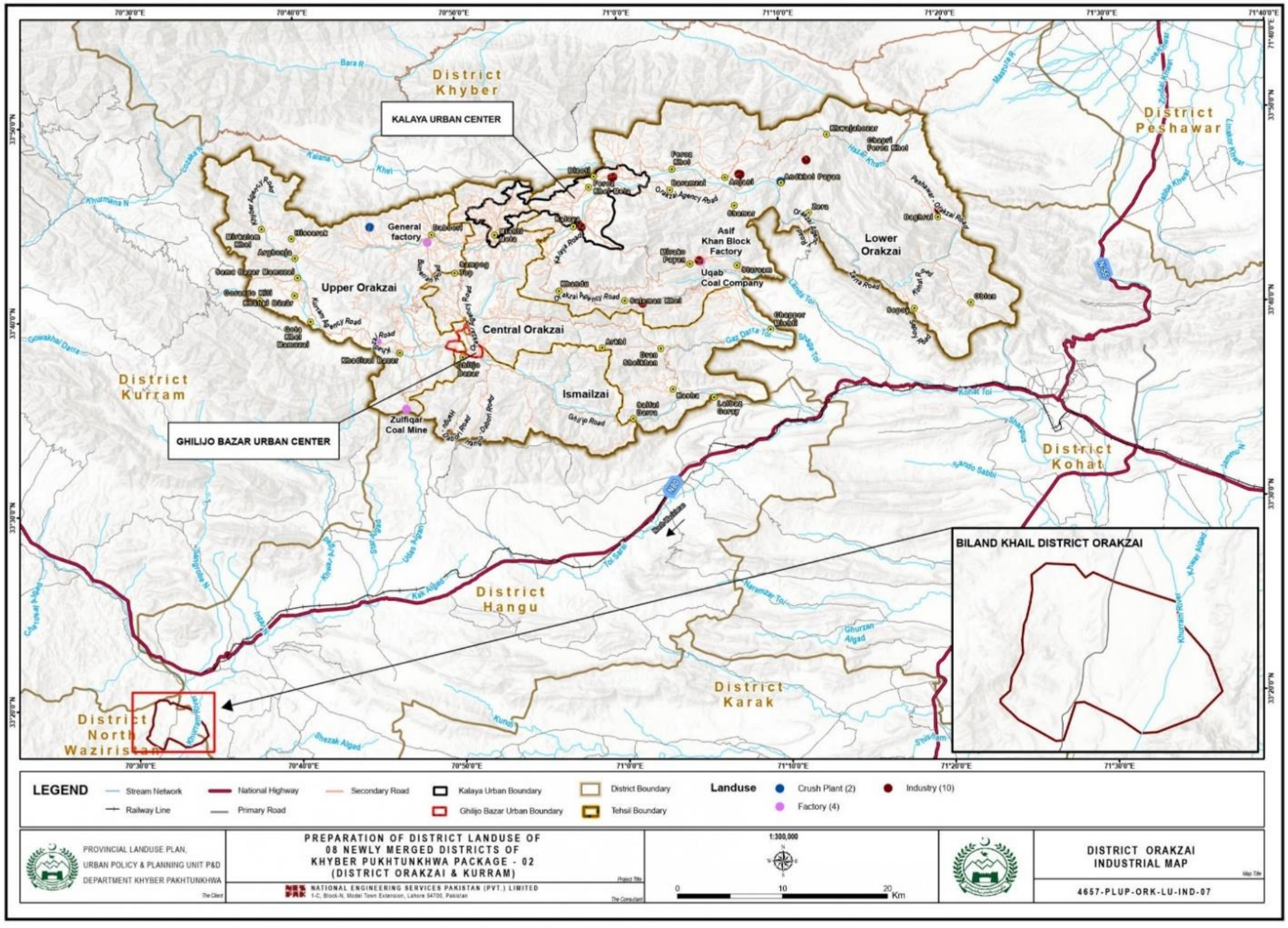
3.7.1.1.2 Medium Industries

There are currently no medium-scale industries in District Orakzai. All existing industries employ fewer than 50 individuals and are classified as small-scale.

3.7.1.1.3 Heavy Industries

Heavy or large industries are absent in the district. Industries with more than 250 employees would fall into this category, indicating latent potential for future development.

[69] Secondary data were collected from the Directorate General of Industries and Commerce in January 2023.



Map 3-27: Industries in Orakzai District

3.7.1.2 Categorization by Type

Another way of classifying industries is based on their type. They are classified according to primary, secondary, and tertiary. Now, this classification system helps understand the nature and scope of different industries and their roles in the economy. Primary industries are industries that use the extraction of minerals or natural resources directly from the earth, such as agriculture, mining, fishing, and forestry to create finished products. Secondary industries are where activities or manufacturing convert raw materials obtained from the primary industries. These deal with production to provide consumer goods. The textile industry and the leather industry are common examples of this sector. Tertiary industries, on the other hand, are those that provide services to individuals and businesses, such as transportation, healthcare, banking, advertising, and retail trade.

There are a total of 10 industries, and all are classified as primary industries. These are classified in Table 3-73, below,

Table 3-91: District Orakzai Industries Categorization by Type[70]

Industrial Sector	Primary Industries	Secondary Industries	Tertiary Industries	Total Units
Crush Plants	10	-	-	10

3.7.2 Industrial Growth Pattern

Industrial growth patterns encompass the evolution of industries in terms of size, structure, output, and technological advancement, influenced by factors such as economic policies, technological innovations, market demand, and external conditions like globalization and environmental changes. Technological advancements and government policies play crucial roles in shaping industrial growth, while shifts in consumer preferences influence which industries grow and how they adapt. Understanding these patterns helps in analyzing past and present industrial trends and forecasting future developments, providing valuable insights for policymakers, businesses, and researchers.

By looking at data on establishment, overall industrial units have decreased in this district. There were only 10 operational units in 2020-21 which has decreased to 4 units in 2022-23. Likewise, the total number of industrial units was 10 in 2021-22, and it also decreased to only 9 total industrial units in 2022-23.

The year-wise industrial growth pattern of District Orakzai is given in Table 3.70, below,

Table 3-92: District Orakzai Industrial Growth Pattern[71]

Year	Operational Units	Non-Operational Units	Total Industrial Units
2018-19	0	0	0
2019-20	0	0	0
2020-21	10	0	10
2021-22	10	0	10
2022-23	4	5	9

3.7.3 Ownership Pattern

Industrial ownership patterns describe the structure and distribution of control within industrial enterprises, influenced by industry type, economic systems, historical developments, and government

[70] Secondary data collected from the Directorate General of Industries and Commerce in January 2023.

[71] Bureau of Statistics, Planning & Development Department, Government of Khyber Pakhtunkhwa. Development Statistics of Khyber Pakhtunkhwa 2023. Table No. 139 and secondary data collected from the Directorate General of Industries and Commerce in January 2023.

policies. Ownership can be private, public, foreign, cooperative, or mixed, and evolves through privatization, nationalization, and economic liberalization. Understanding these patterns is essential for analyzing economic structures, investment potential, and the impact of policies on industrial development.

In District Orakzai, all industrial establishments are privately owned. These enterprises range from small workshops to medium-scale manufacturing units and are operated by individuals or private entities. Unlike government-run industries, these private enterprises drive economic growth through market-based strategies and contribute significantly to local employment. The district's industries include sectors such as stone crushing and food processing.

Currently, there are 10 industries in District Orakzai, all of which are privately owned, with all 10 being crush plants.

Table 3-93: District Orakzai Industries Ownership Pattern

Industrial Sector	Private Owned	Government Owned	Total Units
Crush Plants	10	-	10

3.7.4 Industrial Employment

Industrial employment encompasses a broad spectrum of job opportunities within the manufacturing and production sectors. These industries are pivotal to economic development, offering a range of employment from unskilled labor to highly specialized technical positions. The nature of industrial employment varies significantly across different sectors, including primary industries like mining and agriculture, secondary industries such as manufacturing and construction, and tertiary industries involving services and logistics.

In District Orakzai, the industrial employment landscape is primarily driven by 10 industrial units which only constitutes of crush plants which estimated to be employing between 80-90 employees his distribution indicates a predominant reliance on primary industries for employment, reflecting the district's focus on raw material processing.

3.7.5 Raw Material Availability

Having access to raw materials is crucial for industrial development, as it affects production, costs, and supply chains. These materials include natural resources (such as minerals, fossil fuels, timber, and agricultural products), processed materials (like steel, aluminum, and plastics), and renewable resources (including biomass and water). Being close to the sources of these materials can reduce costs, but sourcing globally can offer advantages while introducing risks. Industries are increasingly pressured to adopt sustainable practices and utilize renewable resources due to fluctuating costs and environmental concerns. Advancements in extraction, processing, and recycling technologies are improving efficiency and reducing reliance on virgin materials. Effective supply chain management, including logistics and inventory, is essential. Material availability is also impacted by regulatory factors such as trade policies and environmental regulations, which require careful navigation. Future trends in this area focus on sustainable sourcing, innovative materials, and circular economy practices to minimize waste and ensure long-term sustainability. This understanding helps industries maintain efficiency, manage costs, and adapt to changes in the landscape.

3.7.5.1 Raw Material for Crush Plants

In District Orakzai there are 10 crush plants, the raw materials for these crusher plants primarily include various types of rocks and minerals, which are processed to produce construction aggregates and other products. Most of these crusher plants use limestone as a raw material, limestone is a

sedimentary rock primarily composed of calcium carbonate. It is easily crushed and used in construction for making cement, road bases, and other aggregate products.

3.7.5.2 Raw Material for Coal Industry

District Orakzai has considerable deposits of minerals especially coal[72]. Coal is crucial for local energy production and various industrial processes, yet its extraction has been irregular, with notable peaks in production occurring sporadically. As of 2022-23 84,540 tons of coal been extracted from various mines in Orakzai

3.7.6 Industrial Workforce

Industrial employment and workforce dynamics define the roles, characteristics, and trends of workers in various industrial sectors. These dynamics are influenced by technological advancements, economic policies, globalization, and demographic changes. Understanding these trends is essential for policymakers, business leaders, and educators to develop strategies that promote economic growth, generate employment, and support workforce development in a rapidly evolving industrial environment.

The Labor Force Survey (LFS) 2020-21 by the Pakistan Bureau of Statistics provides crucial insights into employment and unemployment rates, labor force participation, and the structure of employment across sectors and regions in Pakistan. The survey collects data on employed and unemployed individuals, employment rates, labor force participation, demographic characteristics, and the informal sector. A representative sample of households from different provinces and regions is used, and the data serves as a foundation for statistical reports and publications.

The details of the type of workforce and labor working in District Orakzai according to the Labor Force Survey (LFS) 2020-21[73] are discussed below.

3.7.7 Employment Distribution by Sector

According to the Labor Force Survey (LFS) 2020-21, in District Orakzai, agriculture employs 27% of the workforce, indicating that it is not a major contributor to employment, the industrial sector employs 26.7% of the workforce, The services sector is the largest employer, with 46.3% of the workforce engaged in activities like retail, healthcare, education, hospitality, and finance.

3.7.8 Workforce Distribution by Area

In rural areas, agriculture is the dominant sector, accounting for 100% of the economy, while industry and services account for 100% and 100%, respectively. Urban areas account for 0% of workforce in any sector

3.7.9 Formal and Informal Workforce

LFS data shows that 10.7% of individuals in Orakzai were engaged in formal employment, whereas 87.3% were in informal employment. In 2020-21, out of the total employed population of Orakzai, 0.5% were employers, while 51.2% were own account workers. Contributing family workers constituted 15.3% of the employed population, while employees made up the large proportion of employed individuals at 33.1%. Looking at gender-wise distribution, a percentage of males (41.9%) were employees as compared to a very low percentage of females (2.6%). On the other hand, LFS states that a higher percentage of females were own account workers (64.4%) as compared to males (47.4%).

[72] Development Statistics of KP 2023-24

[73] Pakistan Bureau of Statistics. (2022). *Pakistan Labor Force Survey 2020-2021*. Annexure-I Key Indicators of Labor Market (KILM) at District Level, District Orakzai

3.7.10 Future Industrial Development Proposals

The Orakzai district is enriched with natural resources that can be utilized optimally by implementing proper mechanism. For this sector, the following interventions are proposed to improve future growth and development:

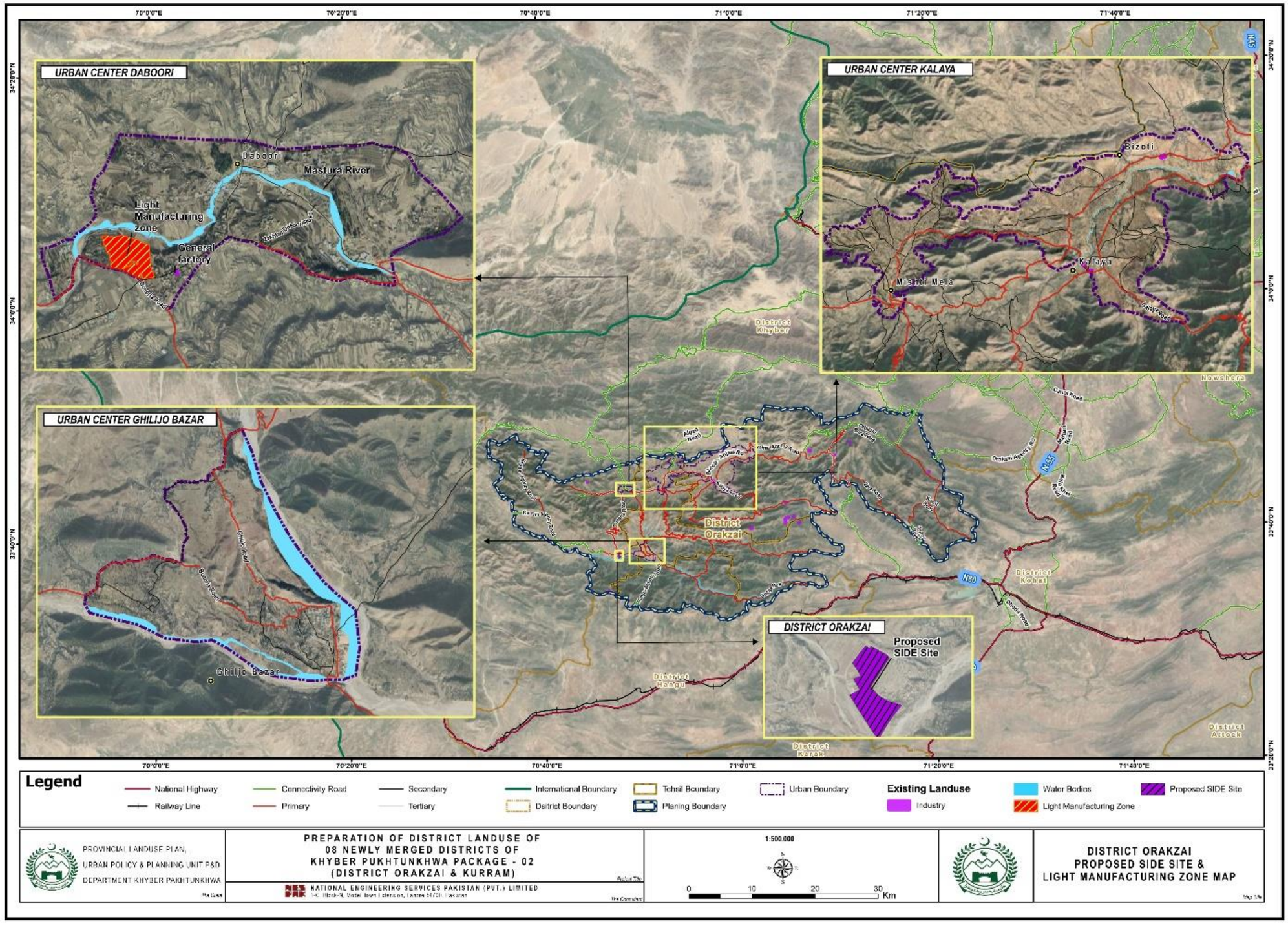
a) Mineral Processing & Value Addition Complex (Stone & Coal Based)
b) Small Industrial Estate for Stone Crushing & Allied Industries (Cluster-Based)
c) Women-Led Cottage & Food Processing Units Scheme
d) Skill Development & Technical Training Centre
e) Coal-Based Micro Power Generation Unit
f) Public-Private Partnership for Limestone-Based Cement or Blocks Industry
g) Industrial Regulatory Support & One-Window Facilitation Cell in Orakzai

These proposals are briefly presented in following table:

Table 3-94: Proposed Industrial Development

Proposal Title	Objective	Key Components	Implementing Agencies / Partners
1. Mineral Processing & Value Addition Complex (Stone & Coal Based)	Shift Orakzai from raw material extraction to value-added products	- Common Crushing & Grinding Units - Tile / Bricks / Construction Blocks Manufacturing - Coal Briquette & Charcoal Products - Testing & Certification Lab	Khyber Pakhtunkhwa Economic Zones Development & Management Company (KPEZDMC), Mines Department, SIDB, Private Investors
2. Small Industrial Estate for Stone Crushing & Allied Industries (Cluster-Based)	Organize scattered crush plants into a regulated industrial zone	- All crushing plants relocated to designated zone - Shared power, water & road infrastructure - Effluent & dust control systems	SIDB + District Administration + EPA KP
3. Women-Led Cottage & Food Processing Units Scheme	Introduce small-scale agro-industries in rural Orakzai	- Honey Processing Units - Dry Fruit & Herb Packaging Centers - Pickle / Spices & Dehydration Units	SMEDA, BISP, KP Women Empowerment Department
4. Skill Development & Technical Training Centre (Mining, Machine Operation & Safety)	To address weak workforce capacity for growing industry	- Heavy machinery operation training - Blasting & mining safety certifications - Welding, mechanical repair, electrical skills	TEVTA, Board of Technical Education, Pakistan Stone Development Company
5. Coal-Based Micro Power Generation Unit (Captive Use for Industry)	Provide dedicated electricity to industrial clusters	- 2–5 MW modular coal / solar hybrid plant - Power distribution to crusher & upcoming units	PEDO, Private Energy Investors

6. Public-Private Partnership for Limestone-Based Cement or Blocks Industry	Utilize abundant limestone deposits for construction products	- Feasibility & investor facilitation - Joint venture with local private group	KP Mineral Dept, FIEDMC, Chinese or Afghan Investors
7. Industrial Regulatory Support & One-Window Facilitation Cell in Orakzai	Ease licensing, taxation, and environmental approvals	- Dedicated district desk for industry - Investor facilitation, legal guidance	Industries Department + Deputy Commissioner Office



Map 3-28 Proposed Industrial/Light Manufacturing Sites for District Orakzai

3.7.11 Propose Future Demand

3.7.11.1 District Industrial Requirements

Table below presents the projected industrial land requirements for District Orakzai by the planning horizon of 2045. Based on the projected district population of 529,326, the total industrial land requirement is estimated at 454 acres. This requirement reflects the anticipated growth in economic activities, employment generation, and the need to promote industrial development within the district.

Currently, District Orakzai has a very limited industrial base, with only 24.1 acres of existing industrial land. This indicates a substantial deficit in industrial infrastructure relative to the projected demand. To address this gap and support economic growth, a significant portion of industrial land has been proposed within Urban Local Manufacturing Zones (LMZs). A total of 343 acres has been allocated for LMZ development in urban areas, which will facilitate the establishment of small and medium-scale manufacturing units, processing facilities, and local industries.

In addition to the LMZ allocations, 79.44 acres have been proposed for a Small Industrial Development Estate (SIDE) site. The SIDE estate will serve as a planned industrial cluster that provides infrastructure, utilities, and organized industrial plots to attract investment and promote industrial activity within the district. The combined allocation of LMZs and SIDE sites represents a strategic approach to strengthening the district's industrial sector while ensuring spatially organized industrial growth.

Table 3-95 District Orakzai Required & Proposed Industrial Areas

District Population 2045	Total Industrial Requirements	Existing Industrial Area	Proposed Urban LMZ	Proposed SIDE Site
529,326	454	24.1	343	79.44

3.7.11.2 Urban Area Industrial Requirements

The table below provides a detailed breakdown of industrial land allocation within the urban centers of District Orakzai, comparing existing conditions in 2025 with the projected requirements for 2045. The analysis focuses on the urban areas of Kalaya, Ghiljo, and Dabori, which are expected to serve as key nodes for economic and industrial development.

In Kalaya, which functions as the primary urban center of the district (district headquarter), the existing industrial land in 2025 is only 1.37 acres. However, with the projected population increasing to 41,202 by 2045, the proposed industrial allocation significantly to 327.3 acres as per Kalaya Approved Master Plan. This substantial increase reflects the strategic role of Kalaya as the district's main industrial hub, where large portions of the proposed LMZ areas will be concentrated to support manufacturing and employment generation.

The Ghiljo urban area currently has no industrial land allocation due to adjacent SIDB site to the urban area. With a projected population of 10,637, Ghiljo is expected to function primarily as a residential and service-oriented settlement, with industrial activities likely concentrated in nearby urban centers such as Kalaya and proposed SIDB site

In Dabori, the existing industrial land in 2025 is 0.18 acres, which is extremely limited. By 2045, with the population projected to reach 16,068, approximately 16 acres of industrial land are proposed.

This allocation is intended to support small-scale local industries and service-related economic activities that cater to the surrounding population.

Overall, the combined industrial land allocation for urban areas is projected to increase from 1.55 acres in 2025 to 343.30 acres by 2045. This expansion reflects the district's strategy to promote localized manufacturing through Urban Light Manufacturing Zones (LMZs) while also establishing organized industrial estates through the SIDE initiative. The proposed industrial development framework aims to stimulate economic growth, create employment opportunities, and strengthen the economic base of District Orakzai in the long term.

Table 3-96 District Orakzai Urban Areas Required & Proposed Industrial Areas

Urban Area	Year	Population	Existing & Proposed Industrial (Acres)
Kalaya	2025	31611	1.37
	2045	41,202	327.3
Ghiljo	2025	7338	0.00
	2045	10,637	0.00
Dabori	2025	5,223	0.18
	2045	16,068	16.00
Total	2025	44172	1.55
	2045	67907	343.30

3.7.12 Constraints

- District Orakzai only has very low number of small-scale industries, with no medium or heavy industries present. This limits the economic diversity and the potential for large-scale industrial growth.
- All existing industries are categorized as primary, focusing on raw material processing rather than manufacturing or services. This restricts the district's industrial diversification and value addition.
- There is a significant need for improved infrastructure, such as roads, rail links, and industrial zones, to support industrial activities and growth.
- The industrial sector is entirely privately owned, which may limit the scope for state intervention or public-private partnerships to drive growth.
- The workforce is predominantly engaged in informal employment, and there might be a mismatch between the skills available and the skills required for advanced industrial activities.

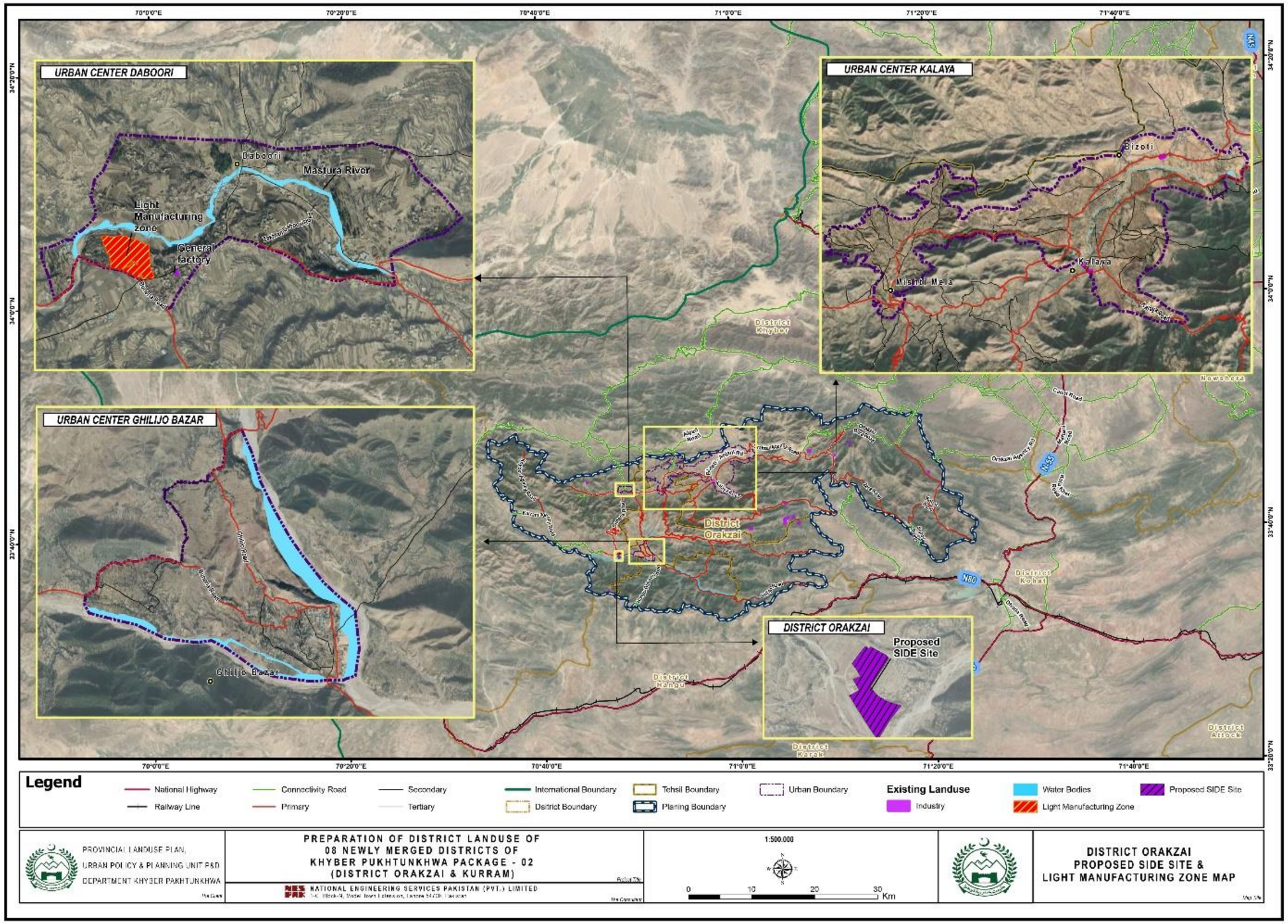
- Industries face challenges in adhering to strict environmental regulations and ensuring sustainable practices, especially given the emphasis on environmental sustainability in the KP Industrial Policy.
- Attracting both local and international investors remain a challenge, particularly in underdeveloped areas like District Orakzai. Financial and regulatory incentives are needed to boost investment.
- There is a need for extensive skill development and technical training to match the evolving industrial landscape and technological advancements.
- The focus on primary industries limits economic diversification. Expanding into secondary and tertiary industries could be challenging due to existing constraints.
- A significant portion of the workforce is engaged in informal employment, which can affect job security and productivity. Transitioning to formal employment and improving working conditions are ongoing challenges.

These constraints and challenges highlight the need for comprehensive industrial and economic policies to address the specific needs of District Orakzai and foster sustainable industrial development.

3.7.13 Recommendations

- Implement policies to attract medium and heavy industries to District Orakzai. This must include providing incentives for businesses to establish operations in the region, such as tax breaks, subsidies, and infrastructure support. Dedicated industrial zones with the necessary infrastructure and utilities must be established to support larger-scale industries. These zones should be equipped with facilities for research, development, and advanced manufacturing.
- Develop initiatives to support the growth of secondary (manufacturing) and tertiary (services) industries. Grants or subsidies must be offered to businesses in these sectors, and their market entry should be facilitated. Existing primary industries should be encouraged to invest in value-added processes, such as developing processed products from raw materials like limestone and wheat.
- Research and promote the use of alternative raw materials that support a broader range of industries. This should involve partnerships with research institutions and investments in technology for material processing and recycling. Efficient supply chain management systems must be developed to ensure a steady and cost-effective supply of raw materials to various industries.
- Prioritize the development of essential infrastructure, including roads, rail links, and industrial parks. Connectivity must be enhanced to facilitate the movement of goods and support industrial activities. The investment must be made in modernizing existing industrial facilities and creating new ones with state-of-the-art equipment and amenities.
- Facilitate public-private partnerships to leverage both public support and private sector efficiency. Private entities must be engaged in infrastructure development, technology adoption, and industrial management. The potential for cooperative ownership models should be explored to enable more collaborative and community-focused industrial initiatives.
- Implement comprehensive skill development and technical training programs tailored to the needs of emerging industries. Collaboration with educational institutions and industry experts is essential to design relevant curricula. Policies must be developed to transition workers from informal to formal employment, improving job security and working conditions. Incentives should be offered to businesses to formalize their employment practices.
- Provide assistance to operational units to enhance their efficiency and sustainability. This must include financial aid, technical support, and market access. The reasons behind non-operational units must be investigated, and targeted interventions should be developed to address issues such as financial instability or operational challenges.

- Develop and enforce regulations that encourage sustainable industrial practices. Training and resources must be provided to help industries comply with environmental standards. Investment in research and development focused on sustainable technologies and practices is required to minimize environmental impact.
- Create a favorable investment climate by offering financial incentives, reducing bureaucratic hurdles, and highlighting the region's potential to investors. District Orakzai must be promoted as a viable investment destination through targeted marketing campaigns and investor outreach programs.
- Identify and support emerging sectors that could complement the existing industrial base. Incentives must be provided for businesses in these sectors to establish operations in the district. Strategies should be developed to diversify the local economy by attracting businesses in sectors such as technology, services, and manufacturing



Map 3-29: District Orakzai Proposed SIDE Site and Light Manufacturing Zones

3.8 Trade and Commerce

3.8.1 Distribution of Commerce and Trade Centers

Trade and commerce hold significant potential for the economic development of Orakzai District. Although currently the district lacks a fully developed Sub-Regional Commerce and Trade Center, its strategic location, fertile agricultural land, livestock resources, and mineral deposits provide a foundation for commercial growth. Internationally, Orakzai can benefit from trade routes such as the Khyber Pass Economic Corridor (KPEC), linking Pakistan with Afghanistan and Central Asia, which facilitates cross-border trade and regional connectivity. Nationally, the district can integrate with major trade hubs in Khyber Pakhtunkhwa, including Peshawar, Mardan, and Kohat, enabling the flow of agricultural produce, livestock, and minerals to broader domestic markets. Regionally, within southern Khyber Pakhtunkhwa, Orakzai complements trade centers like Bannu, Dera Ismail Khan, and Kohat by supplying agricultural products, livestock, and raw materials while gaining access to goods and services from these cities. The district possesses notable mineral resources, including coal (8 million tons), iron ore (50,000 tons), and potential oil and gas reserves, which could support future industrial development. Agriculture and horticulture remain major economic activities, with favorable conditions for wheat, maize, vegetables, and fruits such as pomegranates and apples. Livestock farming, including cows, goats, and poultry, contributes to local livelihoods and provides raw materials for trade. Development initiatives aimed at improving irrigation, modern farming practices, and infrastructure can enhance production and link Orakzai's local economy with regional, national, and international markets. By fostering trade in minerals, agricultural products, and livestock, the district can create employment opportunities, strengthen its economic base, and play an increasingly important role in the commerce network of Khyber Pakhtunkhwa.

3.8.2 International Commerce and Trade Center in Khyber Pakhtunkhwa

Peshawar, the capital of Khyber Pakhtunkhwa, is strategically located near the Khyber Pass, serving as a gateway to Afghanistan and Central Asia, making it a key hub for international trade. The city has developed significant infrastructure, including the Peshawar Dry Port and Bacha Khan International Airport, to support trade in agricultural products, textiles, handicrafts, industrial goods, and minerals such as marble, limestone, and coal. Its markets handle high-quality fruits, vegetables, wheat, rice, and spices, while local artisans produce hand-woven carpets, embroidered fabrics, pottery, and metalwork for international buyers. Industrial goods include machinery, pharmaceuticals, and cement, with surrounding districts like Mardan, Charsadda, Dera Ismail Khan, Swat, Bannu, and Kohat contributing through textiles, food processing, and marble production. The Khyber Pass Economic Corridor (KPEC), featuring a 48-kilometer, 4-lane expressway between Peshawar and Torkham, is set to enhance regional trade, reduce congestion, improve transportation efficiency, and create up to 100,000 jobs, aligning with Pakistan's commitments under CAREC and promoting economic growth.

3.8.3 National Commerce and Trade Centers in Khyber Pakhtunkhwa

Khyber Pakhtunkhwa hosts several key national trade centers that drive economic activity across Pakistan. Peshawar, the provincial capital, is the most prominent hub, historically serving as a gateway to Afghanistan and Central Asia via the Khyber Pass. The city thrives on agricultural trade, handling high-quality fruits, vegetables, and staple crops, while also supporting textiles, handicrafts, and growing industrial sectors. Mardan is noted for its textile industry, including cotton ginning and weaving, and for agricultural produce, efficiently connecting local farmers to national markets. Swat combines trade with tourism, exporting high-quality fruits like apples and peaches, marble, and handicrafts such as embroidery and shawls. Charsadda is a vital agricultural center producing

pomegranates and sugarcane, while gradually developing small-scale industries. Kohat supports cement production and manufacturing, leveraging its strategic location near the Indus Highway. Dera Ismail Khan is a hub for wheat, rice, pulses, and food processing, serving southern KP. Bannu contributes through textile manufacturing, food processing, and agricultural trade, connecting southern KP with broader markets. Collectively, these centers strengthen the province's integration into national commerce and support employment, production, and economic development.

3.8.4 Regional Commerce and Trade Centers

In southern Khyber Pakhtunkhwa, Kohat, Dera Ismail Khan, and Bannu serve as crucial regional trade centers. Kohat, located in southern KP, is a significant industrial and agricultural hub, renowned for cement production and fertile lands producing wheat, maize, and vegetables. Its strategic location along the Indus Highway enhances connectivity, allowing efficient movement of goods across the province and to other regions of Pakistan, and its markets cater to diverse consumer needs. Dera Ismail Khan, situated at the southern tip of KP along the Indus River, is a vital agricultural and trade center. Its economy is driven by wheat, sugarcane, rice, dates, and citrus production, supported by year-round irrigation from the river. The city also hosts a thriving livestock sector and food processing units, benefiting from its strategic transit position linking Punjab, Balochistan, and KP. Bannu, in the southern region, is an important commercial hub with a rich history of trade and industry. The city's economy includes textile manufacturing, food processing, and agricultural trade, while its strategic location near major transportation routes ensures effective distribution and strengthens its role in regional commerce. Together, these three cities form a network that supports economic activity, connects local producers to national markets, and plays a pivotal role in the trade and development of southern Khyber Pakhtunkhwa.

3.8.5 Sub-Regional Commerce and Trade Center

Sub-Regional Commerce and Trade Centers (SCTCs) in districts is an important aspect of enhancing regional trade, providing economic infrastructure, and creating employment opportunities. Although Kurram District currently lacks a fully developed Sub-Regional Commerce and Trade Center (SCTC), it has the potential to be part of an emerging economic hub in Khyber Pakhtunkhwa. Developing such a center could be part of a larger vision that links local agriculture, mining, and manufacturing to broader regional and global trade. With investments in infrastructure, logistics, and trade facilitation, Kurram could play a key role in promoting economic activity and commerce in the KP region. The establishment of such centers would also contribute significantly to the local economy, job creation, and business development.

3.8.5.1 Major Trade Sectors

Khurlachi Border Kurram

Parachinar border is a key trade route with Afghanistan therefore one of the most important trade sector in Parachinar is border trade with Afghanistan. The Customs Station at Kharlachi is located nearby Parachinar city in Kurram District of Khyber Pakhtunkhwa. Kurram District is bordered by Khost, Ghazni, Gardez and Paktia on Afghan side. The Afghan capital city, Kabul is located around 253 km away from Kharlachi and is comparatively developed border station in terms of availability of internet connectivity and commercial infrastructure. Custom Station Kharlachi has been designated for rebate able exports of cement in addition to simple exports. This has resulted in expansion of new trade opportunities for the area and expansion of bilateral trade with Afghanistan through this trade route.

Table 3-97: Cross Border Vehicular Movement from Khurlachi

No	Month	Import Trucks				Export Trucks			
		2019-20		2020-21		2019-20		2020-21	
		Monthly	Avg Per Day	Monthly	Avg Per Day	Monthly	Avg Per Day	Monthly	Avg Per Day
1	July	257	9	241	8	1854	62	850	28
2	August	273	9	376	13	1015	34	1443	48
3	September	516	17	1161	39	898	30	1959	65
4	October	899	30	1578	53	1173	39	1917	64
5	November	503	17	659	22	1518	51	1712	57
6	December	502	17	436	15	1610	54	2408	80
7	January	376	13	536	18	2096	70	3787	126
8	February	458	15	277	9	1751	58	2243	75
9	March	256	9	1692	56	1272	42	4202	140
10	April	0	0	1492	50	0	0	3818	127
11	May	0	0	1814	60	0	0	3025	101
12	June	0	0	2636	88	0	0	3591	120
Grand Total		4040	11	12898	36	13187	37	30955	86

Imports and export trade volume data by using available data from secondary source for Kharlachi border crossing is given below has shown that Kharlachi border has shown significant trade volume with dutiable commodities

Table 3-98: Trade Volume at land Border Crossing KP (Rs.Million)

Customs Station	Exports Value 2020-21	Import Volume 2020-21
Torkham	104325.8	68230
Kharlachi	26889.29	7328.89
Ghulam Khan	8256.01	5280.74
Angoor Adda/Tank	3815.39	3286.7
Total	143286.49	84126.28

As seen from Table 3-77 above Kharlachi & Torkham border crossing plays pivotal role in Pakistan Afghanistan trade, second highest volume trade is handled through Kharlachi border. This border crossing play vital role to economy of the district.

Agricultural and Livestock

Agriculture and horticulture is the primary trade sector in Orakzai District in Khyber Pakhtunkhwa, Pakistan, has considerable potential for agricultural and horticultural activities, benefiting from fertile soil, favorable climate conditions for growing a variety of crops, including wheat, maize, vegetables. Kurram district is known for its fruit variety of fruits i.e. Apples, Peaches, Apricot, and Cherries etc. These fruits contribute to the local economy and provide a source of livelihood for many farmers in the

district. The fertile valleys and streams in Kurram support the growth of these fruits, making agriculture an important economic activity in the region. The district's livestock sector is an important part of its economy. Key livestock includes 194,253 cows, 106,086 sheep, and 155,532 goats, alongside smaller populations of buffaloes, camels, and other animals. Poultry makes about 50% (485,741) of total population of livestock of the district.

Manufacturing and Industries

In Kurram there is no such industrial sector and has no economic zone. The current landscape comprises 9 small-scale industrial units, all within the primary sector, emphasizing the district's reliance on natural resources and agriculture. These industries, while modest in scale, provide an essential economic foundation, offering a pathway for future industrial growth and diversification

The manufacturing and industrial landscape in Orakzai District is still evolving. The district has abundant mineral resources, including coal and copper. However, challenges such as poor infrastructure, safety concerns in mining, and limited industrial diversification hinder the full development of the sector. With focused efforts on mineral processing, oil and gas extraction, and the development of industrial zones, Kurram has the potential to emerge as a key player in the region's industrial growth.

3.8.6 Commercial Activities in District Orakzai

Commercial activities in Orakzai District are primarily based on agriculture, livestock, mineral resources, and retail trade. The district benefits from its fertile agricultural land, livestock production, and mineral wealth, including Chromite, Limestone, Gypsum, Marble, and Coal. The growing demand for construction materials and consumer goods further supports the development of commerce. With improvements in infrastructure, road connectivity, and market access, the district's commercial potential is significant, particularly in small-scale industries, food processing, and construction-related trade.

3.8.6.1 Various Types of Markets

District Orakzai hosts a variety of markets that cater to the needs of local residents and visitors. These markets are broadly categorized into traditional bazaars, retail markets, wholesale hubs, specialized markets, occasional markets, and highway-oriented commercial ribbons.

Traditional bazaars such as Ghiljo Bazaar, Sama Bazaar, and Mishti Mela Bazaar serve as major commercial centers, offering a wide range of products including clothing, footwear, jewelry, electronics, and food items. These markets are well-known for their vibrant atmosphere and attract both locals and visitors.

3.8.6.2 Wholesale Markets

Although Orakzai does not have large formal wholesale markets, towns like Kalaya and Mishti Mila host important local wholesale hubs. These markets are essential for distributing agricultural produce, livestock, construction materials, and consumer goods. They also support cross-border trade with Afghanistan, reinforcing their importance in the district's economic activity.

3.8.6.3 Retail Markets

Retail markets in Orakzai serve both urban and rural populations, providing daily essentials and frequently demanded goods. Kalaya and Mishti Mila have the largest retail markets, offering food

items, clothing, consumer goods, and agricultural supplies. Smaller markets in towns such as Ghani Khel, Maidan, and Thall cater to rural communities, ensuring access to essential commodities. Many retail outlets are located along main roads, enhancing accessibility for residents and facilitating trade with Afghanistan.

3.8.6.4 Specialized Markets

Specialized markets in Orakzai often combine wholesale and retail transactions and are closely linked with local production and processing activities. They provide specific products or services and support both commercial and industrial operations within the district.

3.8.6.5 Sunday Bazaar and Occasional Markets

Sunday bazaars and occasional markets play a vital role in Orakzai's local economy and social life. Operating weekly or at specific times, these markets offer fresh produce, meat and livestock, spices and grains, household goods, traditional crafts, and personal care products. They are particularly important for residents in remote areas, providing access to goods not available in smaller shops or permanent markets.

3.8.6.6 Highway-Oriented Ribbons

Highway-oriented commercial areas in Orakzai cater to travelers and transit traffic. These include auto-repair shops, welding workshops, tire services, eateries, and other low-cost products and services. The district's location along major traffic routes support clusters of such businesses, particularly in urban centers and main bazaars, enhancing both local employment and commercial activity.

3.8.7 Propose Future Demand

3.8.7.1 District Commercial Requirements

Table below presents the projected commercial land requirements for District Orakzai based on population growth and planning standards. In 2025, the district population is recorded at 403,751, with an existing commercial land area of 131.37 acres. Based on the applied planning standard of approximately 1 acre per 1,000 population, the commercial demand for 2025 is estimated at 403.75 acres. This indicates that the existing commercial infrastructure is significantly below the required level, resulting in a commercial land deficit of approximately 272 acres.

By the planning horizon of 2045, the population of District Orakzai is projected to increase to 597,233. Correspondingly, the total commercial demand rises to 597.23 acres. After considering existing commercial land and planned allocations, the total district commercial requirement for 2045 is estimated at 466 acres. Out of this requirement, 437 acres are proposed within urban areas, while an additional 29 acres remain as district-level requirements to accommodate future commercial expansion in other settlements or along major corridors. This approach reflects a planning strategy that concentrates commercial activities within urban centers while allowing limited additional commercial development at the district scale.

Table 3-99 District Orakzai Commercial Requirements

Year	Population	Existing Commercial (Acres)	Commercial Demand (Acres)	District Commercial Requirements 2045	Proposed Urban Commercial	Additional District Requirements
2025	403751	131.37	403.751	272		
2045	597233	-	597.233	466	437	29

3.8.7.2 Urban Areas Commercial Demand

The below table provides a detailed breakdown of commercial land requirements within the major urban centers of District Orakzai Kalaya, Ghiljo, and Dabori for both 2025 and 2045. The analysis compares existing commercial areas with population-based demand and identifies the proposed commercial allocations.

In Kalaya, the main urban center of the district, the existing commercial area in 2025 is 42.84 acres, which exceeds the population-based demand of 31.61 acres, resulting in a surplus of 11 acres. By 2045, the population is projected to increase to 41,202, generating a commercial demand of 41.20 acres. Despite this growth, the existing commercial area still slightly exceeds the calculated demand. However, a substantial 393.3 acres of commercial land is proposed in Kalaya according to the Kalaya Approved Master Plan (KAMP). This large allocation reflects the role of Kalaya as the primary commercial hub of the district, accommodating higher-order commercial activities, wholesale markets, and regional trade functions.

In Ghiljo, the existing commercial area in 2025 is 17.12 acres, which exceeds the demand of 7.34 acres, resulting in a surplus of approximately 10 acres. By 2045, with a projected population of 10,637, the commercial demand increases to 10.64 acres, but the existing commercial land still remains sufficient. Nevertheless, 22.7 acres of commercial land are proposed to support future urban growth and to improve the spatial distribution of commercial activities.

Similarly, in Dabori, the existing commercial area in 2025 is 20.80 acres, which significantly exceeds the demand of 5.22 acres, creating a surplus of about 16 acres. By 2045, with the population projected to reach 16,068, the commercial demand increases to 16.07 acres, but the existing commercial area still remains adequate. Despite this surplus, 20.5 acres of commercial land are proposed to accommodate planned urban expansion and future commercial development.

At the aggregate urban level, the total urban population increases from 44,172 in 2025 to 67,907 in 2045. While the existing commercial land of 80.76 acres already exceeds the calculated demand of 68 acres, a total of 437 acres of commercial land is proposed across the urban centers. This indicates that commercial planning is not based solely on population standards but also considers the strategic economic role of urban centers, future market expansion, and the need to support regional trade and service activities within District Orakzai.

Table 3-100 District Orakzai Proposed Urban Commercial Requirements

Urban Area	Year	Population	Existing Commercial (Acres)	Commercial Demand (Acres)	Additional Commercial Demand	Proposed Commercial Area
Kalaya	2025	31611	42.84	31.61	-11	
	2045	41,202	42.84	41.20	-2	393.3 As per KAMP
Ghiljo	2025	7338	17.12	7.34	-10	
	2045	10,637	17.12	10.64	-6	22.7
Dabori	2025	5,223	20.80	5.22	-16	
	2045	16,068	20.80	16.07	-5	20.5
Total	2025	44172	80.76	44	-37	0
	2045	67907	80.76	68	-13	437

3.8.8 Future Proposed Interventions

Trade and commerce are the key sector for the whole district. The district economy is highly dependent on this sector, but the sector is neglected that needs to be boosted. The following interventions are proposed to boost this sector:

3.8.8.1 Future Trade & Commerce Development Proposals

The trade and commerce sector in Orakzai District holds significant potential to stimulate local livelihoods, enhance market integration, and promote inclusive economic growth. To unlock this potential, a phased strategy has been formulated comprising short-term, medium-term, and long-term interventions, each addressing specific development priorities through practical, scalable measures.

The short-term trade and commerce interventions for Orakzai District focus on quickly stimulating local economic activity through low-cost, high-impact measures.

These short-term proposals are presented in following table:

Table 3-101: Future Trade and Commerce Development Short Term Proposals

Proposal	Objective	Key Actions	Lead Agencies
1. Establish Weekly Business & Farmers' Markets (Sasta Bazaars / Sunday Bazaars)	Formalize local trade and support farmers & women entrepreneurs	Set up designated market spaces in Hangu, Kalaya & Ghiljo	District Administration + Local Govt
2. Digital Market Information System (Mobile-Based Price Updates)	Stop exploitation by middlemen	Mobile SMS alerts for livestock, coal, crops	KP IT Board + Livestock Dept
3. Registration & Licensing of Traders with Incentives (Zero-Fee for First Year)	Encourage formal commerce	One-window registration camp	Industry Dept + DC Office

The short-term trade and commerce interventions are designed to deliver quick and visible economic impact in Orakzai District through market formalization, digitalization, and business facilitation.

The medium-term interventions are presented here:

Table 3-102: Future Trade and Commerce Development Medium Term Proposals

Proposal	Objective	Key Features	Partners
1) Establish a Livestock & Agri Trade Terminal (Mandis with Weighing System)	Organized trading of sheep, goats, cattle, poultry, and crops	Auction platforms, scales, sheds, disease testing	Livestock Dept + Local Govt
2) Local Product Branding & Packaging Support Center	Improve marketability of honey, dry fruits, coal, and stone	Shared packaging machines, labeling, certification	SMEDA / Chamber of Commerce
3) Trade Facilitation & Training Centre (Skills in Business, E-Commerce, Local Tax Rules)	Build business capacity	Workshops for youth & traders	SMEDA + TEVTA + NGOs

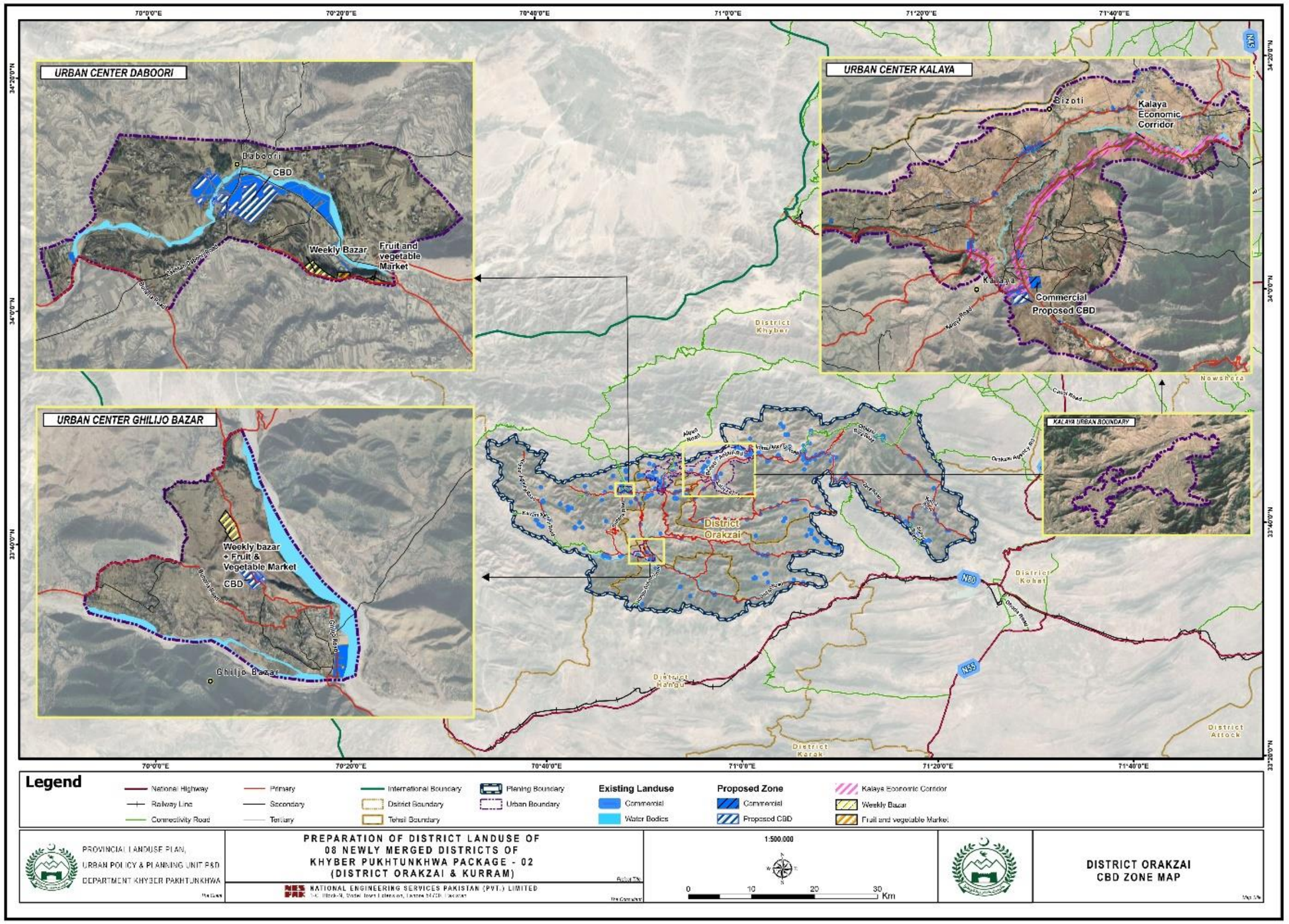
The long-term strategy for trade and commerce development in Orakzai focuses on transforming the district into a regional logistics and commercial hub, leveraging its strategic position between Kohat, Kurram, and Afghanistan.

The long-term interventions are presented here:

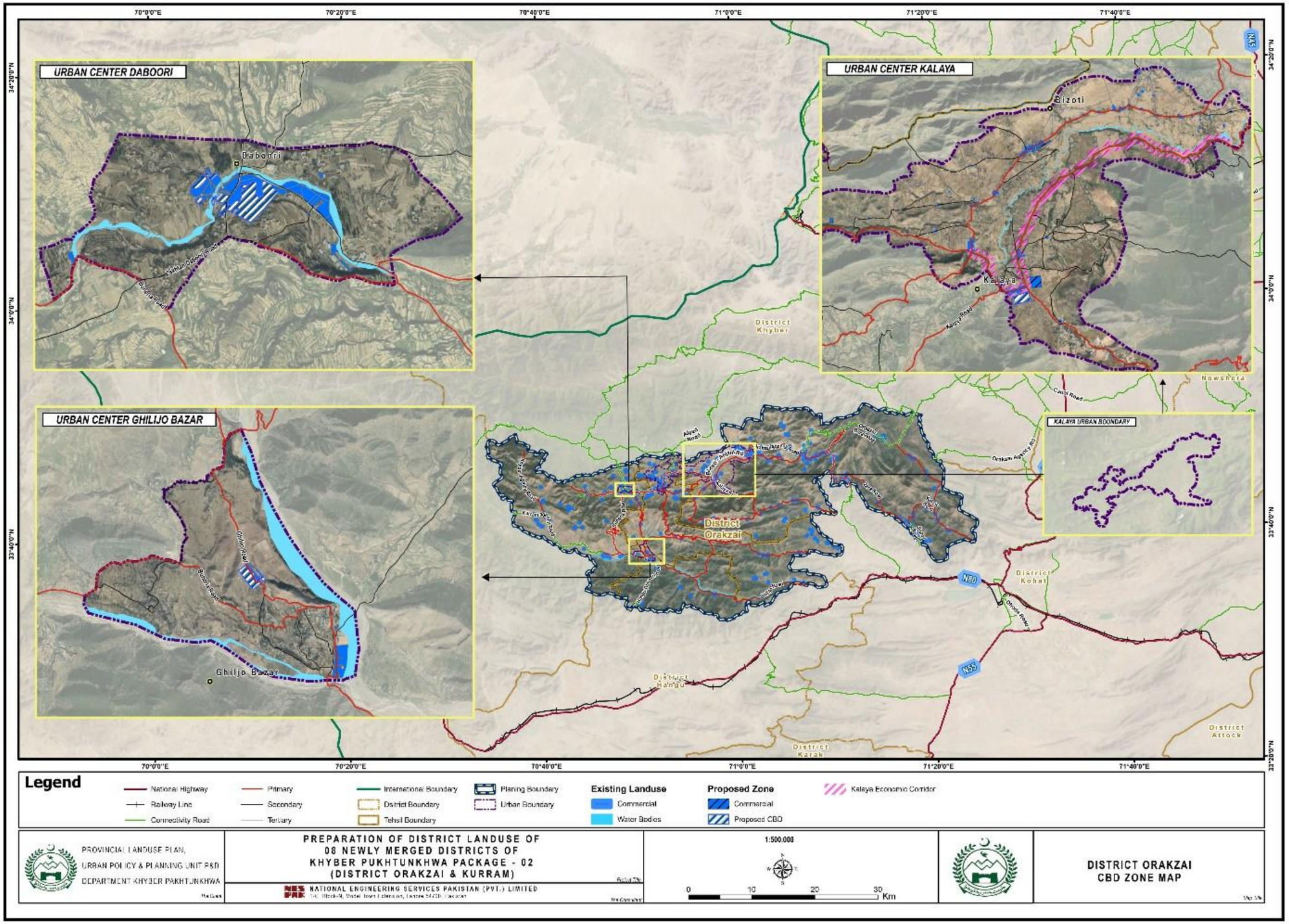
Table 3-103: Future Trade and Commerce Development Long Term Proposals

Proposal	Objective	Implementation Strategy	Stakeholders
1) Orakzai Regional Trade Corridor Development (Linking Kohat → **Kurram → Afghanistan Route)**	Convert Orakzai into a logistics & transit hub	Road upgradation + check post automation	KP Govt + Commerce Ministry + Customs
2) Establish a Border Trade Facilitation Center (Mini Dry Port Model)	Enable legal cross-border trade	Customs clearance, warehousing, trucking terminal	FBR + KP Board of Investment
3) Special Incentive Program for Female Traders & Youth Start-ups	Inclusive economic participation	Low-interest loans + vendor stalls + digital platforms	BOK + KP SME Authority

In conclusion, the proposed short-, medium-, and long-term trade and commerce development plans for Orakzai District provide a phased roadmap for sustainable economic transformation. The short-term actions focus on quick, low-cost measures to formalize local trade and enhance market access. The medium-term interventions build institutional capacity, strengthen value chains, and promote entrepreneurship through product branding and business training. The long-term strategy envisions Orakzai as a regional logistics and trade hub, integrated with national and cross-border markets. Collectively, these initiatives aim to boost local livelihoods, attract investment, and establish Orakzai as a dynamic center of inclusive and competitive commerce.



Map 3-30 Proposed Commercial Zones of District Orakzai



Map 3-31 Proposed Commercial Zones of District Orakzai

3.8.9 Constraints

District Orakzai has immense potential to become a regional leader in mineral extraction, agriculture, and hospitality sectors. By leveraging its natural resources and improving key sectors, the district can significantly enhance employment opportunities and economic growth. However, several major constraints hinder this progress:

- Orakzai lacks the presence of large-scale industrial hubs, factories, or manufacturing zones. Without such facilities, the district struggles to generate mass employment opportunities in industrial sectors.
- The hospitality sector in Orakzai lacks modern standards and international best practices. The absence of family-oriented hotels and guesthouses deters both domestic and international tourists, limiting the growth of the tourism industry.
- Commercial areas across the district lack essential facilities, including pedestrian pathways, proper sewage systems, and common amenities like restrooms for women. These deficiencies make the district less attractive to both shoppers and potential investors, stalling commercial growth.
- Commercial areas across the district lack essential facilities, including pedestrian pathways, proper sewage systems, and common amenities like restrooms for women. These deficiencies make the district less attractive to both shoppers and potential investors, stalling commercial growth.
- Orakzai retains a reputation for being unsafe, which discourages international investors and tourists. This perception stifles the development of the manufacturing sector and hampers efforts to attract investment into the region.
- A large portion of the population in Orakzai is involved in subsistence farming, which is subject to the vagaries of weather, land fertility, and market access. The district struggles with outdated farming techniques, lack of irrigation facilities, and limited access to high-quality seeds and fertilizers. This makes agricultural employment unstable and inadequate for addressing the growing population's needs.
- The district continues to struggle with poor telecommunication services, which impedes business operations and dissuades investors. Reliable communication infrastructure is essential for attracting business interest and enabling modern economic activities.
- Local business owners, especially those in the mineral mining sector, face difficulties in accessing financing facilities. This lack of financial support hinders their ability to expand operations, invest in technology, and improve productivity.
- Frequent power outages and underdeveloped infrastructure severely hamper economic activities, particularly in the industrial sector. This lack of reliable infrastructure reduces the district's competitiveness and discourages investment.
- The absence of forward linkages, such as access to markets beyond the region, prevents the agriculture sector from realizing its full potential. Additionally, there is a lack of IT infrastructure to facilitate business transactions and attract buyers.
- The district's value chains lack compliance with international best practices and certifications, making it less attractive to investors. This gap limits the ability to access global markets and reduces overall competitiveness.
- Due to limited access to gas, many locals rely on wood and tree logging to meet their energy demands. This reliance on unsustainable energy sources leads to deforestation, negatively impacting the region's environment and long-term ecological balance.

- Forest owners in the district are largely unaware of the opportunities presented by international carbon markets. There are no facilities or programs in place to educate them or provide access to these markets, resulting in missed opportunities for economic and environmental benefits.

3.8.10 Recommendation

The following recommendations focus on addressing the key constraints in District Orakzai and maximizing its economic potential across various sectors. These proposed projects, when implemented, will enhance the district's infrastructure, promote investment, and drive growth in industries such as minerals, agriculture, tourism, and hospitality.

- To attract investors, financial feasibility studies on mineral extraction should be conducted. These studies will help establish fact books on existing mineral reserves, making the region more appealing to investors. Offering incentives to investors will further encourage exploration and development in the mineral sector.
- Setting up an industrial estate with a focus on mineral processing is essential. This estate should prioritize cluster development and promote research in relevant fields. Establishing such a hub will support the processing of extracted minerals, boosting the local economy and creating employment opportunities.
- Dedicated research centers for oil, gas, and coal should be established to attract long-term investments in these industries. These research facilities will help drive innovation and position Orakzai District as a leader in energy resources.
- Investments in cold storage facilities and food processing plants and local produce, should be incentivized. These investments will ensure that agricultural products are preserved and processed efficiently, leading to increased market reach and profitability.
- Proper zoning for family-friendly theme parks and hospitality developments is crucial for boosting tourism. Designating specific areas for entertainment and hospitality sectors will help attract tourists and stimulate economic growth in Orakzai Distirct.
- Establishing local offices for tourism promotion, in collaboration with national tourism bodies, will help unlock Orakzai's tourism potential. Areas like Sampok Top (Tirah Valley) should be actively promoted to attract visitors and develop the local tourism sector.
- Local offices of regional and national mineral departments should be established to streamline operations and increase efficiencies in sectors like coal and limestone extraction. These offices will facilitate better management and regulatory oversight.
- Enhancing infrastructure along existing trade routes and commercial spaces is essential for improving trade efficiency. Allied facilities such as parking, service areas, and management systems should be developed to support commercial growth. Vertical parking solutions may be implemented where space is limited.
- Targeted development of commercial areas along highways will help tap into untapped economic opportunities. Developing these highway-oriented commercial ribbons in the short term will drive regional commerce and attract investment.
- Designating areas near Orakzai's urban center for occasional markets, exhibitions, and festivals will help promote the district's economic values and attract investments. These opportunities can also support the women-led handicrafts sector.
- A local regulatory body, with a focus on women's participation, should be established to oversee and promote the handicrafts sector. Providing opportunities for entrepreneurs, especially women, in regional exhibitions will help scale the industry and attract investment.

- Demarcating specific commercial zones with a long-term commercialization roadmap will help prevent haphazard growth. This planned approach will promote agglomeration within optimal commercial areas, fostering sustainable economic development.
- Establishing forward and backward linkages in industries such as agriculture and manufacturing will reduce freight costs and improve accessibility to consumers. Strengthening these connections will enhance the efficiency of local businesses.
- Developing forward linkages for the horticulture sector by setting up cold storage units and processing facilities for products like fish will help the district meet international standards. These efforts will improve the profitability and sustainability of agricultural activities in Orakzai District.
- The mining sector can be revitalized by increasing investor accessibility and developing business centers that connect stakeholders. These centers will facilitate knowledge and skill transfer within the industry, promoting innovation and growth.
- Investment in infrastructure for research, laboratories, and startup centers is crucial for the district's long-term development. These facilities will drive innovation in key industries like mineral processing and agriculture, helping Orakzai District gain a competitive advantage.
- Training programs should be implemented to develop a skilled labor force for the hospitality and industrial sectors. Increasing the supply of skilled workers will improve operational efficiency and support the district's economic development.

3.9 Solid Waste Management

3.9.1 Solid Waste Management in Orakzai District

Orakzai District faces significant challenges in managing solid waste due to the absence of a structured waste management system. With no formal waste collection, transportation, or disposal mechanisms, the majority of waste is either openly dumped or burned, leading to severe environmental or public health risks. The district's rugged terrain and dispersed rural settlements make the implementation of a centralized waste management system difficult. Additionally, there is limited awareness among the local population regarding sustainable waste disposal methods, recycling, and the environmental impacts of improper waste handling.

3.9.1.1 Current and Projected Solid Waste Generation in Rural Centers

Based on the updated projections, both rural and urban centers of Orakzai District are expected to experience steady population growth over the planning horizon, leading to a significant increase in solid waste generation.

In rural areas, with per capita waste generation increasing from 0.28 kg/capita/day in 2025 to 0.34 kg/capita/day by 2045, annual solid waste generation is projected to rise from approximately 37,976 tons to 64,916 tons, resulting in a cumulative generation of about 251,887 tons over the planning period. Accordingly, a landfill area of approximately 5 acres has been considered to accommodate long-term disposal needs.

Similarly, in urban centers, annual solid waste generation is projected to increase from around 3,619 tons in 2025 to 8,427 tons by 2045, with a cumulative generation of approximately 26,434 tons over the planning horizon, requiring an estimated landfill area of 0.315 acres in Kalaya,0.092 acres in Ghiljo and 0.094 acres in Daboori.

The projected increase in waste generation across both rural and urban settlements highlights the need for a phased, efficient, and demand-responsive solid waste management system to ensure sustainable collection, handling, and disposal in line with future growth.

Table 3-104: Current and Future Solid Waste Generation in Rural Settlements

Year	Population	Generation (kg/c/d)	SW (ton/year)
2025	371,583	0.28	37976
2030	407,260	0.29	43703
2035	449,537	0.31	50537
2040	465,880	0.32	54755
2045	529,325	0.34	64916
Total Waste Generation			**251,887**
Area (Acres)			**5 acres**

3.9.1.2 Current and Projected Solid Waste Generation in Urban Centers

The assessment of solid waste generation in urban centers is based on existing population, growth projections, and adopted per capita waste generation rates. Currently, waste generation is relatively low due to smaller population size; however, it is expected to increase significantly with urbanization and population growth.

Projected waste quantities have been estimated for the design horizon to ensure adequate planning of collection, transportation, and disposal systems. The increase in waste generation highlights the need for an efficient and sustainable solid waste management system in the urban centers.

Table 3-105: Current and Future Solid Waste Generation in Kalaya

Year	Population	Generation (kg/c/d)	SW (ton/year)
2025	21,632	0.29	2290
2030	24,985	0.29	2645
2035	27,599	0.30	3022
2040	30,418	0.32	3553
2045	41,202	0.34	5113
			16622
		Area (acre)	0.315

Table 3-106: Current and Future Solid Waste Generation in Ghiljo

Year	Population	Generation (kg/c/d)	SW (ton/year)
2025	7,338	0.29	777
2030	7888	0.29	835
2035	8298	0.30	909
2040	8723	0.32	1019
2045	10637	0.34	1320
			4859
		Area (acre)	**0.092**

Table 3-107: Current and Future Solid Waste Generation in Dabori

Year	Population	Generation (kg/c/d)	SW (ton/year)
2025	5,223	0.29	553
2030	6308	0.29	668
2035	7180	0.30	786
2040	8144	0.32	951
2045	16068	0.34	1994
			4952
		Area (acre)	0.094

3.9.2 Proposed Solid Waste Management Strategies

Orakzai District faces significant challenges in managing solid waste due to its rural landscape, dispersed population, and lack of formal waste management infrastructure. To address these issues, a multifaceted approach is recommended, focusing on community engagement, infrastructure development, and sustainable practices.

Engaging local communities is crucial for the success of any waste management program in Orakzai. Establishing community-based organizations (CBOs) can empower residents to take ownership of waste collection and segregation efforts. These CBOs can collaborate with local authorities and non-governmental organizations to receive training, resources, and support necessary for effective waste management. Programs that have been successful in similar contexts often involve residents in decision-making processes, ensuring that solutions are tailored to the community's specific needs.

Investing in appropriate waste management infrastructure is essential. Given the district's terrain and settlement patterns, decentralized waste processing facilities, such as small-scale composting units and recycling centers, are recommended. These facilities can handle organic waste locally, reducing transportation costs and promoting the production of compost for agricultural use. Additionally, establishing designated disposal sites that adhere to environmental standards will help mitigate the adverse effects of open dumping and burning.

Raising awareness about the importance of proper waste management is vital for behavioral change. Educational campaigns can inform residents about the health and environmental risks associated with improper waste disposal and the benefits of practices like recycling and composting. Schools, religious institutions, and community centers can serve as platforms for disseminating this information. Incentive-based programs, such as rewarding households that consistently segregate waste, can further encourage community participation and commitment to sustainable waste management practices.

By integrating these strategies, Orakzai District can develop a robust solid waste management system that addresses current challenges and promotes environmental sustainability.

3.9.3 Proposed Waste Collection and Transportation System in District Orakzai

To manage the growing waste quantities in Orakzai, a phased collection system has been proposed, combining manual tools for accessibility with mechanized support for efficient transfer. The bulk of household waste will be collected through handcarts, with their numbers gradually increased over the planning period to match population growth and settlement expansion. Communal containers of standardized size will be placed at key junctions, markets and road-accessible village nodes to serve as secondary storage points. These containers will be serviced by skip-lifter vehicles operating on scheduled rounds, ensuring regular clearance without overflow. The proposed fleet and equipment mix has been scaled in a balanced manner prioritizing manual collection in denser pockets and containerized transfer for dispersed localities making the system both practical and financially manageable within local constraints.

Table 3-108: Resource Evaluation for Waste Collection and Transportation in Rural Settlements (2025-2045)

Year	Handcart	Communal bins (5 m3)	Skip lifters
2025-2030	34	38	6
2030-2035	39	43	7
2035-2040	41	47	8
2040-2045	47	53	9

3.9.4 Proposed Waste Collection and Transportation System in Kalaya

Solid waste management in Kalaya is proposed through a phased and demand responsive collection system. During the initial phases, waste will be primarily collected using handcarts, supported by a limited number of communal containers placed at accessible locations. Given the low number of containers in the early planning periods, the provision of a dedicated skip lifter vehicle is not required and waste lifting can be managed through shared or periodic arrangements. A skip lifter is introduced in the later phases as waste quantities and container numbers increase, ensuring efficient and regular clearance. This approach allows gradual system strengthening while remaining operationally practical and financially efficient.

Table 3-109: Resource Evaluation for Waste Collection and Transportation in Kalaya (2025-2045)

Year	Handcart	Communal bins (5 m3)	Skip lifters
2025-2030	2	2	0
2030-2035	3	3	0
2035-2040	3	3	1
2040-2045	4	5	1

3.9.5 Proposed Waste Collection and Transportation System in Ghiljo

In Ghiljo, solid waste management will rely on a balanced mix of manual collection and containerized transfer. Handcarts will be used for door-to-door collection within settlements, while communal containers will serve as secondary storage at road accessible points.

Table 3-110:Resource Evaluation for Waste Collection and Transportation in Ghiljo (2025-2045)

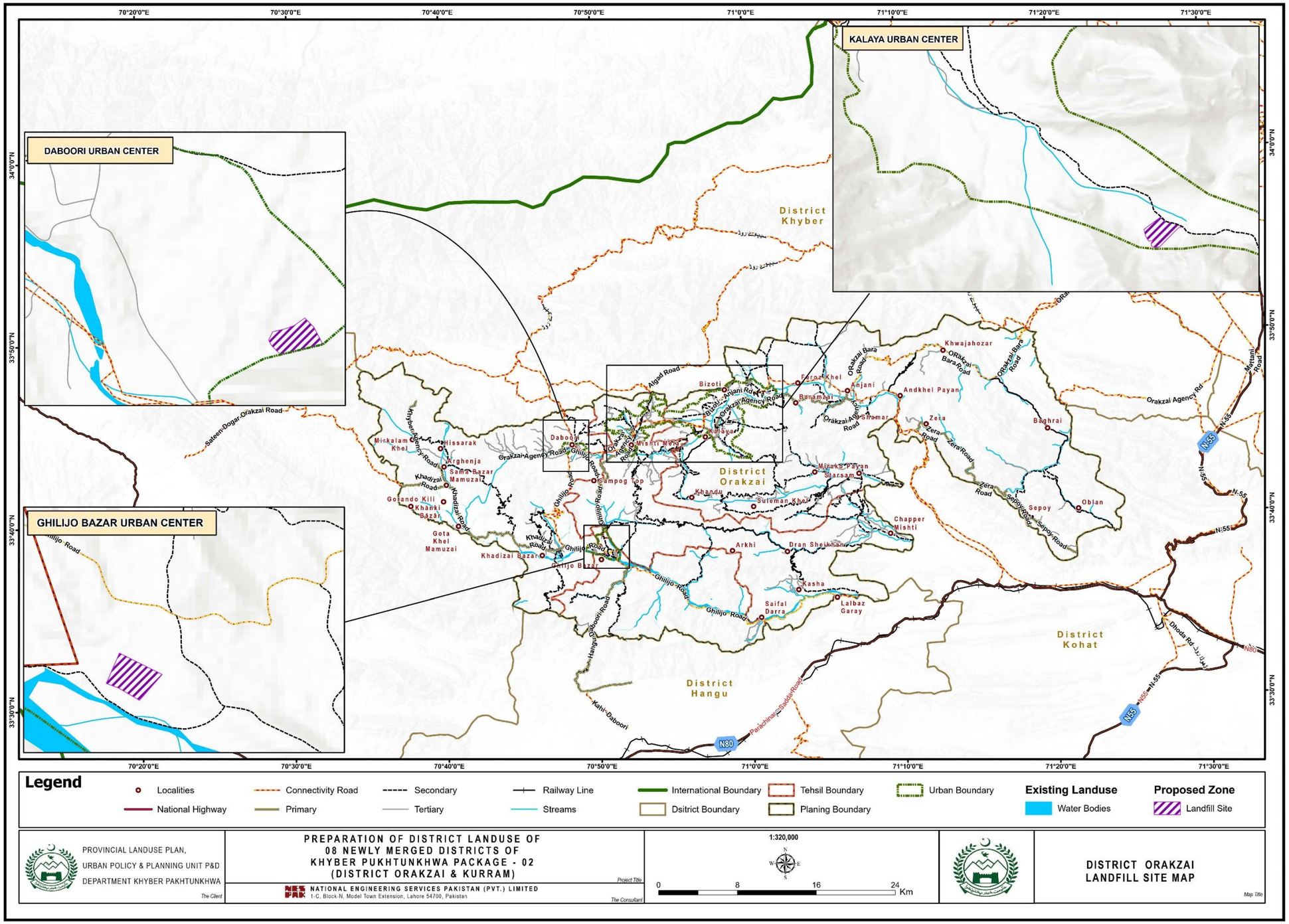
Year	Handcart	Communal bins (5 m3)
2025-2030	1	1
2030-2035	1	1
2035-2040	1	1
2040-2045	1	1

3.9.6 Proposed Waste Collection and Transportation System in Dabori

For Dabori, a phased and locally appropriate waste collection approach is proposed, prioritizing handcarts for primary collection across dispersed residential pockets. Communal containers will be strategically located to consolidate waste. The proposed system allows incremental expansion, ensuring service reliability while remaining financially manageable.

Table 3-111:Resource Evaluation for Waste Collection and Transportation in Daboori (2025-2045)

Year	Handcart	Communal bins (5 m3)
2025-2030	1	1
2030-2035	1	1
2035-2040	1	1
2040-2045	2	2



Map 3-32: Proposed Landfill Sites in Urban Center

3.9.7 Constraints

- The district lacks a centralized piped water distribution system, and most residents rely on tube wells, hand pumps, and seasonal streams (khwars) for their water needs. Many existing water supply schemes are either non-functional or insufficient to meet the growing demand.

- There is no functional wastewater treatment facility in Orakzai, leading to the direct discharge of untreated sewage into open drains or natural watercourses. The absence of a proper sewerage system increases the risk of groundwater contamination and poses serious public health concerns.

- With no major surface water reservoirs, Orakzai District heavily depends on groundwater sources for drinking, irrigation, and livestock needs. Unregulated extraction is causing a decline in groundwater levels, threatening long-term water availability.

- Orakzai experiences seasonal variations in water availability, with dry months leading to severe water shortages. The reliance on rainfall fed streams and springs makes water supply highly unpredictable, affecting both domestic and agricultural activities.

- The natural drainage system of the district consists mainly of streams and khwars, which are insufficient for handling heavy rainfall. The lack of a proper stormwater drainage system results in waterlogging, soil erosion, and localized flooding, particularly in densely populated areas.

- The district's hilly terrain and deforestation contribute to high sedimentation rates in water channels, reducing their capacity and increasing the risk of flash floods. Soil erosion further depletes agricultural lands, impacting food production and livelihoods.

- Water contamination from improper sanitation, agricultural runoff, and unregulated waste disposal is a major concern. The absence of regular water quality monitoring limits the ability to detect and address pollution, endangering public health.

- Many rural areas in Orakzai suffer from electricity shortages, affecting the operation of tube wells and water pumping stations. The lack of alternative energy solutions increases dependency on unreliable power sources, limiting access to water for both domestic and agricultural use.

- Many water supply and sanitation projects suffer from poor maintenance due to inadequate funding and lack of technical expertise. Without proper upkeep, existing infrastructure continues to deteriorate, leading to inefficient water distribution and service interruptions.

- Orakzai's solid waste management is constrained by rugged terrain, lack of formal disposal systems, inadequate infrastructure, limited funding, and low public awareness. Open dumping and burning are common due to the absence of proper collection and disposal mechanisms.

- Changes in climate patterns have led to unpredictable rainfall, further straining water resources. The district's vulnerability to extreme weather events, including droughts and heavy rains, makes long-term water security a significant challenge.

3.9.8 Recommendations

- Establish a piped water distribution network to ensure equitable access to safe drinking water across the district. This should include the construction of new tube wells, overhead reservoirs, and water treatment facilities.

- Identify and repair non-functional tube wells and water supply schemes to maximize the use of existing infrastructure. Regular maintenance programs should be established to ensure continuous operation.

- Develop decentralized wastewater treatment plants, such as waste stabilization ponds or aerated lagoons, to treat domestic and industrial wastewater before discharge. Treated wastewater can be reused for irrigation to reduce dependence on freshwater sources.
- Implement groundwater recharge techniques such as rainwater harvesting, artificial recharge wells, and watershed management programs to maintain groundwater levels. Strict regulations should be enforced to prevent over-extraction.

- Design and construct proper stormwater drainage systems, particularly in densely populated areas, to prevent flooding and waterlogging. Natural water channels (khwars) should be reinforced and maintained to improve drainage efficiency.

- Establish a district wide water quality monitoring system to detect contamination and ensure compliance with national water safety standards. Proper waste disposal practices should be promoted to prevent pollution of water sources.

- Introduce solar powered tube wells and water pumping stations to reduce dependence on unreliable electricity sources. This will ensure a continuous water supply, particularly in remote areas.

- Develop a comprehensive water resource management framework that balances domestic, agricultural, and industrial water demands. This should include sustainable irrigation practices and efficient water distribution strategies.

- Implement afforestation and soil conservation programs to reduce erosion and sedimentation in water channels. Protecting watershed areas will enhance groundwater recharge and prevent degradation of water sources.

- Conduct awareness campaigns and training programs for local communities on water conservation, hygiene, and sanitation practices. Engaging local stakeholders in water management initiatives will ensure long-term sustainability.

- Establish a proper waste collection and disposal system to prevent solid waste from clogging drains and contaminating water bodies. Recycling and composting initiatives should be encouraged to reduce environmental impact.

- Increase government investment in water supply and sanitation projects while enforcing strict regulations for water conservation and pollution control. Public-private partnerships should be encouraged to enhance service delivery.

- Develop climate-resilient water management plans to mitigate the impacts of changing rainfall patterns and extreme weather events. Drought-resistant crops and water-efficient irrigation systems should be promoted to ensure agricultural sustainability.

3.10 DRINKING WATER SUPPLY

3.10.1 Analysis and Background Studies

This section primarily provides a general overview, data analysis, and background studies of the existing water supply, sewerage, and solid waste management (SWM) systems in Orakzai.

3.10.2 Project Area

The project area for Orakzai District in Khyber Pakhtunkhwa, Pakistan, is entirely rural and shares boundaries with Kurram, Hangu, and Kohat Districts, and Afghanistan to the west. The district is administratively divided into Central Tehsil, Ismail Zai Tehsil, Lower Tehsil, and Upper Tehsil. The district's landscape includes the Spin Ghar range, fertile valleys like Kalaya and Mishti, and key water resources such as the Kohat Toi and Mustura Rivers. The population of project area is given in the following table;

Table 3-112: Details of Project Area Population

Sr. No.	Rural Settlement	Population (2025)
1.	Central Tehsil	96,784
2.	Ismail Zai Tehsil	40,156
3.	Lower Tehsil	130,015
4.	Upper Tehsil	136,796
Total Population of Orakzai District		**403,751**

3.10.3 Drinking Water

Water is one of the most significant natural resource available at the disposal of human. It is facing increasing global demands and challenges, thus a considerable decline in its availability is observed due to mismanagement/misuse which has culminated in an intricate scenario, in terms of water availability to various regions. The situation is considered to have serious implications for global and regional peace being a glaring politico-economic issue of the current century.

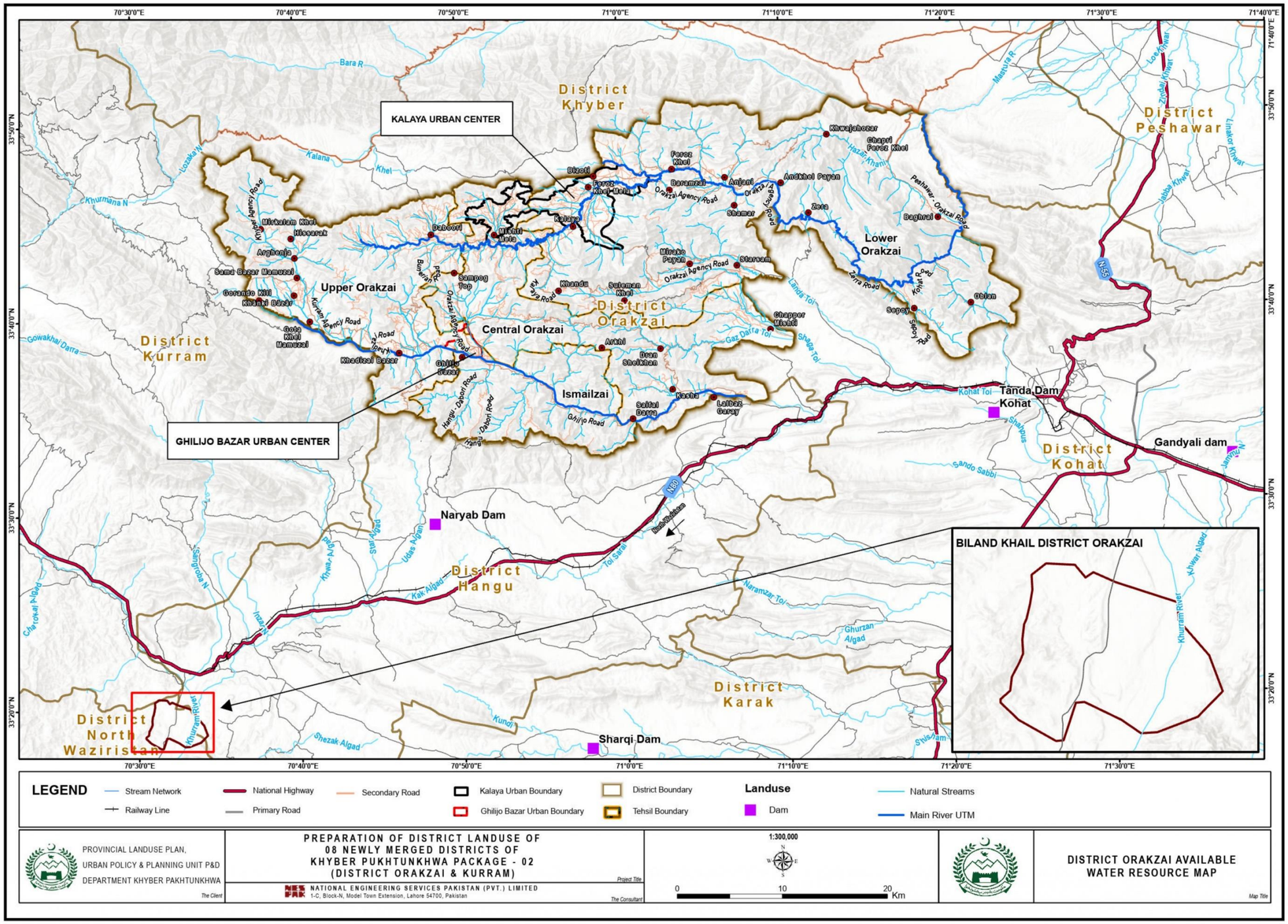
3.10.3.1 Sources of Drinking Water Supply

Orakzai District relies on a combination of groundwater and surface water resources for its drinking water supply. Tube wells, installed primarily by the Public Health Engineering Department (PHED), serve as the main source, with their discharge capacity varying based on groundwater availability across different areas. Site observations in Alizai and Dogar confirm that groundwater depths generally range between 180–220 ft, indicating feasible conditions for tubewell-based supply systems in lower parts of the district. In addition to tube wells, natural springs provide water to several rural settlements, while hand pumps are used in locations with shallow water tables. The overall groundwater potential in Orakzai remains uneven, with some pockets facing scarcity, whereas areas in the lower plains exhibit comparatively better yields.

Surface water resources in the district include rivers and natural streams that supplement the groundwater supply. The Kohat Toi and Mastura Rivers, along with smaller streams such as Tasapparai Khwar, Usterzai Khwar, and Landa Toi, contribute to the district's hydrological system. While these

surface water bodies hold potential, the absence of large scale storage infrastructure limits their utilization.

The district's water supply system is predominantly managed by PHED through both gravity fed and tubewell based schemes. However, several challenges persist, including limited groundwater recharge, seasonal fluctuations in surface water availability, and the absence of major storage facilities. In Lower Orakzai,households often depend on privately installed boreholes due to inadequate coverage of formal schemes, while in Dogar the absence of a structured water supply system compels residents to rely on self-managed sources despite good aquifer potential. Addressing these issues through improved source development, rehabilitation of existing schemes, and sustainable water resource management will be crucial for ensuring long-term water security in Orakzai District.The available water sources are visually represented in below map.



Map 3-33: Available Water Resources in District Orakzai

3.10.4 Existing Water Supply Scheme

The existing water supply schemes in Orakzai District, covering Central Tehsil, Ismail Zai Tehsil, Lower Tehsil, and Upper Tehsil, primarily rely on tube wells, natural streams, and small-scale distribution networks to meet domestic and agricultural water needs. The oldest scheme, established in 1960, utilizes galvanized iron (GI) pipes, which have a typical lifespan of 40 to 50 years. As a result, these pipes have surpassed their expected service life, leading to reduced water flow and inadequate supply to the communities.

In contrast, the most recent water supply scheme, launched in 2024, uses high-density polyethylene (HDPE) pipes, known for their durability and resistance to corrosion, with a service life exceeding 100 years. The integration of these modern materials aims to enhance water accessibility and improve the quality of life for the district's population. However, to address current water shortages and ensure long-term sustainability, it is imperative to rehabilitate or replace the aging GI pipe systems with more reliable alternatives like HDPE pipes.

Following table shows the detailed existing scheme in Orakzai;

Table 3-113: Existing Scheme Data in Orakzai

S.No	Name of Scheme	District	Address	Year of Completion	Source	Capacity (GPH)	Coordinate		Pipeline	Lengths of Pipeline	Over Head Reservior Tank	Working Hours	Population Served	Functional/Non-Functional	Code
Government/VDOs Schemes															
1	DWSS Shammar & S/village Anjani	Orakzai	Storay Khel Anjani	1986-87	Solar	3000	33.77717	71.11196	HDPE	4000	Not	6	450	Functional	Ork-Lwr-110-01
2	DWSS Und Khel	Orakzai	Storay Khel Anjani	1991-92	Electricity	2500	33.75268	71.109188	GI	___	Not	2	990	Functional	Ork-Lwr-110-03
3	DWSS Shamm/Gravity Spring	Orakzai	Shammar	1986-87	Gravity	1500	33.779982	71.099587	GI	___	Not	12	540	Functional	Ork-Lwr-110-04
4	DWSS Khawa Storay Khel	Orakzai	Khawa Storay Khel	1980-81	Gravity	1500	33.816153	71.083162	GI	___	Not	12	243	Functional	Ork-Lwr-110-05
5	DWSS Toorki Kallay Sultanzai/Spring	Orakzai	Sultanzai Gul Dara	1991-92	Gravity	1500	33.754967	71.0733	GI &HDPE	___	Not	12	1800	Functional	Ork-Lwr-110-06
6	DWSS Zera (Spring)	Orakzai	Zera	1980-81	Gravity	1500	33.771188	71.1222	GI and HDPE	___	Not	12	648	Functional	Ork-Lwr-110-08
7	DWSS Daulat Musa (Spring)	Orakzai	Zera	1992-93	Gravity	1500	33.77099	71.123933	GI and HDPE	100	Not	12	720	Functional	Ork-Lwr-110-09
8	DWSS SAID KHALIL T.W	Orakzai	Said khalil	1988-89	Electricity	2000	33.76878	71.19002	GI	5000	Not	2	135	Functional	Ork-Lwr-110-10
9	DWSS karghan	Orakzai	Karaghan	1988-89	Electricity	2000	33.77112	71.208808	GI	2000	Not	3	990	Functional	Ork-Lwr-110-11
10	DWSS Utmankhel	Orakzai	Utmankhel	1991-92	Electricity	2000	33.789533	71.055035	GI	___	Not	4	855	Functional	Ork-Lwr-110-12
11	DWSS Melo Sar and Village	Orakzai	Melo Sar	1987-88	Electricity	2000	33.837268	71.030465	HDPE	2500	Not	2	1170	Functional	Ork-Lwr-110-14
12	DWSS Star Bezot and Village	Orakzai	Star Bezot	1995-96	Electricity	2000	33.781272	70.999728	GI and HDPE	___	Not	4	1350	Functional	Ork-Lwr-110-16
13	DWSS Feroz Khell to Bezot	Orakzai	Feroz khell Sor Gul	1988-89	Electricity	2000	33.785143	70.98026	GI	___	Not	5	810	Functional	Ork-Lwr-110-17
14	DWSS Goeen to Toorkhawari	Orakzai	Goeen	1984-85	Gravity	2200	33.779218	70.97555	GI	___	Not	12	630	Functional	Ork-Lwr-110-18
15	DWSS Lal Mela	Orakzai	Lal Mela	1988-89	Electricity	2300	33.77468	70.970698	GI	___	Not	2	855	Functional	Ork-Lwr-110-20
16	DWSS Penzari	Orakzai	Penzari	1988-89	Electricity	2700	33.757263	70.95277	GI	___	Not	2	657	Functional	Ork-Lwr-110-21
17	DWSS Kalaya (H.Q)	Orakzai	Kalaya	1980-81	Electricity	2600	33.756165	70.937178	GI and HDPE	___	Not	2	90	Functional	Ork-Lwr-110-22
18	DWSS Dara Mani Khell	Orakzai	Dara Mani Khell	1991-92	Solar	3000	33.767887	70.939287	GI	___	Not	6	810	Functional	Ork-Lwr-110-23
19	DWSS Zeridar	Orakzai	Zeridar	1988-89	Electricity	1600	33.748582	70.909618	GI	5000	Not	3	1350	Functional	Ork-Lwr-110-25
20	DWSS Baramzai	Orakzai	Baramzai	1994-95	Electricity	2000	33.74106	70.947015	GI	2500	Not	2	810	Functional	Ork-Lwr-110-26
21	DWSS Tarangi Kada Alat Khell	Orakzai	Tarangi Kada Alat Khell	1981-82	Gravity	1500	33.726757	70.933585	GI	2000	Not	8	1305	Functional	Ork-Lwr-110-27
22	DWSS Mir Mela	Orakzai	Mir Mela	1986-87	Electricity	3000	33.746445	70.954065	GI	1000	Not	2	1170	Functional	Ork-Lwr-110-28
23	DWSS Ghorghori Chena	Orakzai	Tagha Sam	2004	Electricity	2200	33.841113	71.002972	GI	20000	Not	3	3150	Functional	Ork-Lwr-110-29
24	DWSS Sangra and Village	Orakzai	Sangra Village	1990-91	Electricity	2300	33.811722	71.021322	HDPE	500	Not	2	1440	Functional	Ork-Lwr-110-30
25	DWSS Zawan	Orakzai	Zawan	1994-95	Electricity	2800	33.739487	70.968672	GI	4500	Not	3	630	Functional	Ork-Lwr-110-31
26	DWSS Hassanzai	Orakzai	Hassanzai	1994-95	Electricity	2900	33.728987	70.981652	GI	2000	Not	2	630	Functional	Ork-Lwr-110-32

S.No	Name of Scheme	District	Address	Year of Completion	Source	Capacity (GPH)	Coordinate		Pipeline	Lengths of Pipeline	Over Head Reservior Tank	Working Hours	Population Served	Functional/Non-Functional	Code
27	DWSS Mandar Khell	Orakzai	Mandar Khell	1994-95	Electricity	2000	33.758912	70.968275	GI/HDPE	7500	Not	2	1890	Functional	Ork-Lwr-110-33
28	DWSS Mishti Mela & S/ Village (solarization 2016-2017)	Orakzai	Mashti Mela	1990-91	Solar	2500	33.776118	71.006235	GI	3200	Not	6	1800	Functional	Ork-Lwr-110-34
29	DWSS Bodgar	Orakzai	Bodgar	1986-87	Gravity	1500	33.798172	70.99816	GI	2000	Not	12	540	Functional	Ork-Lwr-110-36
30	DWSS Rhe: Hassan zai	Orakzai	Dara Hassanzai	2012-13	Electricity	2300	33.711097	70.928133	GI and HDPE	2500	Not	2	1890	Functional	Ork-Lwr-110-37
31	DWSS Sampog Mulal Khell	Orakzai	Sampog	1997-98	Solar	3000	33.73814	70.87072	HDPE	400	Not	6	2520	Functional	Ork-Ctr-110-40
32	DWSS Tallai Chun	Orakzai	Tallai Chain	1989-90	Solar	3000	33.737397	70.86376	GI	4000	Not	5	1530	Functional	Ork-Ctr-110-41
33	DWSS Baghnac Ali khel	Orakzai	Baghnak	1988-89	Solar	2400	33.757837	70.887953	GI	3500	Not	5	1260	Functional	Ork-Ctr-110-42
34	DWSS Alaf Khell Ali Khell	Orakzai	Gulli Chack Jab	2013-14	Solar	2500	33.757377	70.885575	GI	1500	Not	6	225	Functional	Ork-Ctr-110-43
35	DWSs Lady Banda	Orakzai	Lady Banda	1988-89	Electricity	3000	33.76162	70.892353	HDPE	3600	Not	2	720	Functional	Ork-Ctr-110-44
36	DWSS Ain posh	Orakzai	Ain posh	2004-05	Electricity	3000	33.756613	70.882232	GI	2000	Not	3	2250	Functional	Ork-Ctr-110-45
37	DWSS khwaja khizar to Ghaljo	Orakzai	Khwaja khizar Ghaljo	1993-94	Solar	2500	33.751002	70.875495	GI	5000	Not	6	450	Functional	Ork-Ctr-110-47
38	DWSS Khwaga Serai	Orakzai	Khwaga Serai	1980-81	Gravity	1500	33.72396	70.89085	HDPE	3500	Not	12	1620	Functional	Ork-Ctr-110-48
39	DWSS Khwaja khizar Spring	Orakzai	Khwaja khizar	1987-88	Solar	1500	33.724335	70.869567	HDPE	___	Not	5	720	Functional	Ork-Ctr-110-50
40	Mirzara and village	Orakzai	Mirzara	1993-94	Electricity	1500	33.777375	70.86211	GI	___	Not	2	720	Functional	Ork-Ctr-110-52
41	DWSS Ghundki/Deg; college Ghiljo	Orakzai	Ghiljo Naky khaly	2013-14	Solar	1500	33.764768	70.864972	HDPE	8500	Not	6	270	Functional	Ork-Ctr-110-53
42	DWSS khi Kada	Orakzai	Khi Kada	1993-94	Solar	1500	33.728743	70.82923	HDPE	1600	Not	6	540	Functional	Ork-Upr-110-54
43	DWSS Thropai	Orakzai	Thropai	1992-93	Gravity	2000	33.730243	70.827327	GI	___	Not	6	810	Functional	Ork-Upr-110-55
44	DWSS Gado Rabia khel	Orakzai	Gado	1993-94	Solar	2000	33.745383	70.810445	GI and HDPE	7000	Not	5	180	Functional	Ork-Upr-110-56
45	DWSS Dappa	Orakzai	Dappa	1984-85	Gravity	2000	33.748477	70.808165	GI	___	Not	6	540	Functional	Ork-Upr-110-57
46	DWSS Khando L/Areas	Orakzai	Mela	1994-95	Electricity	2000	33.750487	70.809368	HDPE	___	Not	3	1080	Functional	Ork-Upr-110-58
47	DWSS Shandawali /Sulema khell	Orakzai	Abi Shall	1994-95	Electricity	2000	33.72664	70.801742	HDPE	___	Not	2	720	Functional	Ork-Upr-110-59
48	DWSS Abi Shall	Orakzai	Khando	1987-88	Gravity	2000	33.733628	70.794415	HDPE	12000	Not	8	720	Functional	Ork-Upr-110-60
49	DWSS Kurez	Orakzai	Kurez	1987-88	Solar	2200	33.751307	70.799853	HDPE	___	Not	6	1710	Functional	Ork-Upr-110-61
50	Dwss Drand	Orakzai	Drand	1991-92	Solar	2300	33.73835	70.803347	HDPE	900	Not	5	1080	Functional	Ork-Upr-110-62
51	DWSS sra khawa	Orakzai	Aa khel	1989-90	Gravity	2700	33.740915	70.802138	GI	2000	Not	8	1440	Functional	Ork-Upr-110-63
52	Dwss sarmalo kandao	Orakzai	Aa khel	1993-94	Gravity	2600	33.726995	70.80846	HDPE	3300	Not	8	630	Functional	Ork-Upr-110-64
53	Dwss kasha Mishti	Orakzai	Mishti	1994-95	Solar	3000	33.718118	70.828628	HDPE	6000	Not	6	630	Functional	Ork-Upr-110-65

S.No	Name of Scheme	District	Address	Year of Completion	Source	Capacity (GPH)	Coordinate		Pipeline	Lengths of Pipeline	Over Head Reservior Tank	Working Hours	Population Served	Functional/Non-Functional	Code
54	Dwss mula khel	Orakzai	Mula khel	1993-94	Solar	1600	33.73519	70.841163	HDPE	___	Not	6	1530	Functional	Ork-Upr-110-66
55	Dwss Miraque Bala	Orakzai	Bar muhammad khel	1987-88	Solar	2000	33.726475	70.758505	HDPE	8000	Not	5	810	Functional	Ork-Upr-110-67
56	DWSS terahi	Orakzai	Bar muhammad khel	1979-80	Electricity	1500	33.755045	70.938683	HDPE	600	Not	2	1350	Functional	Ork-Lwr-110-70
57	Dwss Biland khel	Orakzai	Biland khel	1989-90	Electricity	3000	33.744223	70.945813	GI	1000	Not	3	378	Functional	Ork-Lwr-110-71
58	Dwss Shindand to khikada	Orakzai	Aa khel	1993-94	Gravity	2200	33.780692	71.0737	HDPE	1500	Not	12	495	Functional	Ork-Lwr-110-72
59	DWSS Star Bezot Zone A	Orakzai	Star Bezot	1992	Electricity	2300	33.742697	70.943582	HDPE	2000	Not	3	945	Functional	Ork-Lwr-110-73
60	DWSS Kornski	Orakzai	Kornski	1988	Solar	2800	33.774945	70.984248	GI	800	Not	5	990	Functional	Ork- Lwr-110-75
61	DWSS Kata Panra	Orakzai	Kata panra	2014	Electricity	2900	33.78405	71.23374	GI	12000	Not	3	315	Functional	Ork-Lwr-110-76
62	DWSS Sher Khel	Orakzai	Ali Khel	2022-23	Solar	2000	33.788842	71.276862	HDPE	___	Not	6	600	Functional	Ork- Lwr-110-77
63	DWSS Inzawar	Orakzai	Rabia Khel	2023-24	Solar	2500	33.817928	71.214492	GI	1600	Not	6	1190	Functional	Ork- Lwr-110-78
64	DWSS Daki Chan	Orakzai	Rabia Khel	2022-23	Gravity	1500	33.638307	70.854037	HDPE	___	Not	6	280	Functional	Ork-Upr-110-79
65	DWSS Kota Khel	Orakzai	Mamuzai	2022-23	Gravity	2300	33.604445	70.86222	GI/HDPE	___	Not	12	350	Functional	Ork-Upr-110-80
66	DWSS Nazo Khel Bari Khel	Orakzai	Ali Khel	2022-23	Gravity	3000	33.620982	70.8626	GI	1000	Not	12	280	Functional	Ork-Upr-110-81
67	DWSS Feroz Khel	Orakzai	Feroz Khel	2024-25	Solar	3000	33.621195	70.85899	GI	___	Not	6	364	Functional	Ork-Upr-110-82
68	DWSS Ahmad Khel	Orakzai	Mani Khel	2024-25	Solar	2400	33.647493	70.804623	GI and HDPE	___	Not	6	273	Functional	Ork-Upr-110-83
69	DWSS Star Sam	Orakzai	Mani Khel	2024-25	Solar	2500	33.642545	70.81444	HDPE	___	Not	5	266	Functional	Ork-Upr-110-84
70	DWSS Stori Khel	Orakzai	Anjani	2024-25	Solar	3000	33.639787	70.82643	GI and HDPE	500	Not	6	315	Functional	Ork-Upr-110-85
71	DWSS Shiraz Garhi	Orakzai	Stori Khel	2024-25	Solar	2600	33.691307	70.812183	GI and HDPE	1100	Not	4	224	Functional	Ork-ctr-110-86
72	DWSS karghan (New)	Orakzai	Bezoti	2024-25	Solar	2800	33.69913	70.875582	HDPE	___	Not	5	273	Functional	Ork-Ctr-110-88
73	DWSS Bazran Khel	Orakzai	Utmankhel	2024-25	Solar	2900	33.686037	70.883505	GI	2000	Not	6	343	Functional	Ork-Ctr-110-89
74	DWSS Utman Khel (Zone-B)	Orakzai	Utmankhel	2024-25	Solar	2500	33.66627	70.879682	HDPE	500	Not	5	434	Functional	Ork-Ctr-110-90
75	DWSS Gul Mir Garhi	Orakzai	Sheikhan	2024-25	Solar	3000	33.638043	70.841277	GI	___	Not	5	441	Functional	Ork-Upr-110-92
76	DWSS Ibrahim Zona	Orakzai	Mishti	2024-25	Solar	3000	33.613468	70.905868	GI	___	Not	6	336	Functional	Ork-Upr-110-93
77	DWSS Khawa Dara Storay Khel Tube Well	Orakzai	Khawa Dara, Storay Khel	1996-97	Electricity	2700	33.615582	70.90729	GI	2000	Not	3	2070	Functional	Ork-Ismailzai-110-94
78	DWSS Indara Mashti	Orakzai	Indara Mashti	2004-05	Gravity	2000	33.633958	70.77183	GI	N/A	Not	3	765	Functional	Ork-Upr-110-97
79	DWSS Jallaka Mela	Orakzai	Jallaka Mela	2012-13	Solar	2000	33.672625	70.782463	GI	3000	Not	6	810	Functional	Ork-Upr-110-98
80	Dwss Mirobak Mashti killay	Orakzai	Mirobak Mashti	2004-05	Electricity	2000	33.633663	70.814003	GI	N/A	Not	3	315	Functional	Ork-Upr-110-99

S.No	Name of Scheme	District	Address	Year of Completion	Source	Capacity (GPH)	Coordinate		Pipeline	Lengths of Pipeline	Over Head Reservior Tank	Working Hours	Population Served	Functional/Non-Functional	Code
81	DWSS Feroz Khell	Orakzai	Feroz Khell	2012-13	Electricity	2200	33.785075	70.987295	HDPE	4000	Not	2	990	Functional	Ork- Lwr-110-100
82	DWSS Zaina Khell to Songarani	Orakzai	Zaina Khell Songarani	2012-13	Electricity	2300	33.773357	70.963878	HDPE	___	Not	4	1170	Functional	Ork- Lwr-110-101
83	DWSS Merazi khel	Orakzai	Merozai Khell	2004-05	Electricity	2700	33.764923	71.165355	GI	1000	Not	5	765	Functional	Ork-Ctr-110-102
84	DWSS Indara	Orakzai	Indara	2004-05	Gravity	2600	33.589257	70.943128	HDPE	1000	Not	3	1215	Functional	Ork-Ismz -110-104
85	DWSS Dara Mani Khell	Orakzai	Sabze Khell	1985-86	Electricity	3000	33.583935	70.962925	G.I	___	Not	2	720	Functional	Ork-Ismz-110-105
86	Dwss Merozi Kalat	Orakzai	Merozai Kalat	1991-92	Electricity	1600	33.576643	70.993652	HDPE	2000	Not	3	2340	Functional	Ork-Ismz-110-105
87	DWSS Shadala Utman Khell	Orakzai	Shadala Utman Khell	2012-13	Electricity	2000	33.73174	70.918262	HDPE	2000	Not	2	108	Functional	Ork-Ctr-110-107
88	DWSS Darangi	Orakzai	Darangi Shekhan	2010-11	Electricity	1500	33.700388	70.906678	G.I	1000	Not	3	720	Functional	Ork- Lwr-110-109
89	DWSS Bazrana Mashti	Orakzai	Bazrana Mashti	1995	Electricity	3000	33.68463	70.967242	G.I	1000	Not	2	360	Functional	Ork- Lwr-110-110
90	DWSS Spin Pagi	Orakzai	Spin Pagi	1994-95	Electricity	2200	33.683638	70.969483	G.I	___	Not	5	225	Functional	Ork- Lwr-110-111
91	DWSS Lak Kanry Sheikhan	Orakzai	Lak Kanry	2016-17	Solar	2300	33.684947	71.006005	G.I	___	Not	6	1710	Functional	Ork- Lwr-110-112
92	DWSS Gull Mir Garhi	Orakzai	Gull Mir Garhi	2012-13	Electricity	2700	33.70449	70.924318	G.I	5000	Not	2	1530	Functional	Ork- Lwr-110-113
93	DWSS Amber Mela Essa khell	Orakzai	Essa Khell	1998-99	Electricity	2600	33.686288	70.937712	G.I	9000	Not	2	1620	Functional	Ork- Lwr-110-114
94	DWSS Zara Garhi Mullah Khell	Orakzai	Zara Garhi	2004-05	Solar	3000	33.683097	70.951717	HDPE	___	Not	6	1530	Functional	Ork- Lwr-110-115
95	DWSS Miro Kheln (Jab Kada Mullah Khell)	Orakzai	Nare Garhi	2017	Solar	1600	33.707687	70.92124	HDPE	___	Not	6	270	Functional	Ork- Lwr-110-116
96	DWSS Badama Mullah Khell	Orakzai	Nare Garhi Mullah Khell	2013-14	Solar	2000	33.715042	71.076888	G.I	___	Not	6	540	Functional	Ork- Lwr-110-117
97	DWSS Zanka Khell Ali Khell	Orakzai	Zanka khell	2009-10	Solar	1500	33.708777	71.12179	HDPE	2000	Not	5	360	Functional	Ork- Lwr-110-118
98	DWSS Mazari Garhi	Orakzai	Mazari Garhi	2009-10	Solar	3000	33.701878	71.131983	HDPE	2000	Not	5	540	Functional	Ork- Lwr-110-119
99	DWSS Kool Mullah khell	Orakzai	Kool Mullah Khell	2018-19	Solar	2200	33.731847	71.22527	HDPE	___	Not	6	270	Functional	Ork- Lwr-110-120
100	DWSS Dresoti Pakhtani	Orakzai	Dresoti	2009-10	Solar	2300	33.664438	70.92208	HDPE	1500	Not	6	720	Functional	Ork- ctr-110-121
101	DWSS Gall Ali Khell	Orakzai	Gall Ali Khell	2013-14	Solar	2800	33.661282	70.945742	GI	___	Not	5	450	Functional	Ork- ctr-110-122
102	Dwss Ali Khel Gunda Mela	Orakzai	Gunda mela	2009	Solar	2900	33.661978	71.013593	GI	___	Not	5	1260	Functional	Ork- ctr-110-123
103	DWSS Oblan China Khizar to Bar Sher Khell	Orakzai	Sher Khell	2013-14	Gravity	2000	33.636662	71.04231	HDPE	___	Not	12	1440	Functional	Ork- ctr-110-124
104	DWSS Goeen to Toorkhawari	Orakzai	Tajakan	1994-95	Solar	2500	33.700703	70.669304	HDPE	700	Not	6	1620	Functional	Ork-Upr-110-125
105	DWSS Kalat Mani khell	Orakzai	Kalat Mani khell	2011-12	Electricity	1500	33.719148	70.66659	GI+HDPE	1000	Not	3	810	Functional	Ork-Upr-110-126
106	DWSS Chappri Banda	Orakzai	Chappri Banda	1997-98	Gravity	2300	33.734596	70.637405	GI / PVC	1200	Not	12	2430	Functional	Ork-Upr-110-127
107	DWSS Chappri Banda Feroz khell	Orakzai	Banda Gory Khaly	2018-19	Solar	3000	33.661907	70.696381	GI / HDPE	2000	Not	5	450	Functional	Ork-Upr-110-129

S.No	Name of Scheme	District	Address	Year of Completion	Source	Capacity (GPH)	Coordinate		Pipeline	Lengths of Pipeline	Over Head Reservior Tank	Working Hours	Population Served	Functional/Non-Functional	Code
108	DWSS Mohsin khell Akhell	Orakzai	Malang Garhi	2013-14	Solar	3000	33.662804	70.681854	GI / HDPE	4000	Not	5	225	Functional	Ork-Upr-110-130
109	DWSS Bagh kili Ali khell	Orakzai	Bagh kili	1996-97	Gravity	2400	33.574217	71.009789	HDPE	4000	Not	12	810	Functional	Ork-Ismz-110-131
110	DWSS Karina Ali Khell	Orakzai	Karina	2018-19	Solar	2500	33.610516	70.909393	HDPE	7000	Not	6	720	Functional	Ork-Ismz-110-132
111	DWSS Kandi Mashti to Ghaljo	Orakzai	Kandi Mashti	2004-05	Gravity	3000	33.570219	70.914368	GI	500	Not	8	1980	Functional	Ork-Ismz-110-133
112	DWSS Khatango	Orakzai	Khatango	2015-16	Gravity	2600	33.564838	70.917305	GI / HDPE	9000	Not	8	1440	Functional	Ork-Ismz-110-134
113	DWSS Jabba /Islami Madrassa	Orakzai	Takhtak Jabba Islami Madrassa	1998-99	Gravity	2800	33.703202	71.32038	GI / HDPE	21000	Not	8	1305	Functional	Ork-Ismz-110-135
114	DWSS Takhtak	Orakzai	Takhtak	2011-12	Solar	2900	33.604572	70.862366	GI / HDPE	8000	Not	6	360	Functional	Ork-Ismz-110-136
115	DWSS Perhantan to ghuzgari	Orakzai	prehantan	1991-92	Solar	2500	33.596775	70.840881	GI / HDPE	3000	Not	5	90	Functional	Ork-Ismz-110-137
116	DWSS Inzarki Ali khel	Orakzai	Inzarki	2009-10	Solar	3000	33.600147	70.820618	GI	1000	Not	5	270	Functional	Ork-Ismz-110-138
117	DWSS Kot Ali khell	Orakzai	Kot	1995-96	Gravity	3000	33.569149	70.822128	GI	2000	Not	8	990	Functional	Ork-Ismz-110-139
118	DWSS Sam Feroz khell	Orakzai	Sam Feroz khell	2010-11	Solar	2700	33.555737	70.829086	GI	5000	Not	6	1440	Functional	Ork-Ismz-110-140
119	DWSS Salo Rabia Khel	Orakzai	Salo Rabia Khel	1995-96	Solar	2000	33.801071	71.00161	GI / HDPE	____	Not	6	90	Functional	Ork- Lwr-110-141
120	DWSS Tambi Sheikhan	Orakzai	Tambi	2016-17	Solar	2000	33.833183	71.029938	GI / HDPE	___	Not	5	360	Functional	Ork- Lwr-110-142
121	DWSS Baza to Abi Sall	Orakzai	Baza To Abi shall	2012-13	Gravity	2000	33.838276	70.999588	GI	7000	Not	13	450	Functional	Ork- Lwr-110-143
122	DWSS Sra Mela to Baza	Orakzai	Sra Mela	2012-13	Gravity	2200	33.751705	70.766632	GI	2000	Not	14	360	Functional	Ork-Upr-110-144
123	DWSS Hussaini Garhi	Orakzai	Mandi Hussaini Garhi	2012-13	Gravity	2300	33.619038	70.787308	GI	3000	Not	8	360	Functional	Ork-Upr-110-146
124	DWSS Star Sam	Orakzai	Star Sam	1994-95	Solar	2700	33.634041	70.774147	GI / HDPE	5000	Not	5	1215	Functional	Ork-Upr-110-147
125	DWSS Zera to Palosia	Orakzai	Mandati	1994-95	Gravity	2600	33.587543	71.047233	HDPE	5000	Not	12	1170	Functional	Ork-Cent-110-151
126	Dwss Nalo chan	Orakzai	Nakata	2004-05	Gravity	3000	33.596555	71.071593	PVC	_	Not	8	225	Functional	Ork-Cent-110-152
127	Dwss toor smat sheikhen	Orakzai	toorsmat	1992-93	Gravity	1600	33.595042	70.862813	GI / PVC	1500	Not	9	1080	Functional	Ork-Ismz-110-153
128	Dwss Dobandi	Orakzai	Dobandi	2012-13	Gravity	2000	33.636436	70.999191	GI	6000	Not	13	855	Functional	Ork-Cent-110-154
129	Dwss Sam Momazai	Orakzai	Sam Momazai	1997-98	Gravity	1500	33.637665	71.09185	GI / HDPE	4000	Not	12	144	Functional	Ork-Cent-110-155
130	Dwss Allah Dad	Orakzai	Allah Dad	2009-10	Gravity	2300	33.76218	70.865501	GI / HDPE	4500	Not	12	810	Functional	Ork-Cent-110-156
131	Dwss Israk	Orakzai	Dwss Israk	2009-10	Gravity	2700	33.674011	70.779243	GI / HDPE	13000	Not	12	1080	Functional	Ork-Upr-110-157
132	Dwss totani mamozai	Orakzai	totani Momazai	2013-14	Solar	2600	33.732624	70.813263	GI / HDPE	10000	Not	6	387	Functional	Ork-Upr-110-158
133	Dwss Momand sam	Orakzai	Momand sam	2004-05	Gravity	3000	33.662907	71.028938	GI	10000	Not	8	252	Functional	Ork- Lwr-110-159
134	Dwss Gotak Khangi	Orakzai	Gotak khel	1991-92	Gravity	1600	33.690755	71.081902	GI / HDPE	12000	Not	8	900	Functional	Ork- Lwr-110-161

S.No	Name of Scheme	District	Address	Year of Completion	Source	Capacity (GPH)	Coordinate		Pipeline	Lengths of Pipeline	Over Head Reservior Tank	Working Hours	Population Served	Functional/Non-Functional	Code
135	Dwss Sepal kot dara	Orakzai	Sepal dara Rabia khel	1996-97	Solar	2000	33.70792	71.085373	GI	18000	Not	5	630	Functional	Ork- Lwr-110-162
136	Dwss Guzgar Rabia Khel	Orakzai	Guzgar Rabia Khel	2013-14	Solar	1500	33.689838	71.043396	GI	7000	Not	5	171	Functional	Ork- Lwr-110-163
137	Dwss Bagaro	Orakzai	Bagaro Rabia khel	1992-93	Gravity	3000	33.697906	71.031006	GI	3000	Not	12	135	Functional	Ork- Lwr-110-164
138	Dwss Ghazo Tang china	Orakzai	Samana Rabia khel	2009-10	Solar	2200	33.685047	71.005569	GI	1050	Not	6	1080	Functional	Ork- Lwr-110-165
139	Dwss Oblan	Orakzai	Oblan	1998-99	Gravity	2300	33.755203	70.98185	GI	2200	Not	12	990	Functional	Ork- Lwr-110-167
140	Dwss tor kanri	Orakzai	Aa khel	2009-10	Gravity	2800	33.686882	71.294357	GI / HDPE	12000	Not	8	900	Functional	Ork- Lwr-110-169
141	Dwss Narik Aa khel	Orakzai	Aa khel	2009-10	Gravity	2900	33.73727	71.216782	GI / HDPE	15000	Not	9	540	Functional	Ork- Lwr-110-170
142	Dwss yakho kandao	Orakzai	Aa khel	1994-95	Gravity	2000	33.609614	71.039444	GI / HDPE	5000	Not	10	1935	Functional	Ork- Lwr-110-171
143	Dwss Nakhtaro killay	Orakzai	Utman khel	2018-19	Solar	2500	0	0	___	___	Not	6	450	Functional	Ork- Lwr-110-172
144	Dwss Separdara	Orakzai	Utman khel	2004-05	Gravity	1500	33.48194	71.05383	___	___	Not	12	540	Functional	Ork- Lwr-110-173
145	Dwss Maigano Melosar	Orakzai	Utman khel	2002-03	Gravity	2300	33.31388	70.543365	___	___	Not	12	990	Functional	Ork-Upr-110-177
146	Dwss kago kamar Ali khel	Orakzai	Ali khel	1993-94	Gravity	3000	33.663501	70.780558	___	___	Not	12	486	Functional	Ork-Upr-110-178
147	Dwss Separ Ali khel	Orakzai	Ali khel	1998-99	Solar	3000	33.590994	70.778476	___	___	Not	5	900	Functional	Ork-Upr-110-179
148	Dwss sar ghundi	Orakzai	Ali khel	2009-10	Gravity	2400	33.679479	70.725489	___	___	Not	12	450	Functional	Ork-Upr-110-180
149	Dwss Khanki River to Ghiljo	Orakzai	Ali khel	2009-10	Solar	2500	33.777507	71.144985	HDPE	___	Not	6	198	Functional	Ork-Lwr-110-02
150	Dwss Srey Garey Mishti	Orakzai	Mishti	2010-11	Solar	3000	33.816112	71.083197	GI	___	Not	6	270	Functional	Ork-Lwr-110-07
151	Dwss Talai Aa khel	Orakzai	Aa khel	2004-05	Gravity	2600	33.787853	71.042698	GI/ HDPE	___	Not	8	360	Functional	Ork-Lwr-110-13
152	Dwss Main chan	Orakzai	sheakhan	2004-05	Gravity	2800	33.78758	71.024055	GI	3300	Not	9	117	Functional	Ork-Lwr-110-15
153	Dwss wam panra	Orakzai	sheakhan	1985-86	Gravity	2900	33.768498	70.95501	AC	___	Not	12	135	Functional	Ork-Lwr-110-19
154	Dwss ibrahimzona	Orakzai	Mishti	2011-12	Solar	2500	33.762763	70.942278	GI	5000	Not	5	540	Functional	Ork-Lwr-110-24
155	Dwss chargho spring to badami killay	Orakzai	Ali khel	2014-15	Gravity	3000	33.780532	71.042487	GI	3200	Not	12	630	Functional	Ork-Lwr-110-35
156	Dwss sra khoona	Orakzai	Bar muhammad khel	1994-95	Gravity	3000	33.731132	70.905163	GI	___	Not	10	810	Functional	Ork-Ctr-110-38
157	Dwss Dowli	Orakzai	Bar muhammad khel	2004-05	Gravity	2700	33.727538	70.898028	GI / HDPE	3000	Not	8	450	Functional	Ork-Ctr-110-39
158	Dwss Tanghari to Dawali	Orakzai	Bar muhammad khel	2012-13	Gravity	2000	33.756067	70.877942	GI	4000	Not	9	495	Functional	Ork-Ctr-110-46
159	DWSS Kurez	Orakzai	Bar muhammad khel	2012-13	Gravity	2000	33.724233	70.88252	GI	___	Not	12	45	Functional	Ork-Ctr-110-49

S.No	Name of Scheme	District	Address	Year of Completion	Source	Capacity (GPH)	Coordinate		Pipeline	Lengths of Pipeline	Over Head Reservior Tank	Working Hours	Population Served	Functional/Non-Functional	Code
160	DWSS khan sar jadeed	Orakzai	Bar muhammad khel	2007-08	Gravity	2000	33.726227	70.85266	GI	___	Not	12	540	Functional	Ork-Ctr-110-51
161	DWSS khan sar	Orakzai	Bar muhammad khel	1985-86	Gravity	2200	33.730065	70.742702	HDPE	N/A	Not	12	900	Functional	Ork-Upr-110-68
162	DWSS bazar pakha	Orakzai	Bar muhammad khel	1998-99	Electricity	2300	33.739907	70.726198	HDPE	___	Not	2	450	Functional	Ork-Upr-110-69
163	DWSS Taro mela	Orakzai	Bar muhammad khel	2011-12	Electricity	2700	33.757993	70.97629	GI	___	Not	3	270	Functional	Ork-Lwr-110-74
164	DWSS Bardo Sam	Orakzai	Sepoy	2004-05	Gravity	2600	33.641653	70.856862	N/A	___	Not	12	360	Functional	Ork-upr-110-87
165	DWSS Dadali	Orakzai	Sepoy	1994-95	Gravity	3000	33.787443	71.020213	GI	___	Not	12	720	Functional	Ork-Lwr-110-91
166	DWSS Ibrahimo	Orakzai	Mishti	1986-87	Gravity	1600	33.634713	70.853263	HDPE	___	Not	8	540	Functional	Ork-Upr-110-95
167	DWSS Khwaja Khizar	Orakzai	Khwaja khizar	2004-05	Gravity	2000	33.641027	70.780378	GI	N/A	Not	9		Functional	Ork-Upr-110-96
168	Dwss Merazi khel	Orakzai	B M k	1997-98	Gravity	1500	33.748387	70.956093	HDPE	2800	Not	8	360	Functional	Ork-Ctr-110-103
169	Dwss tarkho sam	Orakzai	stori khel	2004-05	Gravity		33.75408	70.943902	HDPE	2000	Not	8	315	Functional	Ork- Lwr-110-108
170	Dwss Stara pakha	Orakzai	B M k	2004-05	Gravity		33.694027	70.678246	N/A	N/A	Not	8	252	Functional	Ork-Upr-110-128
171	Dwsss Darma B M K	Orakzai	B M k	2011-12	Electricity		33.69434	70.792931	HDPE	___	Not	3	270	Functional	Ork-Upr-110-145
172	Dwss Stori khel	Orakzai	stori khel	2011-12	Gravity		33.640686	70.749855	Process	___	Not	12	324	Functional	Ork-Upr-110-148
173	Dwss Dapper Ali khel	Orakzai	Ali khell	2013-14	Gravity		33.656921	70.724885	GI / HDPE	___	Not	8	216	Functional	Ork-Upr-110-149
174	Dwss Dalani Mumozai	Orakzai	Mumozai	2013-14	Gravity		33.654705	70.711906	GI / HDPE	___	Not	8	405	Functional	Ork-Upr-110-150
175	DWSS Pakhtani	Orakzai	Pakhtani	2018	Solar		33.684765	71.085854	GI	10	Not	5	360	Functional	Ork- Lwr-110-160
176	DWSS Ghiray koor Akhell Ghiljo	Orakzai	Ghairay Kaly	2015	Solar		33.7514	70.973442	GI	9000	Not	6	720	Functional	Ork- Lwr-110-166
177	DWSS Tairay	Orakzai	Tairay	2008	Electricity		33.757778	70.976158	GI	15000	Not	3	1260	Functional	Ork- Lwr-110-168
178	DWSS Bezot to Mir koli Khell	Orakzai	Bezot	2018	Solar		33.719777	70.921376	___	___	Not	5	810	Functional	Ork- Lwr-110-174
179	DWSS Musa Mela Rabia khel	Orakzai	Musa Mela	2017-18	Solar		33.738903	70.943313	___	___	Not	5	270	Functional	Ork- Lwr-110-175
180	DWSS Feroz khell	Orakzai	Karitall	2015	Solar		33.780858	71.092576	___	___	Not	5	720	Functional	Ork- Lwr-110-176

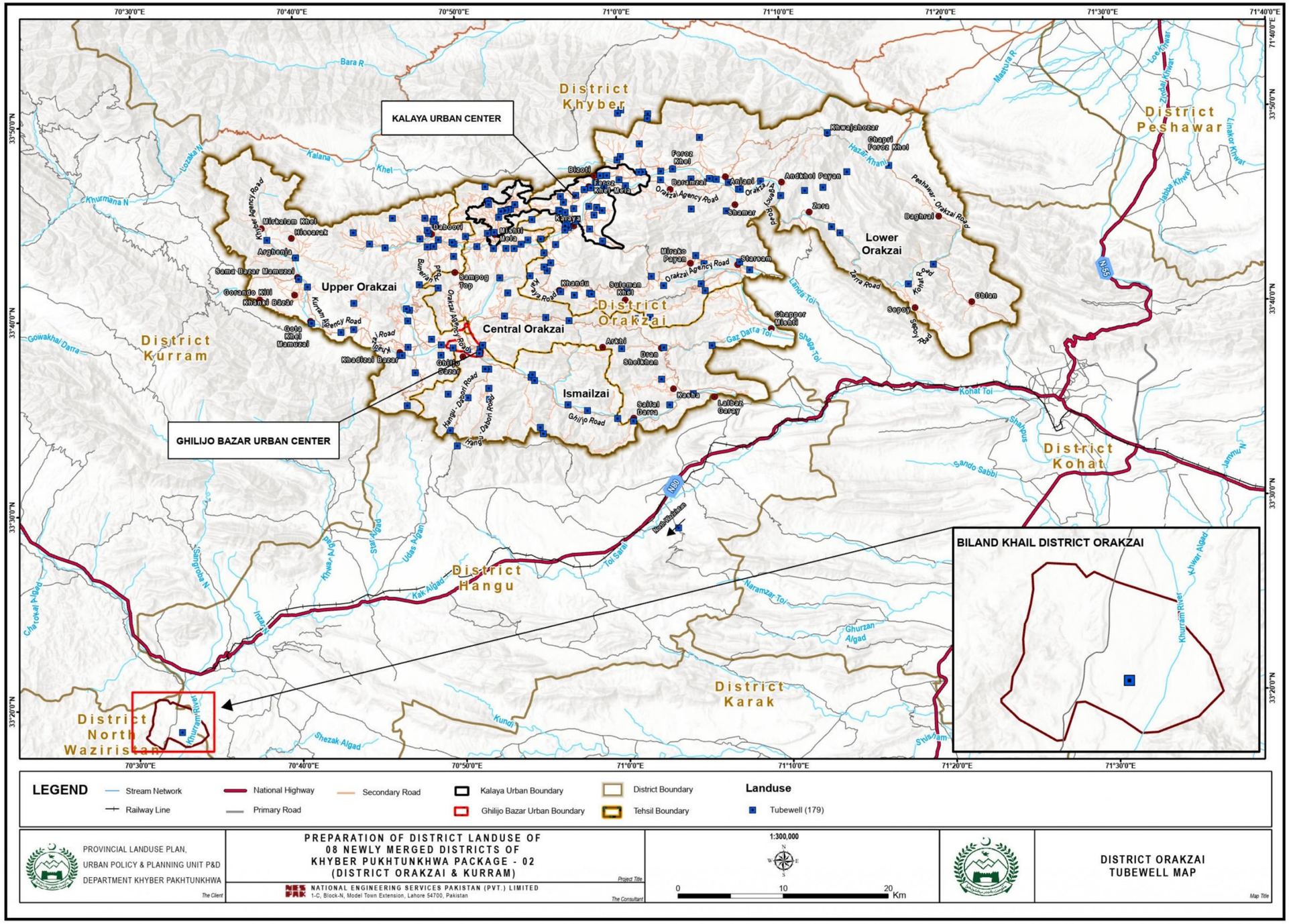
3.10.5 Components of Water Supply Scheme

The existing water supply schemes in Orakzai District, covering Central Tehsil, Ismail Zai Tehsil, Lower Tehsil, and Upper Tehsil, primarily rely on tube wells, natural streams, and small scale distribution networks to meet domestic and agricultural water needs.

3.10.5.1 Tube well

Orakzai District currently operates a network of tube wells across its four tehsils: Central Tehsil, Ismail Zai Tehsil, Lower Tehsil, and Upper Tehsil. A recent survey assessed the status and performance of these tube wells, revealing that while a significant number are operational, many face challenges in providing adequate water supply. The older tube wells, relying on galvanized iron (GI) pipes, suffer from frequent breakdowns and reduced efficiency due to their age, contributing to water shortages in several areas.

The tube wells are powered either by electricity or solar energy, with solar-powered systems offering a more reliable and sustainable solution. Water is typically supplied for an average of six to twelve hours daily, but frequent power outages often limit the operational time of electric-powered wells, impacting water availability. Despite the importance of these water sources, there is currently no comprehensive mechanism in place to monitor the discharge and performance of the tube wells, highlighting the need for better management and infrastructure development. This project aims to address these issues by rehabilitating non-functional wells, enhancing pumping capacity, and expanding the distribution network to serve the district's growing population effectively. Location of existing tubewells mentioned in above table has been shown in map below.



Map 3-34: Location of Existing Tube Wells in District Orakzai

3.10.5.2 Quality and Quantity of Water

Drinking enough water in suitable quantity and quality is the most basic need of each individual. The following section examines water quantity and quality in accordance with local and international requirements for a consolidated, sustainable, and appropriate supply of water.

3.10.5.3 Water Demand/Quantity

Accurate estimation of water demand is vital for the sustainable planning and development of Orakzai District's water supply system. Potable water is required for domestic, non-domestic, firefighting, and horticultural needs. However, due to the unavailability of detailed historical water consumption records in the district, demand projections are based on relevant studies, feasibility reports, and established benchmarks from Khyber Pakhtunkhwa (KP).

Previous studies in KP indicate a wide variation in average per capita consumption, as summarized below:

Table 3-114: Average per Capita Water Consumption

Sr. No.	Study Name/ Water Service Provider	Average Water Demand Value (LPCD)
1	NESPAK 2012 – Greater Water Supply Scheme Peshawar, Feasibility Report 2012 for PHED KP	250
2	Khyber Pakhtunkhwa Cities Improvement Project	160
3	WASA Peshawar and Provincial Reports	260-230
4	Feasibility Studies of Urban Areas in KP	180
5	Determination of Daily Water Consumption Pattern Case Study	100(Urban) 66(Rural)

While these figures represent typical urban and rural water demands, the ground realities of Orakzai District are significantly different. The region faces acute water scarcity, and existing sources are unable to support higher design consumption levels. In light of this limitation, and in consultation with best-practice approaches for water-scarce regions, a per capita demand of 15 gallons per day (GPD) has been adopted for system design.

The value balances the need for ensuring minimum water supply requirements while remaining realistic within the constraints of the district's limited freshwater resources. Based on this design standard, present and future water demands for the tehsils of Orakzai District have been calculated and summarized in the following table, ensuring alignment with both current realities and future planning horizons.

Table 3-115: Current and Future Need of Water

Rural Settlements	Average Daily Demand (MGD) 2025	Average Daily Demand (MGD) 2030	Average Daily Demand (MGD) 2035	Average Daily Demand (MGD) 2040	Average Daily Demand (MGD) 2045
Central Tehsil	1.29	1.42	1.57	1.73	1.84
Ismail Zai Tehsil	0.49	0.52	0.54	0.57	0.58
Lower Tehsil	1.79	1.92	2.07	2.23	2.33
Upper Tehsil	1.97	2.25	2.56	2.46	3.19
	Area Required for WTP				6 acres

3.10.5.3.1 Water Quality

Ensuring an adequate supply of safe drinking water is essential for the well-being of Orakzai District. The hydrological assessment conducted in the district highlights surface water and groundwater as the primary sources, with the Kohat Toi River, Mastura River, and natural streams (khwars) playing a significant role. The Public Health Engineering Department (PHED) operates multiple water supply schemes, including tube wells and small-scale reservoirs, to meet the district's drinking water needs.

A water quality assessment was conducted for the Kohat Toi River, one of the key surface water sources in Orakzai. The study measured essential parameters such as pH, Total Dissolved Solids (TDS), Electrical Conductivity (EC), Dissolved Oxygen (DO), Hardness, and Alkalinity. The results showed that pH levels remained within permissible limits, with values ranging from 8.31 to 8.43 across different sampling locations. However, TDS levels varied, with an average value of 470 ppm, which is within the acceptable range but highlights localized fluctuations in water quality.

The hardness of the water ranged between 307.5 and 315.83 ppm, indicating moderately hard water, which may require treatment for household use. Additionally, electrical conductivity (EC) levels ranged between 1119 and 1230 µS/cm, suggesting moderate mineral content. While most parameters fell within WHO guidelines, further testing and monitoring are recommended to ensure sustainable water quality management.

Despite the presence of adequate water resources, Orakzai faces challenges in water quality monitoring and pollution control. Seasonal variations, sediment inflow from rivers, and potential contamination from agriculture and domestic activities require regular assessment and intervention. Future strategies should focus on improving water treatment infrastructure, establishing a monitoring network, and enhancing community awareness regarding water conservation and quality management.

3.10.5.3.2 Coverage of Existing Water Supply

The drinking water supply in Orakzai District relies primarily on groundwater sources, with tube wells, hand pumps, and natural springs being the main sources of supply. Despite the presence of a water supply infrastructure, a significant portion of the population remains unserved due to the scattered nature of settlements, limited resources, and inadequate maintenance of existing facilities. A detailed map illustrating the distribution of tube wells across the district highlights their spatial coverage, yet accessibility remains a critical concern. Many tube wells, installed by the Public Health Engineering Department (PHED) and other agencies, face operational challenges, leading to inconsistent water availability. The above map shows the existing tube well is Orakzai District.

A household survey conducted in the district indicates that 35% of the population is served by the existing water supply system, while 65% remains unserved. This data, represented in a pie chart, underscores the need for infrastructure expansion and rehabilitation. Many residents still depend on distant sources, often traveling more than 400 feet to fetch water, adding to the daily hardships faced by the local communities. Even in areas with a piped water supply system, availability is limited, with most households receiving water for less than four hours per day. A small percentage of households experience longer supply durations, but overall, inconsistent distribution exacerbates the water scarcity issue, particularly during peak demand periods. The below figure shows how much population is served by the existing water Supply Schemes in Orakzai.

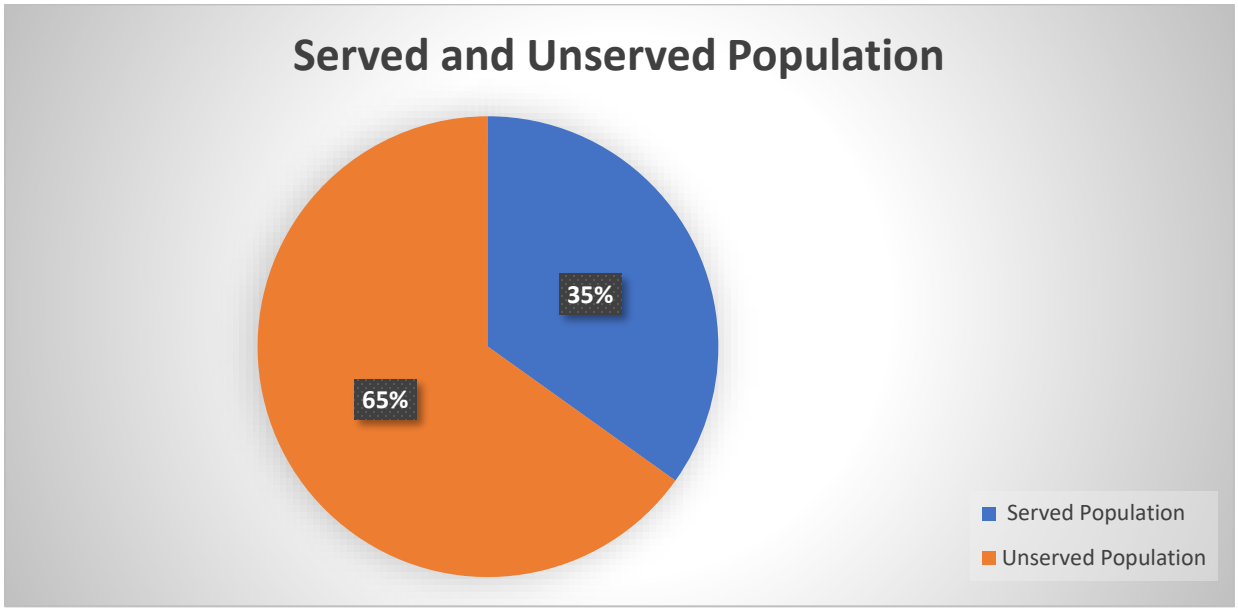


Figure 3-5: Served and Unserved Population in Orakzai District

Water quality remains a pressing concern, with assessments indicating contamination in several sources. Groundwater in certain areas has been found to have bacteriological contamination, high turbidity, and elevated concentrations of dissolved solids. Without adequate filtration and treatment facilities, communities relying on these sources face significant health risks.

To address these issues, efforts must be directed toward rehabilitating non-functional tube wells, expanding piped water supply networks, and ensuring regular monitoring and treatment of drinking water. Rainwater harvesting could serve as a valuable supplementary water source, especially in remote areas with limited groundwater availability. Strengthening water resource management policies will also be essential in ensuring sustainability and equitable distribution. Bridging the existing supply-demand gap will require a strategic, long-term approach focused on infrastructure development, community engagement, and sustainable water management practices.in securing long-term water accessibility for the district's growing population.

3.10.6 Proposed Water Supply System in Rural Settlements

Considering the typical discharge rates and operating hours of existing tube wells in Orakzai District, the current water supply system is inadequate to meet both present and projected demands. To address this gap, a phase-wise water supply development program for the period 2025–2050 is

proposed for all four tehsils and major urban centres, based on the progressive provision of tube wells and Overhead Reservoirs (OHRs).

The planning and design are founded on realistic, field-based yield assumptions rather than optimistic theoretical capacities, ensuring reliability and long-term operational performance. The proposed system not only mitigates existing shortages but also provides operational flexibility and redundancy to accommodate maintenance requirements, seasonal variations in groundwater availability, and future population growth.

Table 3-116: Phase-wise Tube well Requirement in Rural Settlements

Rural Settlements	Required Tube well (2025)	Required Tube well (2030)	Required Tube well (2035)	Required Tube well (2040)	Required Tube well (2045)
Central Tehsil	9.00	10.00	10.00	12.00	12.00
Ismail Zai Tehsil	4.00	4.00	4.00	4.00	4.00
Lower Tehsil	12.00	13.00	14.00	15.00	15.00
Upper Tehsil	13.00	15.00	17.00	16.00	21.00
Total	38.00	42.00	45.00	47.00	52.00

Table 3-: Required OHRs in Rural Settlements

Rural Settlements	No of OHR Required (2025)	No of OHR Required (2030)	No of OHR Required (2035)	No of OHR Required (2040)	No of OHR Required (2045)
Central Tehsil	11.00	12.00	14.00	15.00	16.00
Ismail Zai Tehsil	5.00	5.00	5.00	5.00	5.00
Lower Tehsil	15.00	17.00	18.00	19.00	20.00
Upper Tehsil	17.00	19.00	22.00	21.00	27.00

This phased implementation strategy allows for periodic validation of hydrogeological conditions, promotes sustainable groundwater abstraction, and supports cost-effective execution by distributing investments over the planning horizon, thereby strengthening system resilience without overburdening resources or budgets.

3.10.7 Proposed Water Supply System in Urban Settlements

The proposed water supply system for the urban centre is designed to provide a reliable and sustainable supply of safe drinking water by addressing gaps in the existing infrastructure. The system is primarily based on groundwater abstraction through strategically located tube wells.

Water will be conveyed to elevated storage reservoirs to ensure adequate pressure and meet peak demand. A distribution network using HDPE pipes is proposed for efficient and leak-proof supply with maximum coverage. Where pipelines cross streams or rivers, thrust boring will be adopted to avoid surface disruption. Provision of basic water treatment and disinfection is included where required to

ensure water quality standards. The proposed system will improve service coverage, ensure equitable distribution, and meet present and future water demands.

Table 3-117: Required Number of tube wells in Urban Center

Urban Settlements	No of TWs Required (2025)	No of TWs Required (2030)	No of TWs Required (2035)	No of TWs Required (2040)	No of TWs Required (2045)
Kalaya	3.00	3.00	3.00	3.00	4.00
Ghiljo	1.00	1.00	1.00	1.00	2.00
Daboori	1.00	1.00	1.00	1.00	2.00

Table 3-118: Required OHRs in Urban Centers

Rural Settlements	No of OHR Required (2025)	No of OHR Required (2030)	No of OHR Required (2035)	No of OHR Required (2040)	No of OHR Required (2045)
Kalaya	3.00	4.00	4.00	4.00	6.00
Ghiljo	1.00	1.00	2.00	2.00	2.00
Daboori	1.00	1.00	1.00	2.00	3.00

3.10.7.1 Proposed Water Supply in Kalaya

The proposed water supply system for Kalaya is based on groundwater abstraction through fourteen tube wells till 2045. Water will be conveyed to six overhead reservoirs for storage and pressure management.

A distribution network of HDPE pipes is proposed for efficient supply. Thrust boring will be adopted where pipelines cross streams. The system is designed to meet current and future water demand. The water supply network, Tube well and OHR location is shown in maps below;

3.10.7.2 Proposed Water Supply in Ghiljo

The proposed system for Ghiljo is designed to improve water availability through two tube wells installed at suitable locations. Water will be stored in two overhead reservoirs (OHRs) to ensure consistent supply and pressure stability.

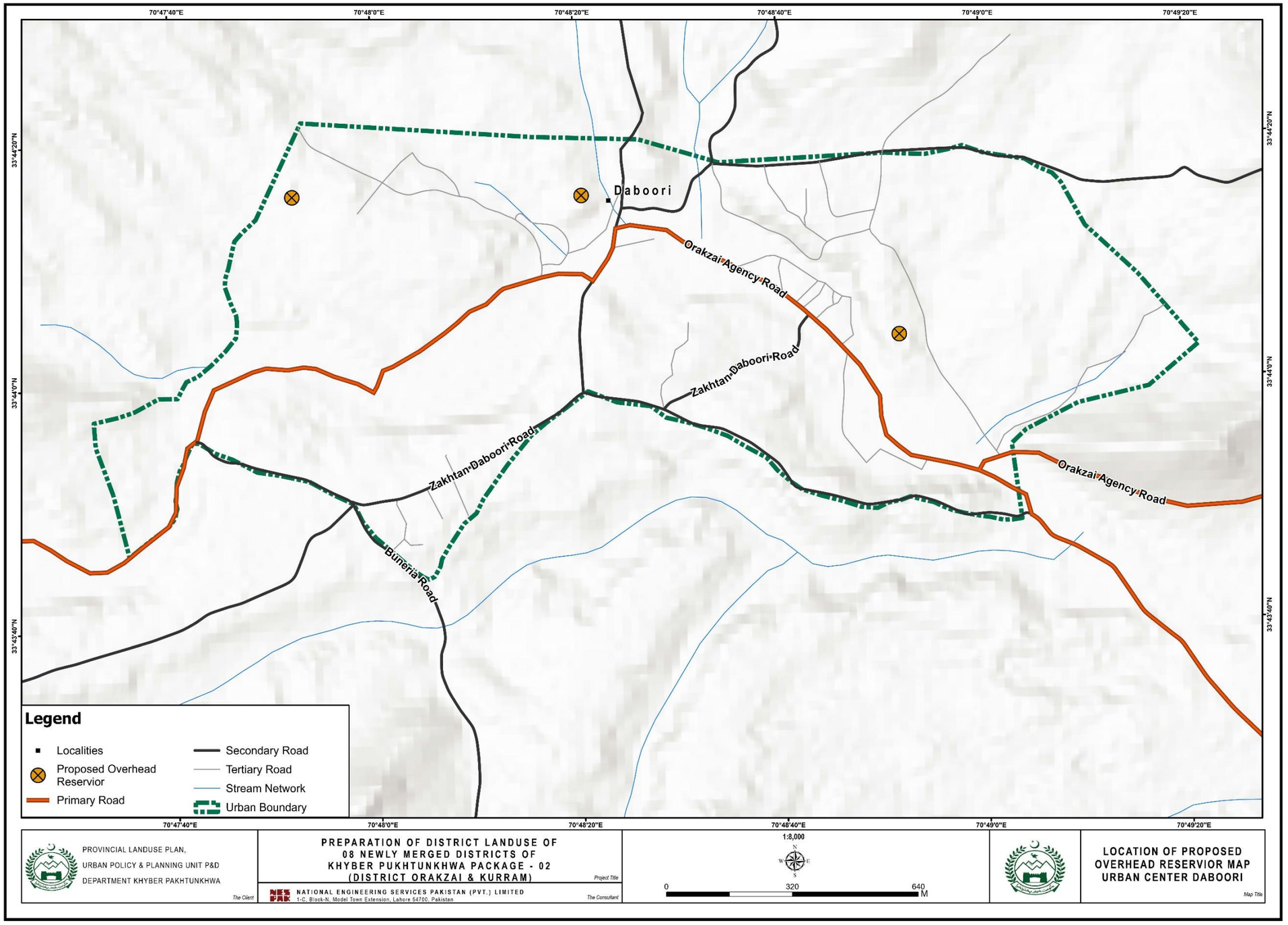
A looped HDPE distribution network is proposed to enhance hydraulic performance and reduce losses. Thrust boring will be adopted at stream crossings. The system is planned to provide reliable service and meet future demand. The water supply network, Tube well and OHR location is shown in maps below;

3.10.7.3 Proposed Water Supply in Daboori

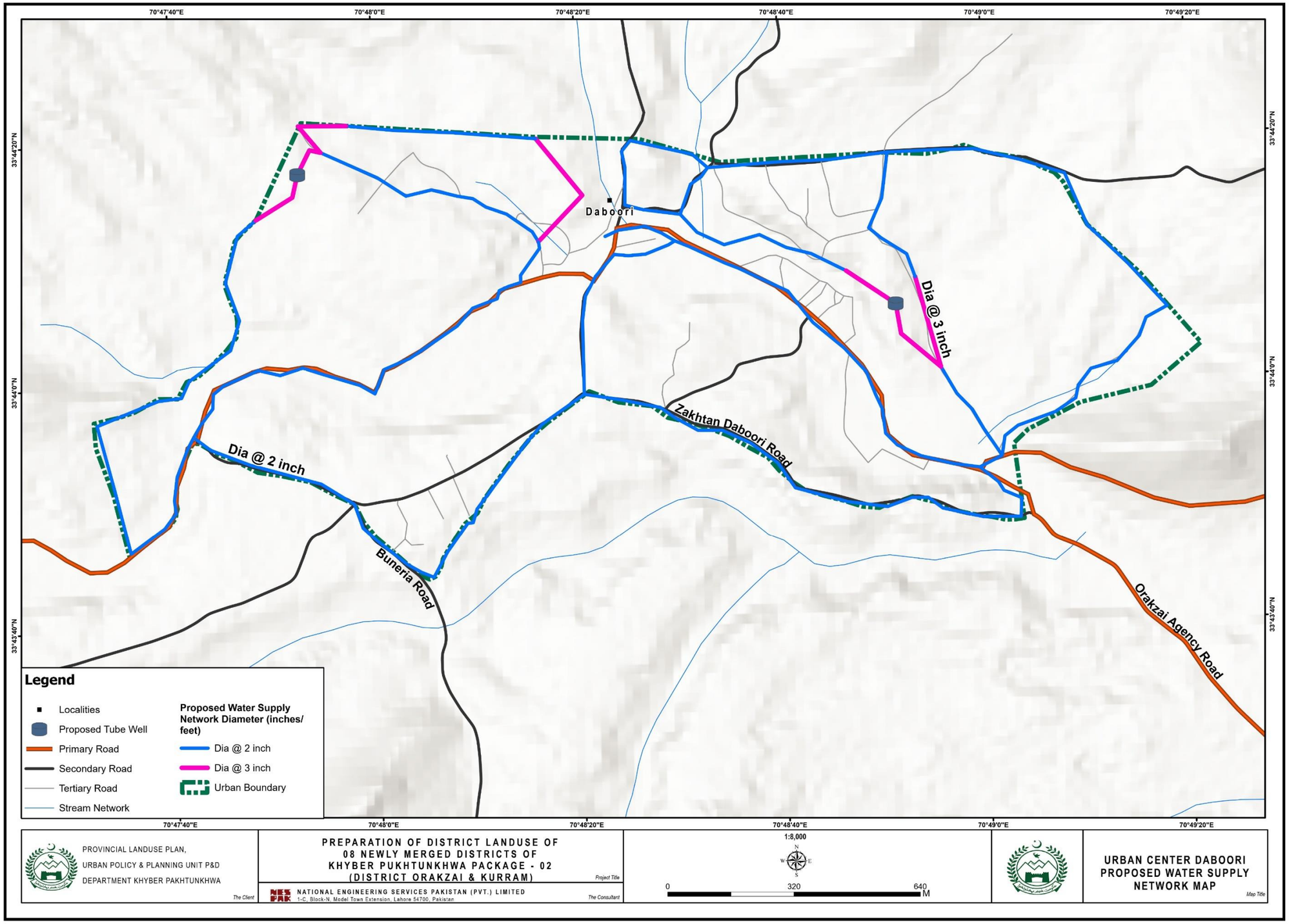
The proposed water supply system for Daboori utilizes two tube wells as the primary source. Water will be pumped to three overhead reservoirs (OHRs) for storage and distribution.

A branched HDPE pipeline network is proposed considering the settlement pattern for cost-effective coverage. Thrust boring will be used where pipelines cross natural obstacles. The system is designed to ensure adequate and sustainable water supply.

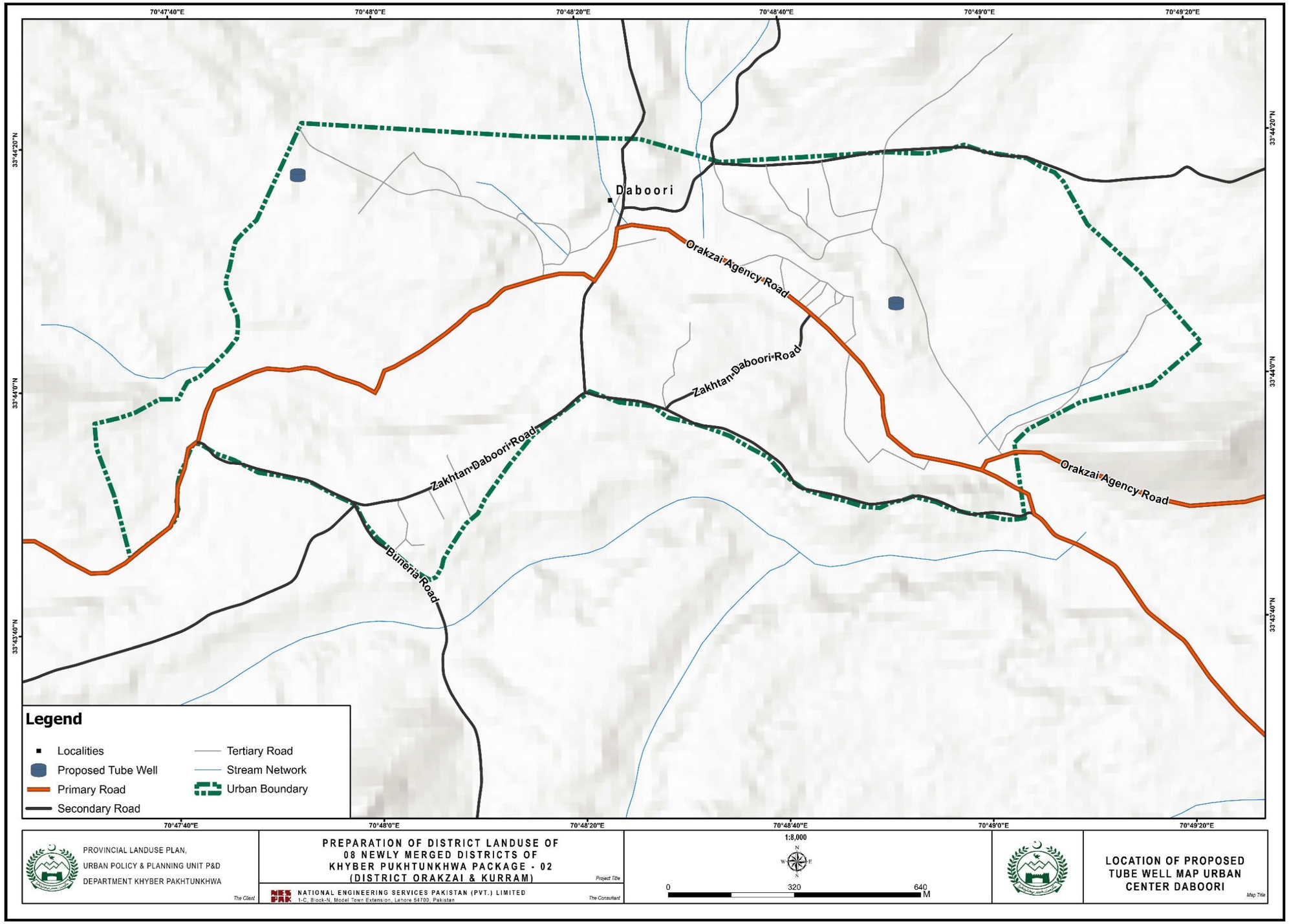
The water supply network, Tube well and OHR location is shown in maps below;



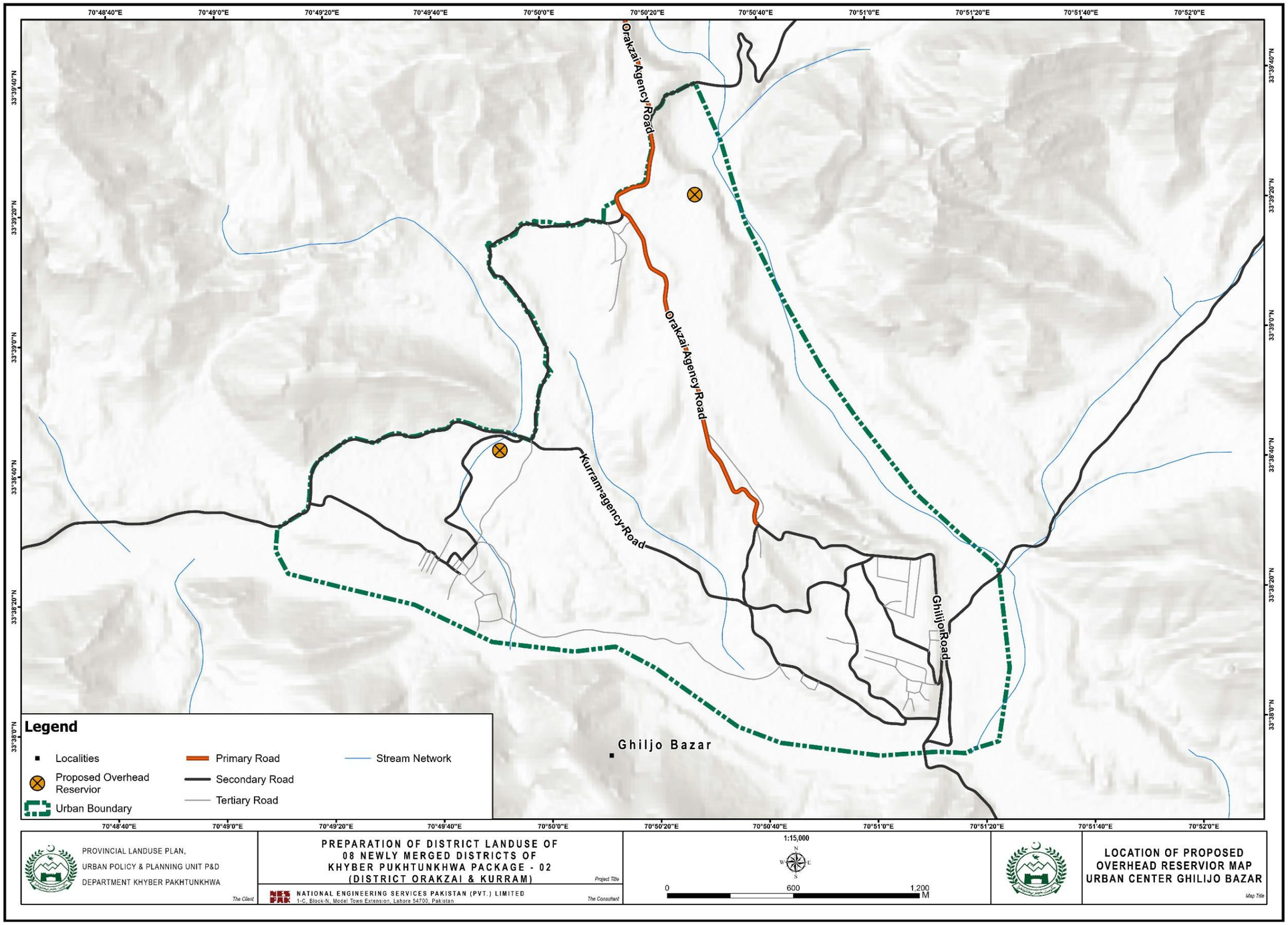
Map 3-35:Location of proposed OHR in Dabori



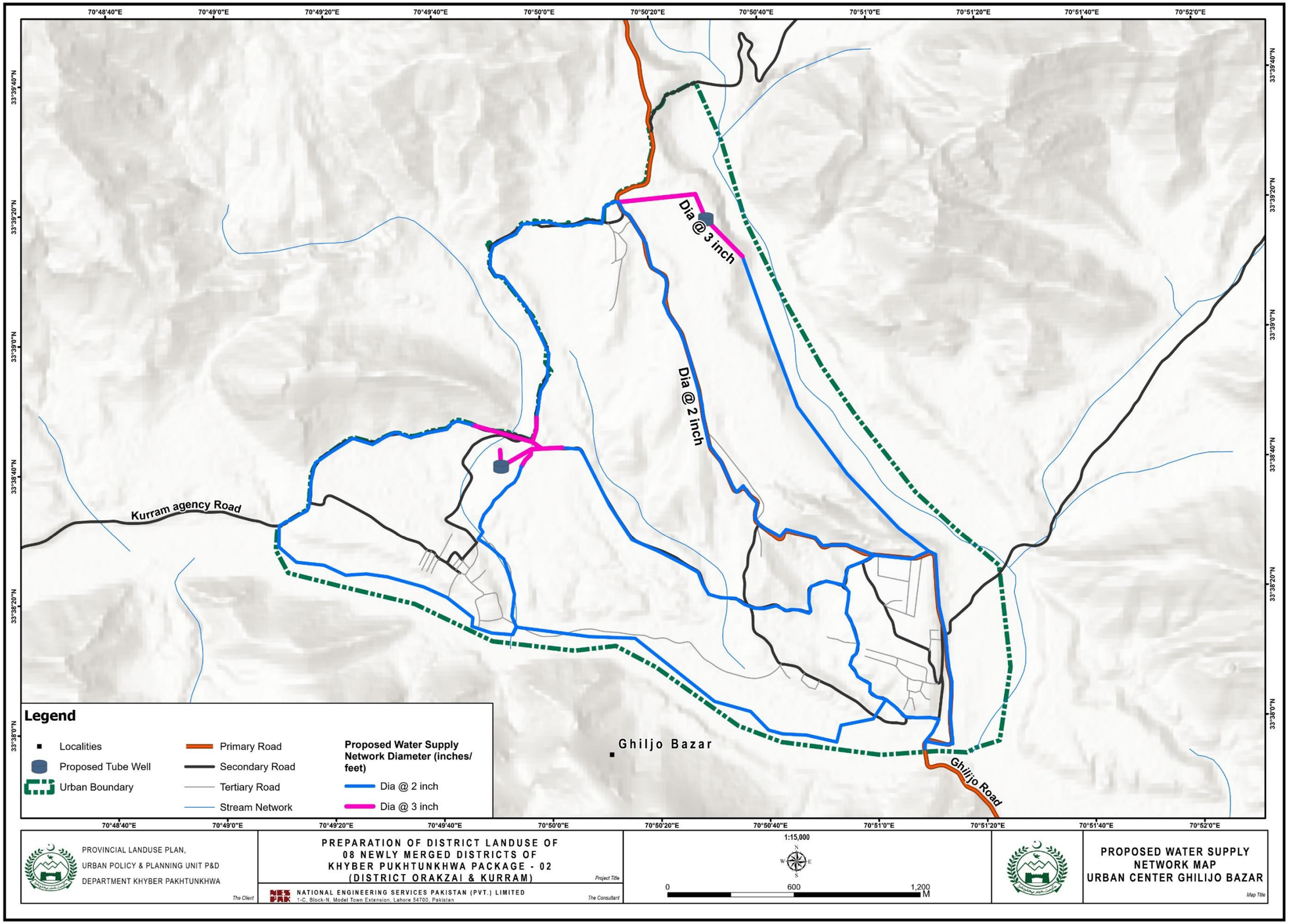
Map 3-36: Dabori Proposed Water Supply Network Map



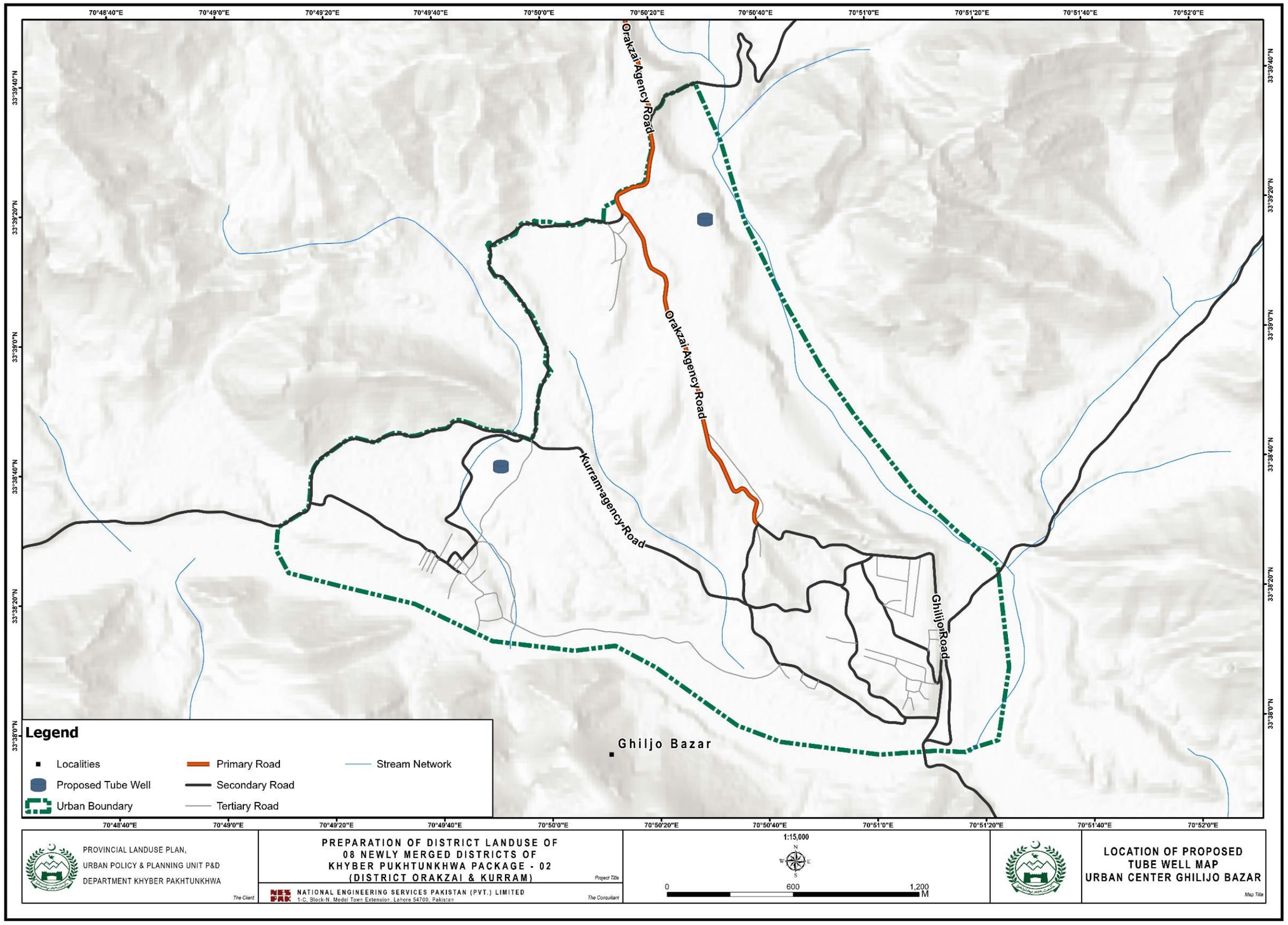
Map 3-37:Location of Proposed TW in Dabori



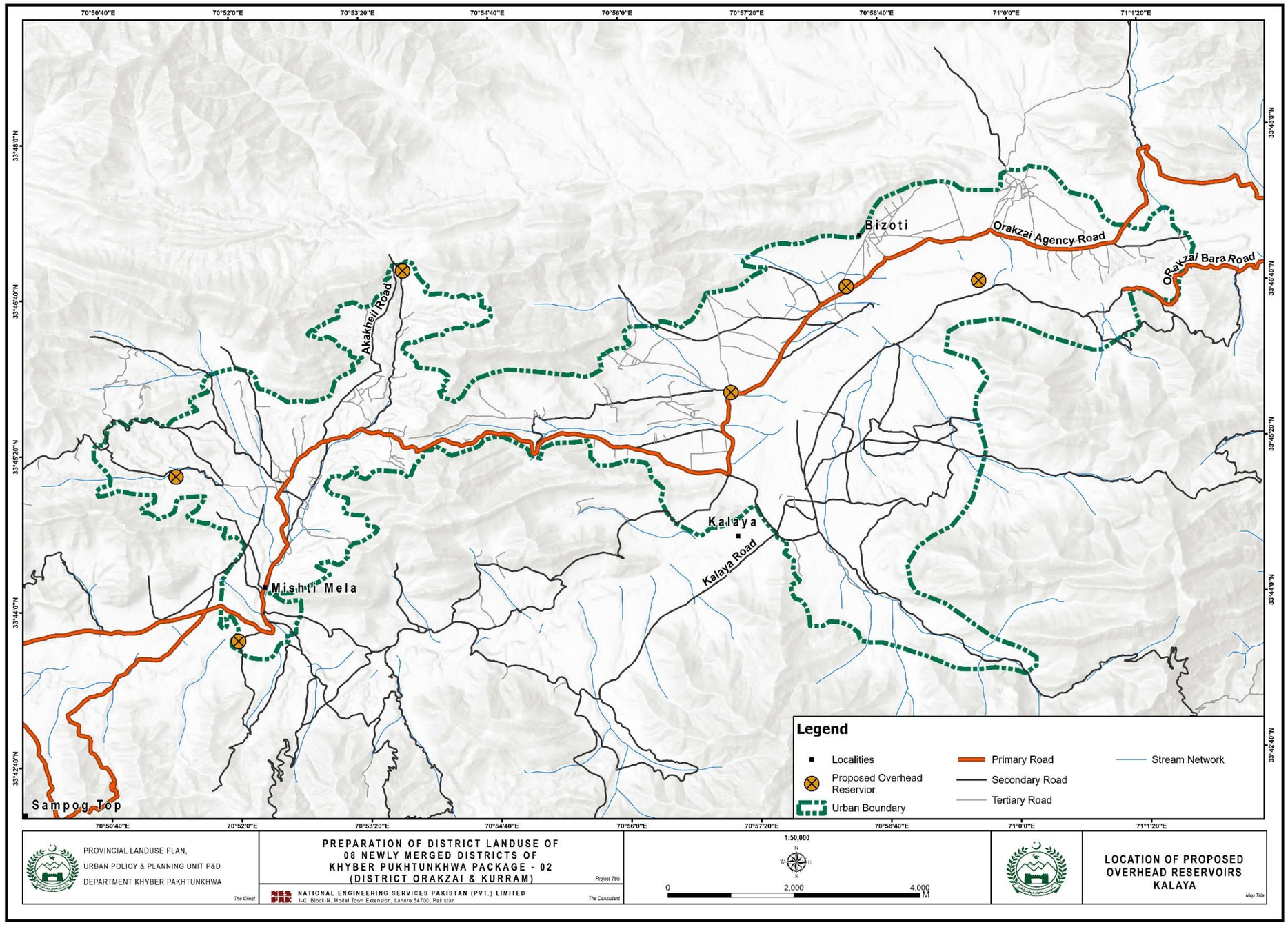
Map 3-38:Location of Proposed OHR in Ghiljo



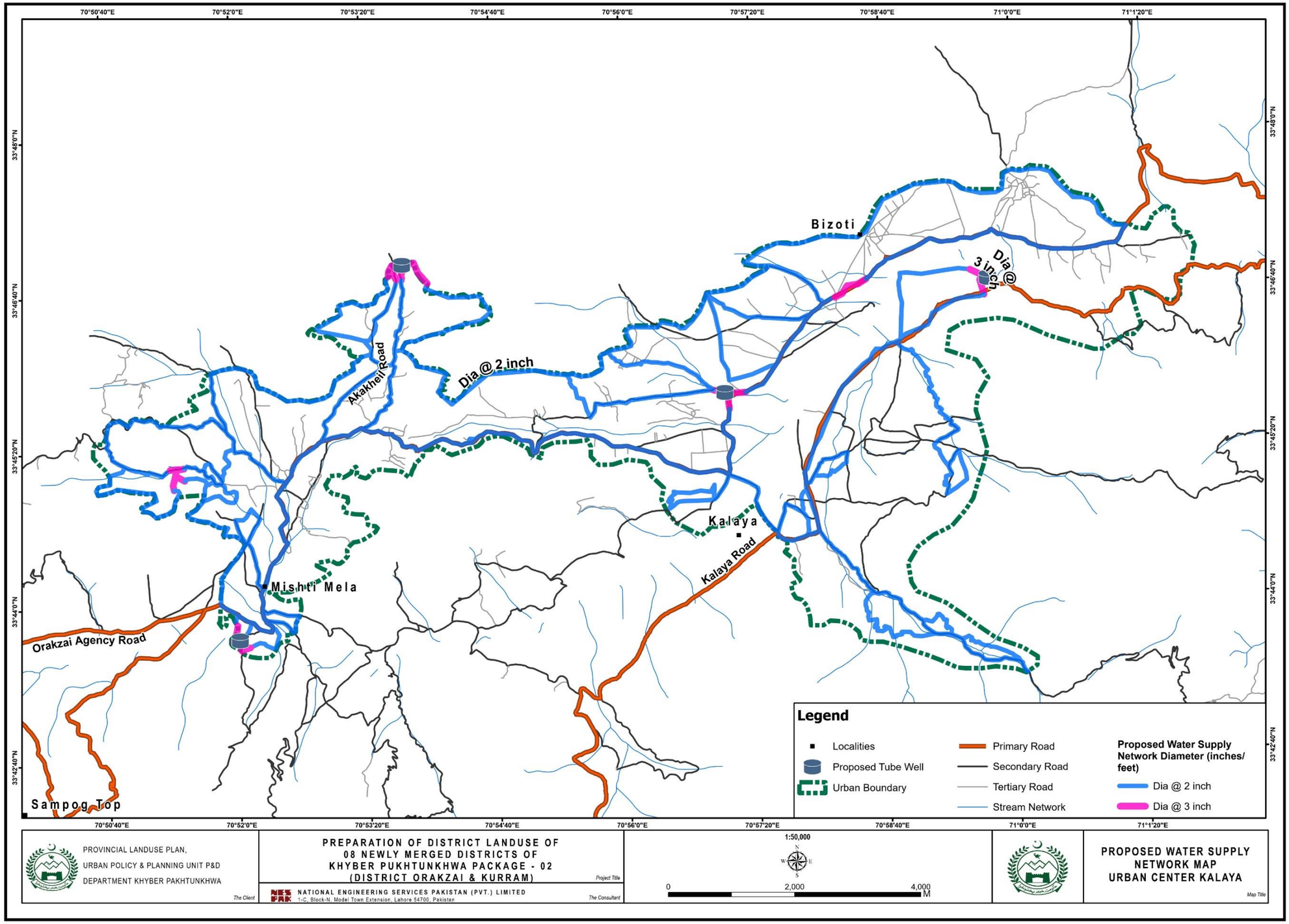
Map 3-39: Ghiljo Proposed Water Supply Network Map



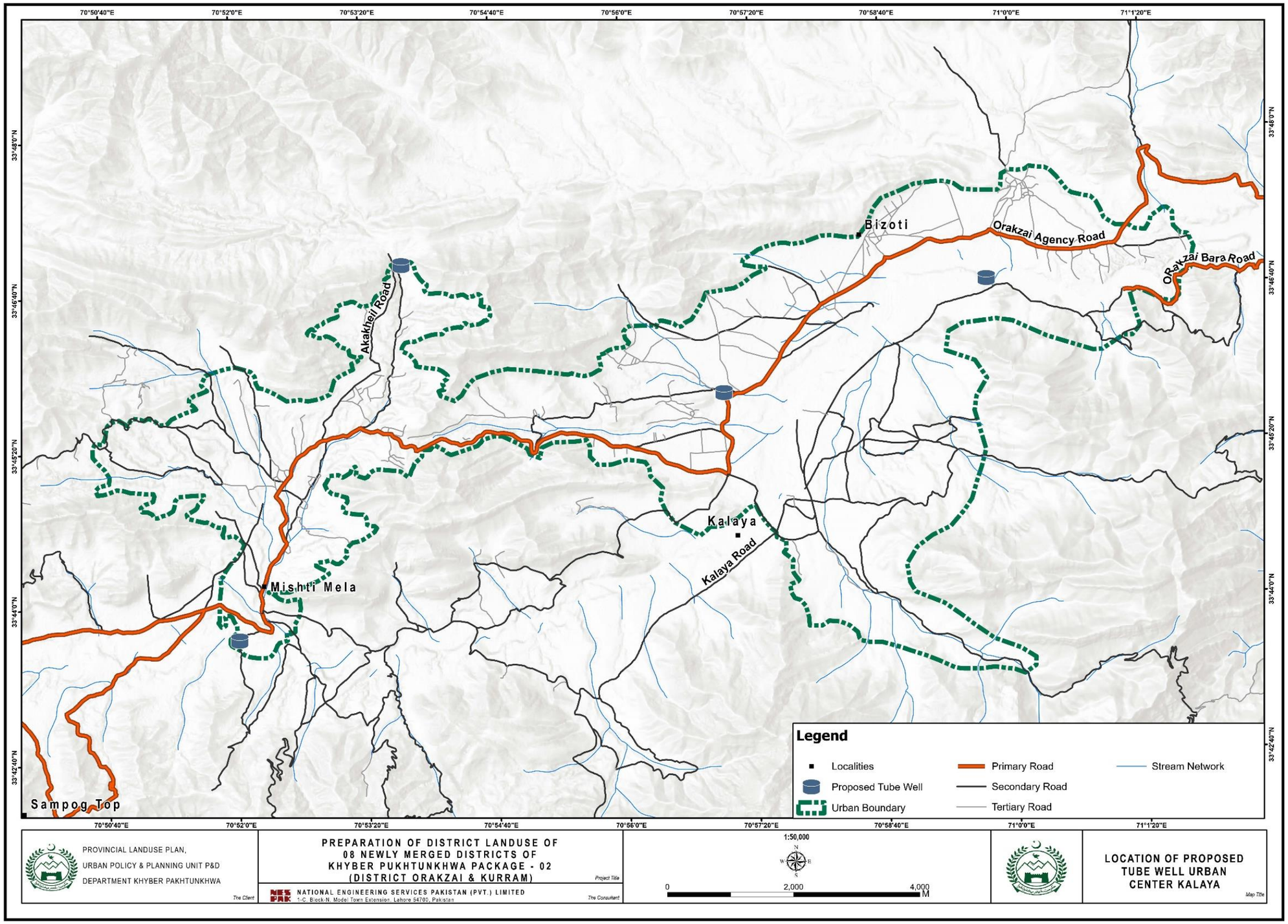
Map 3-40:Proposed Tube well Location in Ghiljo



Map 3-41:Proposed OHR in Kalaya



Map 3-42: Kalaya Proposed Water Supply Network Map



Map 3-43:Proposed Tube well in Kalaya

3.11 Sewerage and Storm water Drainage

Orakzai District, being a rural region with no urban settlements, faces significant challenges in sewerage and stormwater drainage due to the lack of a formal infrastructure network. The absence of a piped sewerage system results in the widespread use of traditional waste disposal methods, which can lead to sanitation issues and environmental contamination.

Stormwater drainage in Orakzai is also underdeveloped, with heavy rainfall leading to localized flooding and erosion. Due to the district's mountainous terrain, rainwater naturally flows through valleys and streams, but in the absence of proper drainage structures, uncontrolled water runoff often causes damage to roads, agricultural fields, and settlements. To mitigate these issues, the district requires improved drainage infrastructure and sustainable wastewater management solutions.

3.11.1 Existing Situation of Sanitation and Drainage System

The sanitation and drainage infrastructure in Orakzai District, particularly in areas like Kalaya, Parachinar is notably underdeveloped. The region lacks a centralized sewerage system, leading residents to depend on on-site sanitation solutions such as pit latrines and septic tanks. The prevalent use of open, unlined drains for wastewater disposal is concerning, as these are often in substandard condition and inadequately maintained. This situation results in environmental contamination and poses significant public health risks.

The district's drainage system primarily relies on natural streams, locally known as khwars, to manage stormwater runoff. However, these natural channels are insufficient during periods of heavy rainfall, leading to localized flooding and erosion. The absence of engineered stormwater management infrastructure exacerbates these challenges, especially in more densely populated areas.

Solid waste management is another critical issue in Orakzai District. The lack of organized waste collection services results in residents often disposing of waste in open areas or directly into drainage channels. This practice not only obstructs the already inadequate drainage systems but also contributes to environmental degradation and health hazards.

Addressing these pressing issues necessitates a comprehensive and integrated approach to sanitation and drainage management. Key strategies should include the rehabilitation and maintenance of existing drainage infrastructure, the development of appropriate wastewater treatment facilities, and the expansion of covered drainage networks. Implementing effective solid waste management systems is also crucial to prevent waste from clogging drainage channels. Community engagement and awareness programs are essential to promote sustainable sanitation practices and ensure the long-term success of these interventions.

3.11.1.1 Sewage Flow in Urban and Rural Centers

The calculation of sewage flow generated in Orakzai District is based on the average per capita water demand and the population to be served. Considering the estimated average water demand of 15(GPD), the sewage flow is calculated as a percentage of the total daily water consumption. Typically, 80% of the total water demand is considered as the sewage flow. The tehsil-wise average sewage flow generated in the project area are summarized in the below table 14.1.

Table 3-119: Sewage flow (2025-2045) in Rural Settlements

Rural Settlements	Sewage Flow(MGD) 2025	Sewage Flow(MGD) 2030	Sewage Flow (MGD)2035	Sewage Flow(MGD) 2040	Sewage Flow(MGD) 2045
Central Tehsil	1.03	1.14	1.26	1.38	1.48
Ismail Zai Tehsil	0.39	0.41	0.43	0.46	0.46
Lower Tehsil	1.43	1.54	1.66	1.78	1.87
Upper Tehsil	1.58	1.80	2.05	1.97	2.55
Area Required for WWTP					8 Acres

Table 3-120: Sewage Flow in Urban Settlements

Urban Settlements	Average Sewage Flow (MGD) 2025	Average Sewage Flow (MGD) 2030	Average Sewage Flow (MGD) 2035	Average Sewage Flow (MGD) 2040	Average Sewage Flow (MGD) 2045	Area Required for WWTP Acres
Kalaya	0.26	0.30	0.33	0.37	0.49	0.74
Ghiljo	0.09	0.09	0.10	0.10	0.13	0.19
Daboori	0.06	0.08	0.09	0.10	0.19	0.24

3.11.1.2 Available and Proposed Treatment Facilities

There are various wastewater treatment technologies available, including Waste Stabilization Ponds, Activated Sludge Treatment, Aerated Lagoons, and Trickling Filters. The selection of a specific treatment method depends on several factors, such as site conditions, terrain, economic feasibility, available land area, and climatic conditions. The wastewater treatment process generally consists of multiple stages, starting with preliminary treatment and progressing through secondary and, in some cases, tertiary treatment.

In preliminary treatment, large and floating particles such as rags and grit are removed to prevent damage to downstream equipment. This stage often involves sedimentation to separate settleable solids from wastewater. Advanced primary treatment may involve the addition of chemicals to enhance the removal efficiency of suspended solids and dissolved impurities, reducing Total Suspended Solids (TSS) by approximately 40 to 60% and Biochemical Oxygen Demand (BOD) by 25 to 35%. While some organic nitrogen, organic phosphorus, and heavy metals associated with solids are removed in this stage, dissolved contaminants remain unaffected.

Secondary treatment primarily utilizes biological and chemical processes to remove organic matter from wastewater. This stage significantly reduces pollutants and improves water quality before discharge. In cases where wastewater is intended for recycling or reuse, such as irrigation or groundwater recharge, tertiary treatment is applied.

Currently, Orakzai District lacks an operational wastewater treatment facility, and wastewater is often discharged into open drains or natural watercourses without treatment, leading to environmental degradation and potential health hazards. To address this issue, designated areas for wastewater treatment facilities must be identified. Based on settlement patterns and population density, a waste stabilization pond would be required for larger settlements such as Kalaya, Ghiljo and Daboori while

smaller treatment ponds could serve other populated areas. Developing a sustainable wastewater treatment system will be essential to improving sanitation, reducing pollution, and protecting water resources in Orakzai District.

3.11.2 Ongoing Projects

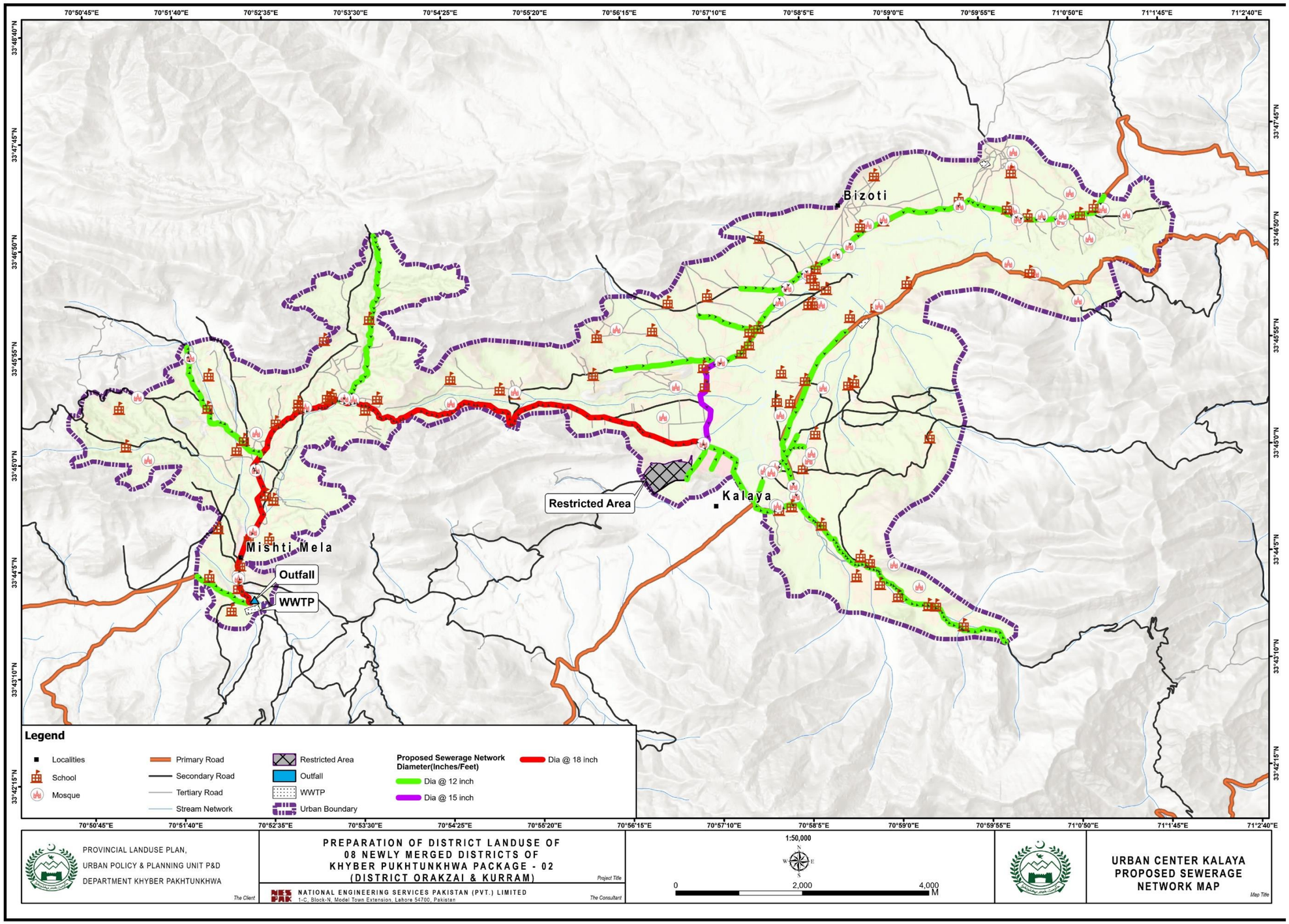
The ongoing drinking water and sanitation-related initiatives in Orakzai District focus on improving water availability, irrigation infrastructure, and sustainable resource management. These projects aim to enhance agricultural productivity and provide reliable water access to communities by utilizing renewable energy sources and modern irrigation techniques. Table below summarizes the development schemes in District Orakzai.

Table 3-121: Development schemes in District Orakzai

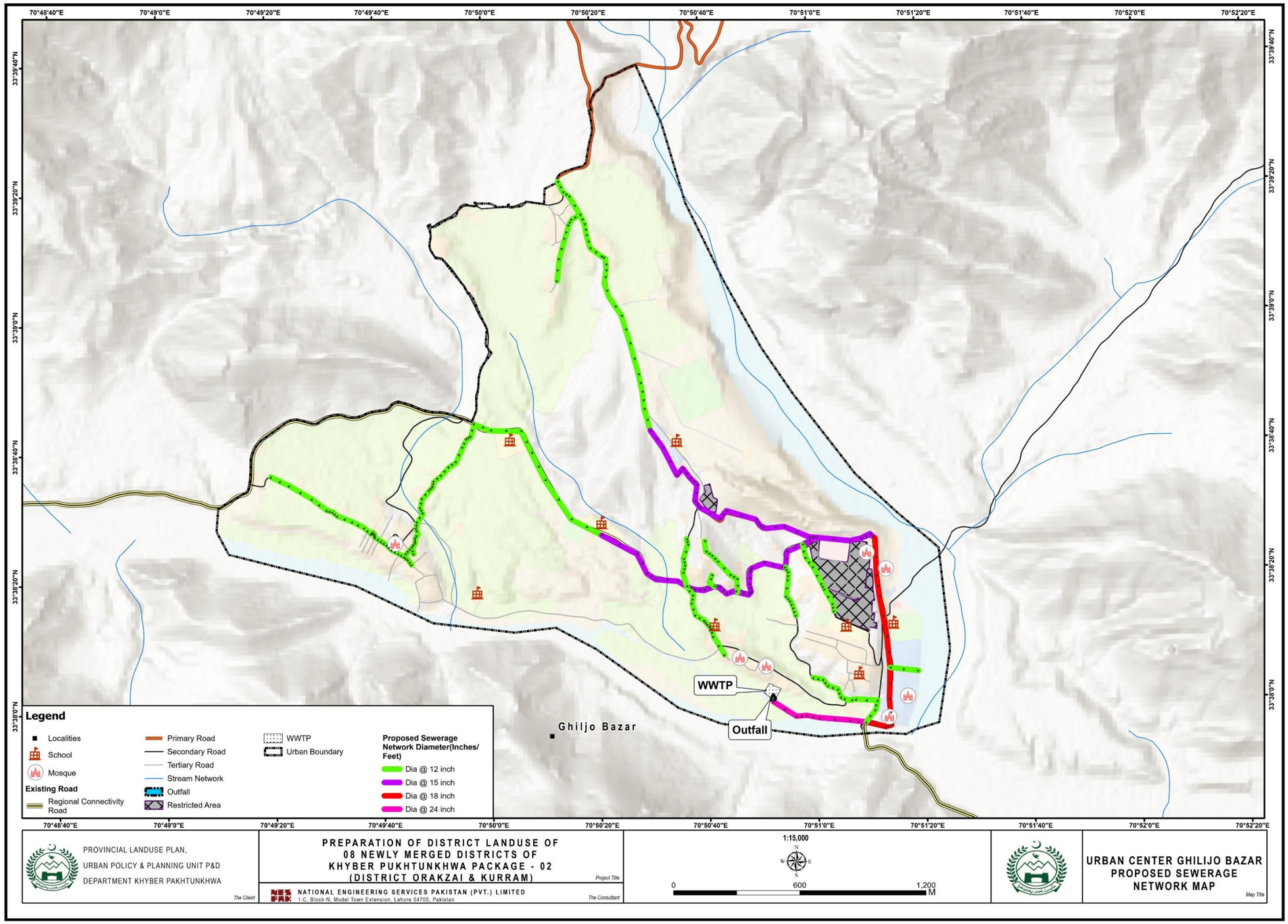
Project Name	Expected Completion
Bezot Irrigation Scheme – Development of irrigation infrastructure to ensure a reliable water supply for farmlands	Ongoing
Solarization of New Irrigation Tube Wells – Integration of solar energy into irrigation systems for sustainable water supply	Ongoing

3.11.3 Proposed Sewerage system in Urban centers

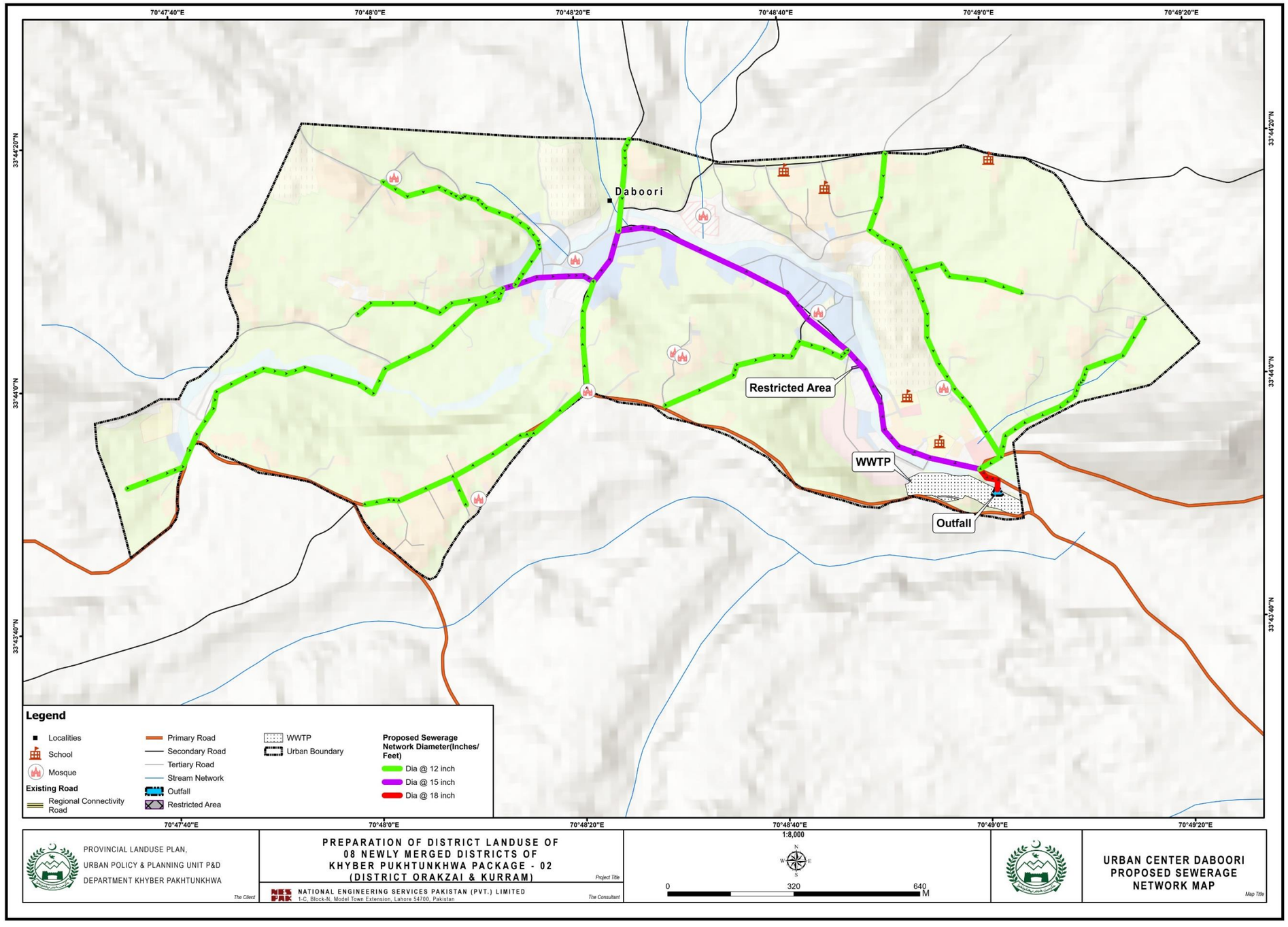
The proposed sewerage system for the urban centers is designed to ensure safe and efficient collection and conveyance of wastewater. A separate sewerage network is proposed based on estimated sewage generation and projected population. The system comprises underground pipelines laid on gravity flow, with lifting stations proposed where required. Wastewater will be conveyed to designated treatment or disposal locations. Thrust boring will be adopted at stream crossings to avoid surface disruption. The proposed system will improve sanitation and environmental conditions in the urban centers. The sewerage network for urban centers is shown in maps below;



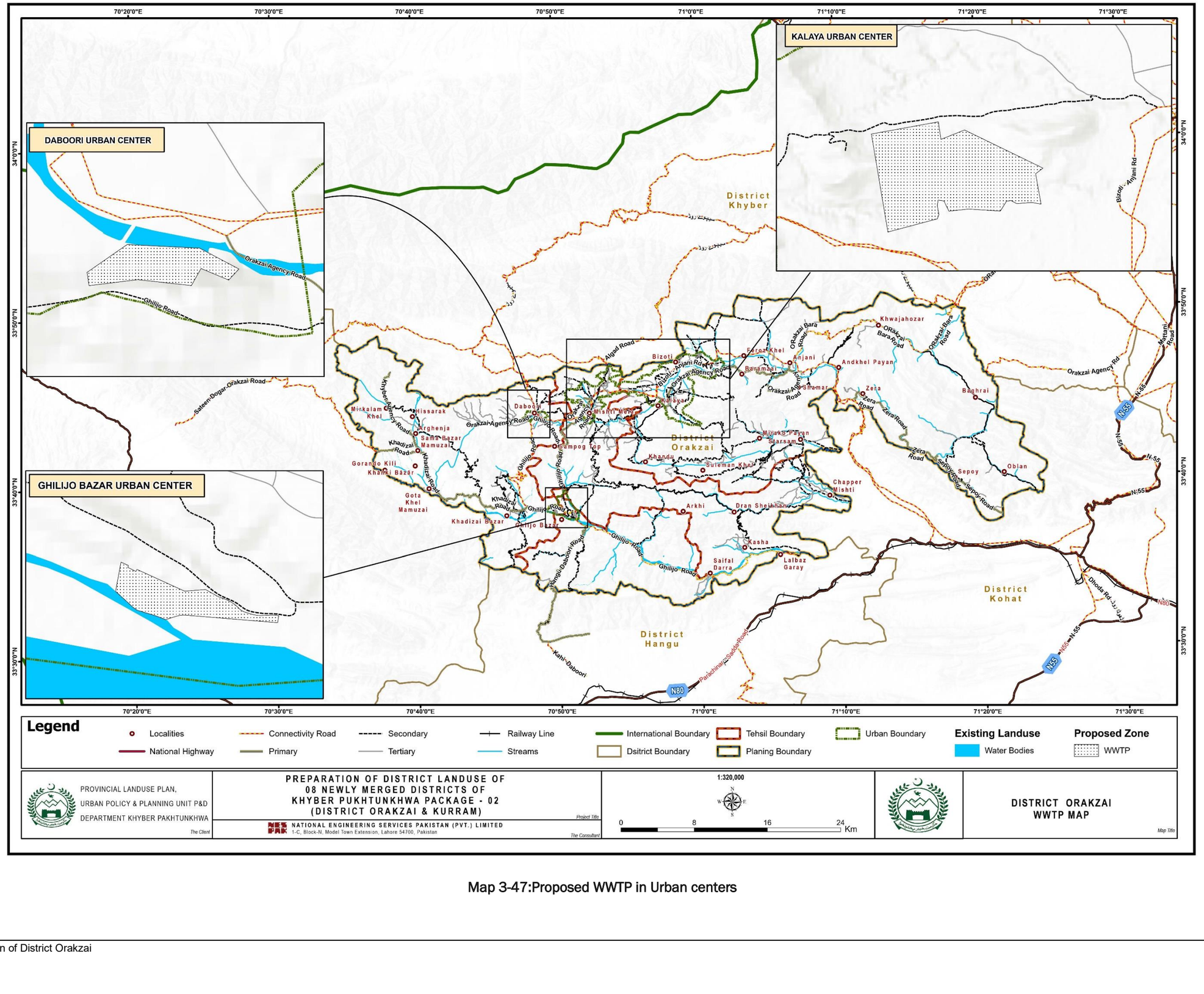
Map 3-44:Proposed Sewerage system in Kalaya



Map 3-45:Proposed Sewerage System in Ghiljo



Map 3-46:Proposed Sewerage System in Dabori



Map 3-47:Proposed WWTP in Urban centers

3.12 Environment

3.12.1 Introduction

The study of environmental consideration for the Orakzai District Land Use Plan helps to incorporate principles of sustainability, environmental protection, and climate resilience during initial stages of development. This section outlines key environmental issues along with proposed strategies and intervention.

3.12.2 Environmental Objectives during Planning Stages

- Improve environmental quality through integrated waste, sanitation, and emission control systems.
- Promote renewable energy and climate-resilient urban infrastructure.
- Ensure sustainable development that conserves natural ecosystems, forests, and water bodies.
- Enhance institutional coordination for effective environmental governance.
- Build community capacity and awareness for environmental stewardship.

3.12.3 Environmental Baseline Analysis Outcome

A detailed environmental baseline analysis was conducted during the baseline study stage. Baseline analysis revealed that the district was facing various challenges from environmental perspectives including absence of any system for environmental management in the district. No environmental testing laboratory or air quality monitoring station was working in Orakzai. Poor solid waste management, water supply, sewerage and sanitation condition were prevailing in the district. Forest and wildlife of Orakzai was facing threats due to urbanization and other anthropogenic activities.

3.12.4 Key Environmental Issues and Mitigation Strategies

3.12.4.1 Environmental Management and Sustainability

Most critical issue observed during baseline study was absence of environmental consideration. KP Environmental Protection Action, 2014, introduces the Strategic Environmental Assessment as a tool to ensure that principles of sustainable development are integrated during planning stage.

To ensure that future growth remains ecologically balanced, there is a pressing need to mainstream environmental considerations in the initial stages of development, supported by strong institutional capacity, real-time monitoring, and evidence-based management tools.

Proposals:

- Preparation of a Strategic Environmental Assessment (SEA) report to integrate environmental considerations into all planning and development projects.
- Establishment of Environmental Monitoring lab
- Implement zoning regulations to control unplanned industrial and residential growth and minimize environmental degradation.
- Develop a data base system for continuous data collection and environmental monitoring.

3.12.4.2 Water and Sanitation

Currently, Orakzai is facing water supply issues. Water supplied through municipality is inadequate and poor in quality. Both groundwater and surface water is used as water supply source in the Orakzai. Baseline analysis revealed bacteriological contamination of ground water along with elevated level of magnesium and calcium, which necessitates filtration of water. No

proper sewerage or drainage system exist in the district, which is not only contaminating water bodies but also posing health risks.

Strategies and Interventions:

Table 3-122 Strategy and Intervention for Water & Sanitation

Strategy	Interventions	Time Frame
Improvement of Water Supply, Sewerage and storm water drainage System	Design and update of existing water supply system, sewerage and drainage schemes	Medium Term
Provision of safe drinking water and water conservation	Identification of points where water is contaminated through water testing and Installation of solar powered water filtration plants Promoting Rainwater Harvesting to conserve water	Medium Term
Prevention of water bodies from contamination	Design and establish wastewater treatment plants to reduce contamination of natural streams.	Medium Term
Integrated water quality monitoring	Establish district-level monitoring systems for testing drinking water sources and wastewater discharge points.	Short Term
Public awareness campaigns	Conduct awareness drives on water conservation and sanitation practices targeting schools and rural communities.	Short Term

3.12.4.3 Solid Waste Management

Baseline study revealed that district is lacking solid waste management system. No practice of waste collection and disposal exist in the district.

Strategies and Interventions:

Table 3-123 Strategy and Intervention for Solid Waste Management

Strategy	Intervention	Time Frame
Institutional Strengthening for Solid Waste Management	Establish solid waste wing in TMA for solid waste management to perform all the functions related to solid waste management	Medium Term
Adopt waste minimization techniques	Promote composting of organic waste by utilizing degradable portion of waste. Encourage people to separate the recyclable waste for reuse or sale it to industries using recyclable materials	Medium Term
Awareness and behavioral change campaigns	Conduct district-wide awareness drives on segregation, and waste minimization practices through schools and media.	Short Term

3.12.4.4 Forestry, Ecology, and Biodiversity

Issues

Despite its rich ecology, Orakzai faces challenges to Forest and Wildlife due to illegal cutting of trees, conversion of forest into urban areas and natural disasters.

Strategies and Interventions:

Table 3-124 Strategy and Intervention for Forestry, Ecology & Biodiversity

Strategy / Intervention	Description	Targeted area
Forest protection	• Strengthen fire-breaks, early warning & rapid response units • Awareness campaigns among communities & tourists • Monitoring & enforcement of illegal logging Promote biogas and improved stoves to reduce dependence of fuelwood • Patrols in high fire-risk zones	Medium Term
Forest Rehabilitation	• Identify degraded patches and restore using native species • Nursery expansion for native plants • Use of mixed species to improve resilience • Transplantation in places where trees lost due to landslides or roadworks	Long term

3.12.4.5 Air and Noise Pollution Control

During baseline study, air and noise level testing showed higher values from the permissible limits along highways, commercial areas and near industries. This requires attention to sustain good air quality in Orakzai.

Strategies and Interventions:

Table 3-125 Strategy and Intervention for Air and Water Pollution Control

Strategy	Intervention	Time Frame
Install air quality monitoring stations	Set up air quality monitoring stations	Short Term

3.12.4.6 Climate Resilience and Disaster Risk

Currently, Pakistan is ranked among one of the most affected countries due to climate change. It is need of the hour to enhance resilience by strengthening the adaptive capacity of District to tackle climate change impacts and be prepared to deal with disasters.

Strategies and Interventions

Table 3-126 Strategy and Intervention for Climate Resilience and Disaster Risk

Strategy / Intervention	Description	Time Frame
Climate-smart infrastructure design	Promote resilient road, bridge, and drainage standards that can withstand intense rainfall and erosion.	Long Term
Establish early warning systems (EWS)	Delineating the zones vulnerable to fire, landslide, earthquake etc. Install sensors for early warning Develop emergency response mechanism.	Short Term
Community disaster preparedness programs	Conduct capacity-building workshops, mock drills, and training for communities, schools, and local institutions in disaster response and first aid.	Short Term
Community training for Climate mitigation and Adaptation	Launch awareness campaign, Involve government departments. Promote campaign through social media to engage community	Short Term

3.12.4.7 Renewable Energy and Sustainable Infrastructure

Strategies and Interventions

Table 3-127 Strategy and Intervention Renewable and Sustainable Infrastructure

Strategy / Intervention	Description	Time Frame
Promote solar projects	Use solar powered streetlights along road. Use solar powered water pumps and tubewells. Use solar panels to power buildings	Short Term
Public–Private Partnerships (PPP) for renewable energy	Encourage investment in solar energy through PPPs and incentive-based models.	Medium Term
Green building and energy efficiency guidelines	Introduce incentives for sustainable building materials, passive cooling, and solar-integrated architecture.	Long Term
Awareness and capacity-building programs	Conduct training for local technicians, contractors, and communities on solar energy maintenance and safety.	Ongoing

3.12.5 Environmental Baseline Analysis Outcome

Environmental baseline analysis revealed that the city was facing various challenges from environmental perspectives including absence of any system for environmental management in the district. Poor water supply sewerage and sanitation condition was prevailing in the city.

Sewerage was being discharged without any treatment to the receiving bodies. Forest and wildlife of Orakzai was facing threats due to urbanization and other anthropogenic activities.

Proposals:

Table 3-128 Environmental Proposal

Proposal	Objective	Time Frame	Lead Agencies
1. Preparation of Strategic Environmental Assessment of Landuse Plan of Orakazai	Integrate environmental consideration into all development plans	Short Term	Urban Policy and Planning Unit, KP EPA
2. Establishment of Environmental Monitoring lab and air quality monitoring stations	Developing environmental testing capacity at local level	Short Term	Local Government, KP EPA
3. Installation of water filtration plants	Provision of safe drinking water to citizen and reduce health issues	Medium Term	Public Health Department, District Government
4. Forest Rehabilitation while identifying degraded patches and planting of native species	Restoration of degraded forest in the district	Medium Term	Forest and Wildlife Department, District Government
5 Public awareness campaign to create awareness regarding Climate Change challenges, adaptation and mitigation measures	Community education and motivation for participation in climate change project	Short Term	KP EPA, Education Department, District Government, NGOs
6. Establishment of Early Warning System to deal with disasters	Strengthening of capacity to deal with emergency	Short Term	PDMA, KP EPA, Forest and Wildlife Department

3.13 Natural Hazard

3.13.1 General

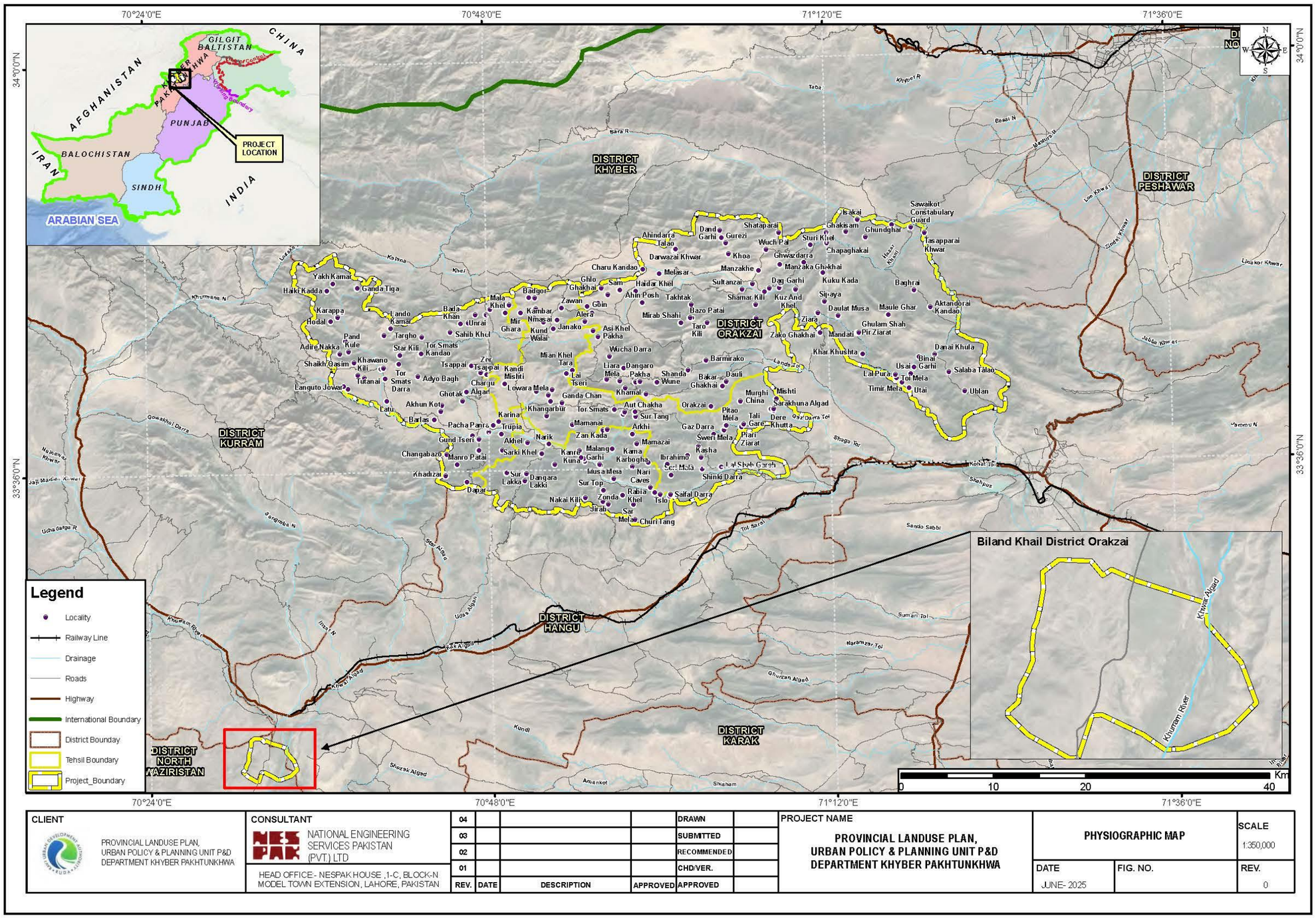
Throughout history, the world has been plagued by natural and man-made disasters that have resulted in the loss of life and damage to property, environment, economy, infrastructure, and other facets of human life. In the recent past, the frequency and impact of the natural hazards have increased manifold because of the ever-increasing development, rapid urbanization and exposure.

Assessment of the geohazards such as landslides, floods, mass movements, earthquakes, land degradation, ground subsidence, rising sea level, cloud bursts and Climate Change Impacts is a challenging task. All of these natural and geohazards in the recent decades have drawn the attention of Planners, Geoscientists and Sustainability Experts to mitigate and /or minimize the impacts, aftermaths, and the risks associated with them.

Economic development, socioeconomic policy, population growth, scientific research, innovative technologies, Disaster Risk Management (DRM) initiatives, public awareness, and natural hazards are the key factors that contribute to sustainability. However, during planning, development, environment management and infrastructure development, the conventional economic and social parameters are usually taken into account and a holistic approach towards mitigation of natural disasters is generally overlooked. Consequently, in vulnerable locations, such as areas presenting steep slopes, geologic faults zones, water courses, flood plains and /or degraded soils, the natural hazards that often occur, such as landslides, earthquakes, and floods can cause extensive damage, disruption of the social and economic network and lead to the loss of human lives and property.

This scenario demands the incorporation of natural hazards into land use planning for the overall safety of the community and environment against disasters. This involves identifying hazard prone areas such as geologic fault zones, mountain ranges having steep slopes, flood plains and seismic zones etc, and restricting development through geohazard zoning, implementation and enforcement of laws and building codes. Mitigation strategies including the diversion of infrastructure and built-up from more hazard prone areas to a relatively less hazard prone areas, resilient design of infrastructure, residential buildings, industrial and commercial areas and preserving open green spaces should be employed to help reduce the impact of natural disasters. Additionally, emergency preparedness needs to be adequately integrated by Planning evacuation routes, emergency transportation corridors and safe heavens for shelters. Sustainable development practices should be promoted to minimize vulnerability along with the protection of natural ecosystems to buffer against geohazards during the disasters. The assessment of anticipated impacts needs to be assessed as these contribute to aggravate the risk associated with the natural disasters.

A thorough knowledge of the underlying geology, geomorphology, geotectonic, climate and seismicity is essential for the sustainability of any planning and development project. In order to avoid the aforementioned disastrous situations and impacts, it is necessary for the planners, geoscientists and engineers to take into account the terrain characteristics and physical parameters of the areas to be developed, during the planning stage so as to assure the disaster resilience to the natural hazards. The geology and the geomorphology of an area are important in the assurance of sustainable planning for land use management and in the protection of human life and value at risk. Please refer to below Map for Physiographic Map of District Orakzai.



CLIENT: PROVINCIAL LANDUSE PLAN, URBAN POLICY & PLANNING UNIT P&D DEPARTMENT KHYBER PAKHTUNKHWA	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN		PROJECT NAME: PROVINCIAL LANDUSE PLAN, URBAN POLICY & PLANNING UNIT P&D DEPARTMENT KHYBER PAKHTUNKHWA
		03				SUBMITTED		PHYSIOGRAPHIC MAP
		02				RECOMMENDED		SCALE: 1:350,000
		01				CHD/VER.		DATE: JUNE- 2025 / FIG. NO. / REV.: 0
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED		

Map 3-48 Physiographic Map of District Orakzai

3.13.2 Disaster Resilience

The objective of natural and human induced disaster resilience of development cannot be substantiated by safe engineering designs alone, unless the concept and requirements of Safer Land use Planning are not hybrid into Master Planning. To materialize the task of sustainable and disaster resilient development, it is imperative, to develop a realistic Disaster Profile of the area under consideration and formulate guidelines for mainstreaming the elements of Disaster Risk Reduction (DRR) not only into the new planning and development but also to the existing built-up fabric of the area. During this noble cause of saving the human lives and environment, it will very soon be realized that there is a dire requirement to divert the existing development from more hazard prone areas towards less hazardous areas. The aforementioned task can be well substantiated by employing the tools of Safer Land use Planning.

3.13.2.1 Safer Land use Planning

If during the planning stage of any development project, the considerations for safe, sustainable and secure built environment are ignored, the intended development is considered to be highly vulnerable to natural and human induced disasters. These disasters cannot be best addressed by safe engineering designs of built-up fabric unless the effective implementation of the Safer Land use Planning has been assured.

In other words, if the planning (and subsequent development) of any area is not compliant to the geohazard considerations and requirements of that area, as identified in the Safer Land use Planning, the entire development and the built-up fabric will either be unsafe being vulnerable to natural/ human induced hazards or is not economically viable.

The development of Safer Land use Plans must accord due consideration to pre and post disasters scenarios and, therefore, require the detailed geohazard mapping of the target areas and the vicinity for geohazard risk assessment. In addition to above, it is mandatory to take into account the engineering design codes, construction practice, building by-laws, existing land use of the area, implications of the intendent land use, capacity and resources of the Government line departments to a post disaster response, recovery and rehabilitation. It also involves the capacity and efficiency of critical infrastructure such as electricity, health, medical emergency services, water supply, communication, accessibility, transportation, emergency evacuation and mobilization corridors, shelter locations, resettlement, and the general awareness of the population towards natural disasters.

3.13.2.2 Exposure

In addition to the above, one of the primary reasons for the catastrophic natural disasters is the level of the exposure of both built up fabric and lifelines to geohazards. For instance, if an earthquake effects an area of 5000 sq. km or storm or riverine flood inundates the area, we can imagine that the destructiveness of the hazards of the affected area if it is densely populated. Contrary to this, if the same intensity geohazard affects the terrain, which is marked by sparse built up, and lifelines density, the incurred losses will be drastically reduced. Therefore, one of the major reasons that render the densely populated and built-up areas extremely vulnerable to geological hazards are attributed to built-up fabric and population density. In this perspective, the importance of terrain characterization for Safer Landuse Planning and development based on geology, seismicity, geotectonics and geohazards to minimize the exposure to natural hazards cannot be over emphasized.

3.13.2.2.1 Disaster Preparedness and Response

In fact, disaster resilience requires the formulation of Disaster Risk Management (DRM) Strategic Polices and Planning based on the well-integrated realistic approach while focusing on both short

and long-term frameworks for disaster preparedness, prevention and post disaster response and rehabilitation. To substantiate this task, Safer Landuse Planning is of pyramid importance for disaster resilience and sustainable development.

3.13.2.3 Disaster Profile of District Orakzai

District Orakzai is exposed to a wide spectrum of distinct existing and envisaged natural hazards which are primarily attributed to a mountainous terrain, high relief, steep and lofty slopes, deeply incised drainage system, seismicity and climatic conditions of the area. The elevation of District Orakzai varies being between 2000 to 3000 m with the Western areas being more elevated than the Eastern areas. Please refer to Elevation Map of District Orakzai.

The climate is cold temperate with mild average annual rainfall ranging between 250 to 500 mm and any prolonged wet weather results in hill torrents and floods in Mastura and Khanki Rivers (Kohat Toi) which disrupts the livelihood of the riparian's living along the river banks and low lying terraces.

The disaster profile of any area serves as a basic tool to formulate and configure the specific Disaster Risk Management (DRM) Strategy of the area to build Disaster Resilience by Safer Landuse Planning while ensuring sustainable development.

The disaster profile of the District Orakzai was developed based on the available secondary data related to the technical aspects such as geology, seismicity, geomorphology, geohazard, climatic and other terrain conditions of the area. While preparing the disaster profile of District Orakzai, the relevant historical data of the natural disasters was also taken into account and the priority order of the disasters is defined as under:

Disaster Profile of District Orakzai

- High Priority
  a) Earthquake
     - High rising buildings
     - Vertical growth/Increased population density
     - Non-Engineered Structures
     - Increased exposure to earthquake hazard
     - Slumps
     - Poor construction practices
     - Use of prohibited construction materials
  b) Flood Hazard
     - Riverine floods
     - Encroachment of drains
     - Horizontal extension of built-up areas
     - Inadequate Protection Works
  c) Slope Hazard
     - Rockfalls/Slide
     - Landslides
- Medium Priority

a) Climate Change Impacts
    - Unprecedented wet and dry season
    - Cloud Burst
    - Flash floods
    - Hill torrents
    - Storms and cyclones
    - Extreme Temperature (Heat/Cold Waves)
    - Disruptions in Hydrological Cycle
    - Early Warning Systems (EWS)
    - Lack of Awareness

b) Differential Erosion

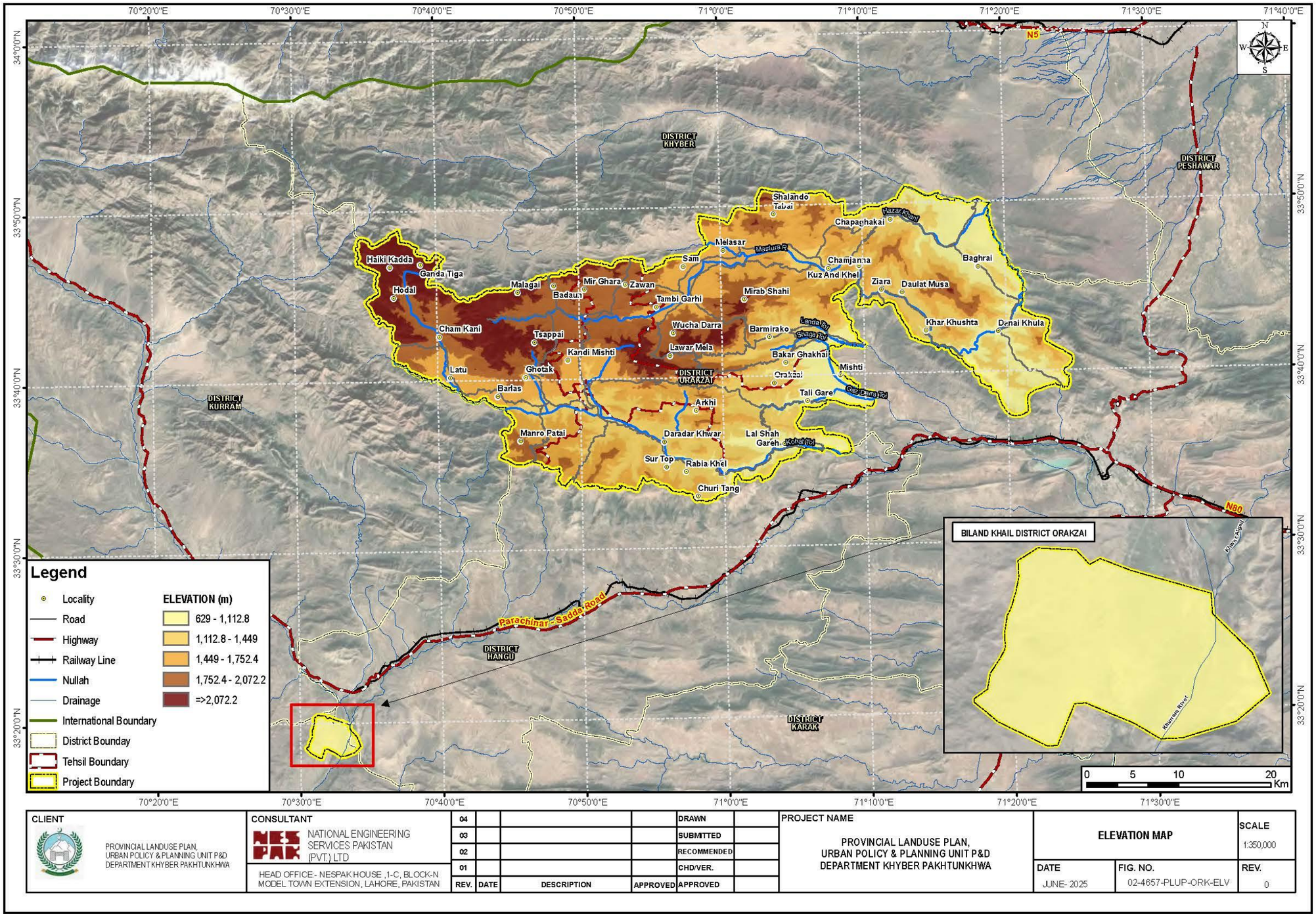
c) Mining and Quarry related hazards

- Low Priority

d) Land degradation and bank collapse

e) Loss of Cultivated and Arable land

The Disaster Profiles are imperative to mitigate the impacts of natural hazards on population through the process of Safer Land use Planning whereas the exposure to natural hazards can be minimized by diverting development from hazard prone areas towards the relatively safer areas which are less prone to hazards.



CLIENT: PROVINCIAL LANDUSE PLAN, URBAN POLICY & PLANNING UNIT P&D DEPARTMENT KHYBER PAKHTUNKHWA	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN		PROJECT NAME: PROVINCIAL LANDUSE PLAN, URBAN POLICY & PLANNING UNIT P&D DEPARTMENT KHYBER PAKHTUNKHWA	ELEVATION MAP	SCALE 1:350,000
		03				SUBMITTED				
		02				RECOMMENDED				
		01				CHD/VER.			DATE: JUNE- 2025	FIG. NO.: 02-4657-PLUP-ORK-ELV
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED				REV.: 0

Map 3-49 Elevation Map of District Orakzai

3.13.3 Earthquake Hazard

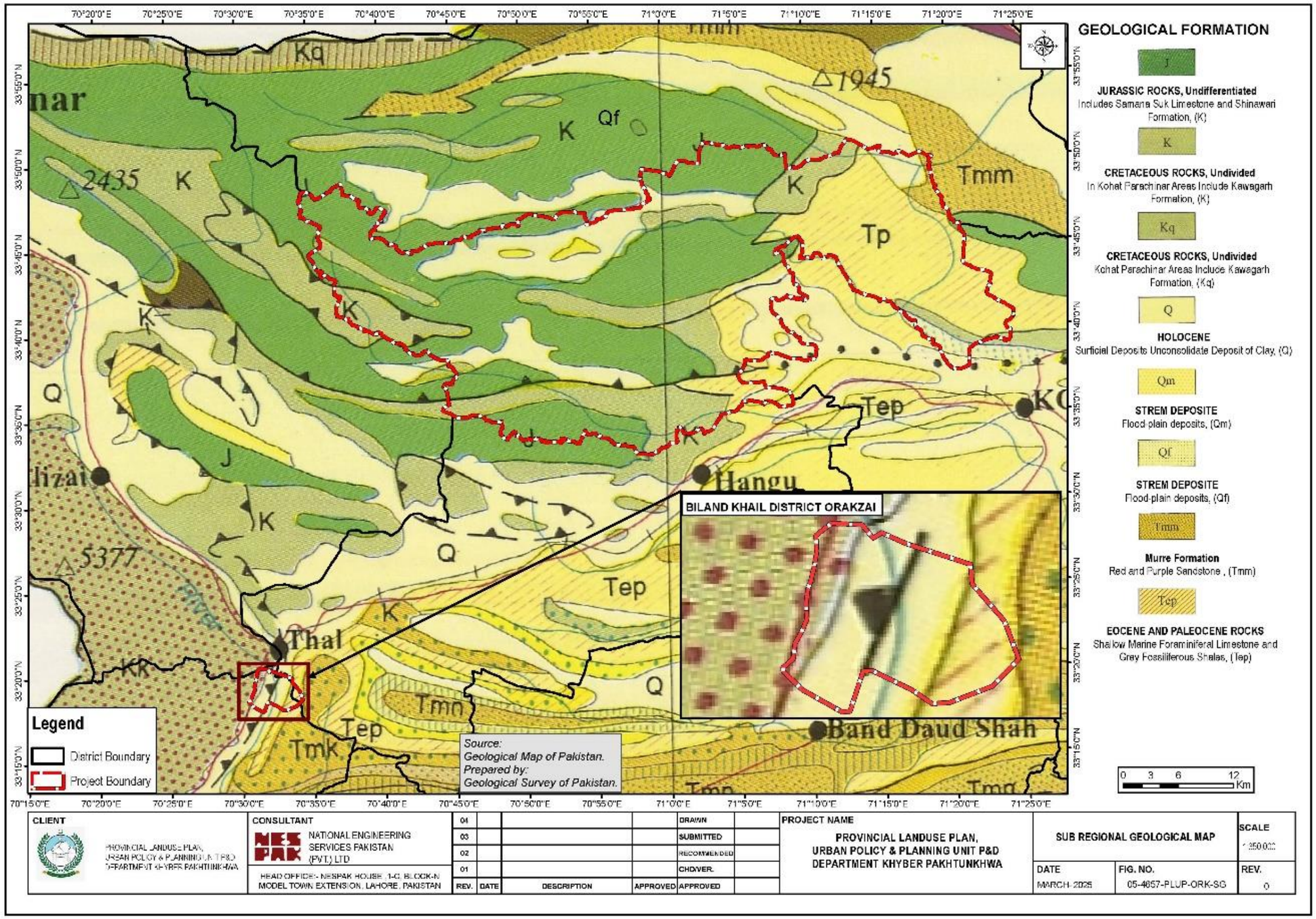
3.13.3.1 Preamble

An earthquake is a sudden and rapid shaking of the ground caused by seismic waves traveling through Earth's crust. These waves are generated when energy stored in the crust is suddenly released, typically due to rock masses straining against one another and then fracturing and slipping. Earthquakes most often occur along the existing geological faults, however major earthquakes result in the development of new geological faults narrow zones where rock masses move relative to each other. The geological faults are the linear zones of variable thickness ranging from a few hundreds to many kilometers in width comprising ground rupture zones. These faults are generally located at the edges of large tectonic plates. The severity of an earthquake is measured using the Richter Magnitude Scale, which ranges from 1 to 9. The impacts of earthquakes can be severe, including ground shaking, landslides, infrastructure collapse, and tsunamis in coastal areas. Moreover, the disastrous impacts of the earthquakes having variable magnitudes can be gauged by using the Modified Mercalli Intensity Scale (MMI) which serves as a direct mean to measure the earthquake impacts at specific variable locations without considering the earthquakes overall strength. It is a subjective scale that determines the seismic ground shaking intensity by considering their effects on built-up objects and lifelines. **Please refer Figure** 3-6 **below which presents the most widely adopted MMI Scale.**

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest,especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Figure 3-6: The Modified Mercalli (MMI) Scale

The District Orakzai is primarily covered by a mountainous terrain comprising East-West oriented linear mountain ranges with intermontane areas filled with variable thickness of diversified quaternary deposits. The rocks belonging to Cretaceous and Jurassic age forms the skylines of the ridges while the middle and lower slopes exhibit restricted development of terraces utilized for cultivation and construction of houses. Please refer to below Sub Regional Geological Map of District Orakzai.



Map 3-50 Sub Regional Geological Map of District Orakzai

The overwhelming East-West structural fabric of District Orakzai holds a signature of intense compressional / collision tectonics which is well elucidated by multiple, East-West striking, parallel to sub-parallel geological faults, indicative of intensely folded and faulted strata. Out of these multiple North dipping thrust faults include Main Mantle Thrust (MMT), which is north of District Orakzai and the other active geological faults that ripped through the terrain of District Orakzai include Hissartang Fault, Main Boundary Thrust (MBT) and its associated faults, Punjal (Khairabad) Fault and Khair-e-Murat Fault which runs South of the District Orakzai. North of MBT is the Himalayan Crystalline zone whereas south of MBT is the Parachinar-Kala Chitta Fold Belt.

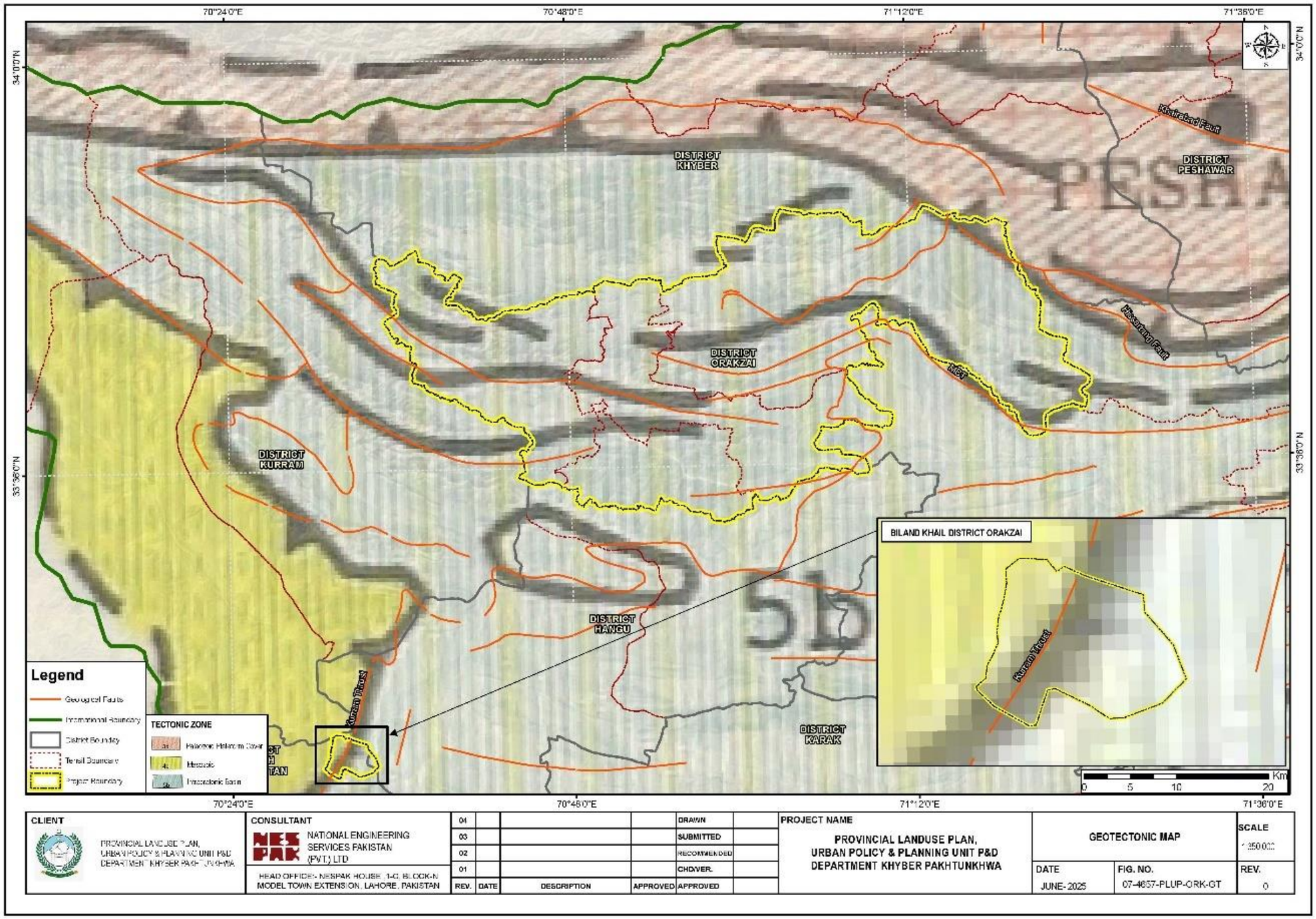
The District Orakzai is bounded by Peshawar Basin and Khyber Mountains in the North, Attock-Cherat Range in the East, Kalachitta Range and Kohat Plateau in the South and Safed Koh Range in the West. In these mountain ranges, a gradual variation in generalized structural trend is observed from East to West. The generalized orientation of strata coincides with the prevailing geological structure of the mountain ranges.

The geologic faults within the proximity of the District Orakzai and its sub-regional vicinity were initially identified using secondary data and relevant literature. However, later on, some field surveys were conducted for ground truthing in a few critical areas due to security and law and order constraints. Major regional geotectonic features within and around the sub-regional vicinity of District Orakzai that are capable of generating hazardous earthquakes are briefly described as in the proceedings sub sections:

3.13.3.2 Regional Geologic Faults

A. Main Mantle Thrust (MMT)

Main Mantle Thrust is major regional zone of collision between the Indo-Pakistan Plate in the South and the Kohistan- Ladakh Island Arc in the North. MMT is passing in the far Northern region from District Orakzai and is aligned in East-West direction. The MMT, which is aligned with the Nanga Parbat-Haramosh on East, span an area of about 400 km through Diamir, Kohistan, Swat, Dir and Bajaur, before entering Afghanistan. The general trend of MMT is NE-SW. It is a seismically active fault and is capable of generating disastrous earthquakes. Please refer Figure-2 showing Regional Geotectonic Map of Northern Pakistan and Below for Geotectonic Map of District Orakzai



Map 3-51 Geotectonic Map of District Orakzai.

B. Main Boundary Thrust (MBT)

Main Boundary Thrust (MBT) is passing through the Southern terrain of District Orakzai having East-West direction and varying dip in the North. MBT comprises a set of North-dipping thrust faults and forms the boundary between the Sub Himalayas and the Lesser Himalayas (Wadia 1931). A hairpin-shaped system of faults truncates the Murree Formation on the East, North and West. It abuts the Mesozoic and earlier rocks against the Murree Formation. West and North of this geological fault, within the short distance of 1 to 5 km, there is a parallel thrust fault along which Precambrian sequence has been pushed over the Paleozoic and Mesozoic rocks.

From near Balakot (Hazara Kashmir Syntaxis), it extends Southwestwards through the Margalla Hills, Attock-Cherat and Kalachitta ranges to the Sufaid Koh Range on Afghanistan boarder, a distance of about 350 km. It is an intensely deformed and tectonised belt with isoclinal folds and several South-verging thrust sheets (Treloar et al. 1989a, Treloaret al. 1990, Greco 1991). The estimated Maximum Credible Earthquake for this segment of MBT is assessed to be between Magnitudes (Mw) 8.0 to 8.5. Please Refer Figure 3-7 showing Regional Geotectonic Map of Northern Pakistan and Figure 3-8 for Specific Geology and Structural Features of District Orakzai.

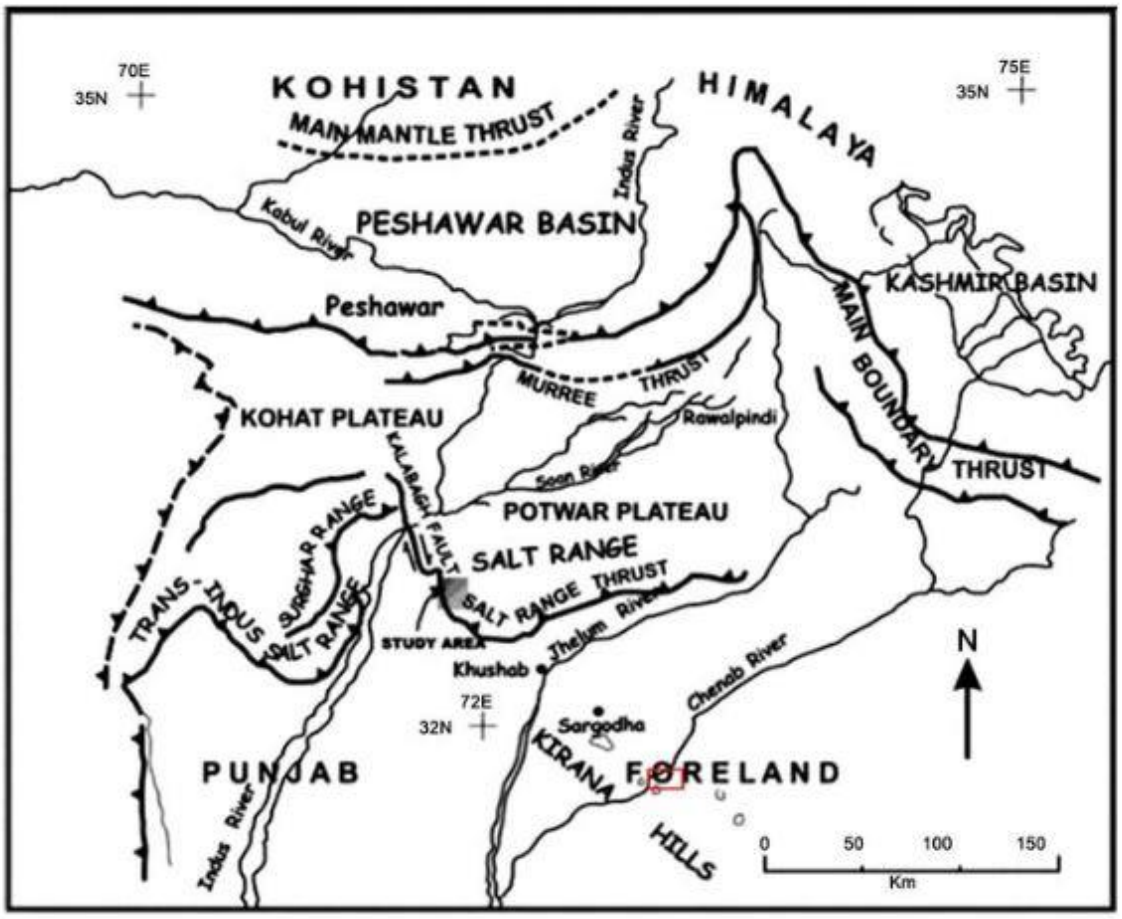


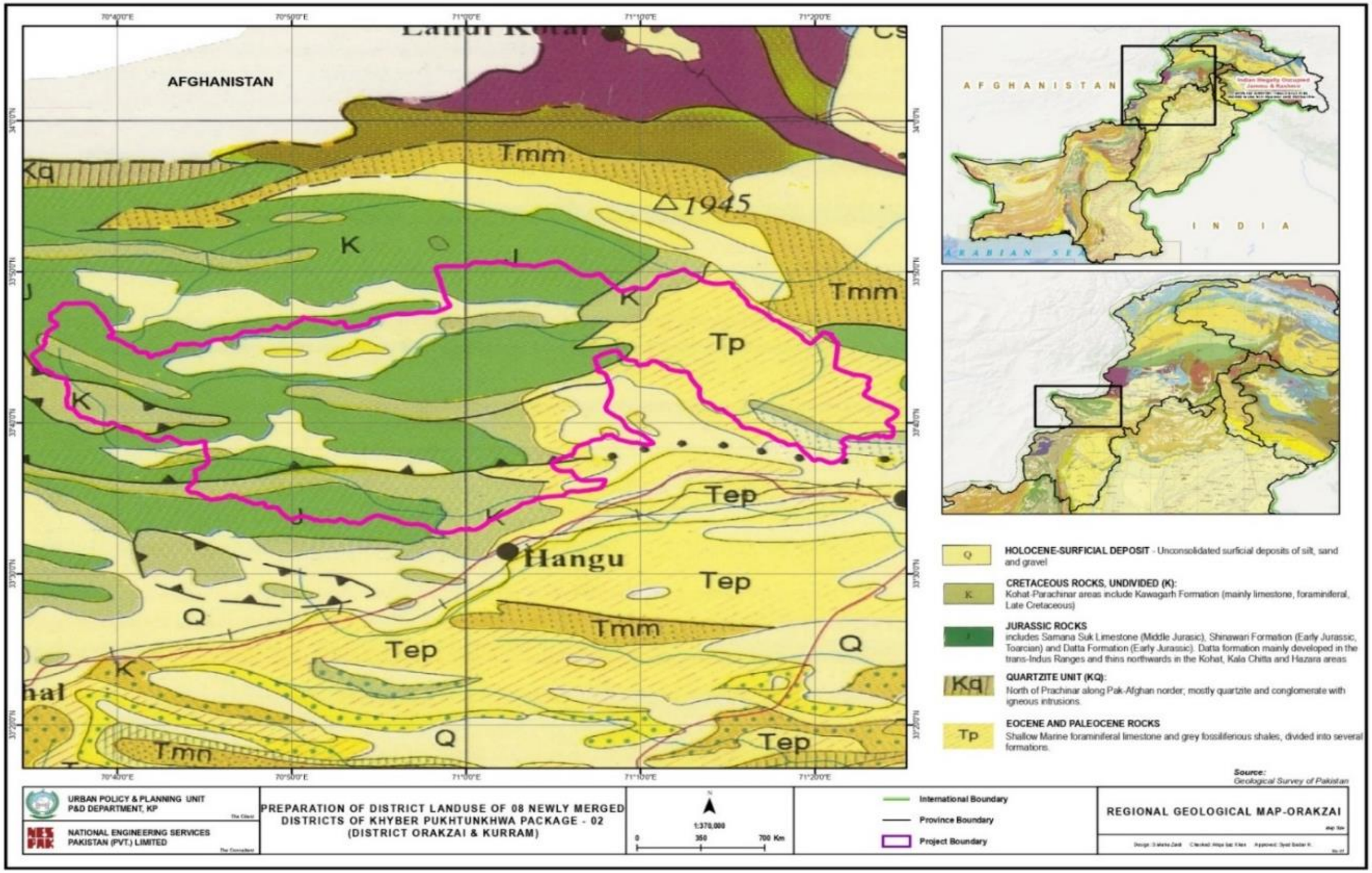
Figure 3-7: Generalized Geotectonic Map of Northern Pakistan showing Major geologic faults and features. (After Ahmad et al., Pakistan Journal of Hydrocarbon Research, 2005.)

In Pakistan, the Lesser Himalayas, which include the Attock-Cherat, Kalachitta and Margalla Hill ranges, lying to the North of MBT, are very young tectonic features. They are characterized by thrusting along MBT as late as 2.1-1.8 Ma, and movement on the Khairabad fault being as late as 0.5 to 0.1 Ma (Burbank and Beek 1989). Therefore, this region reflects moderate to high

seismicity having a number of active geologic faults. According to Nakata et al. (1989) in Pakistan, active faults are rather densely distributed on and in the vicinity of the MBT.

C. Hissartang Fault (HtF):

Hissartang Fault is passing near the Dara Adam Khel area in the central region of District Orakzai in East-West Direction. Yeats and Hussain (1989) explained it as a lineament, South facing scarps occur throughout the Attock-Cherat Range, and Jurassic limestone is faulted over gravels at the Western end of the Nizampur basin. Earlier, Kazmi (1979a, 1979b) had mapped two East-West trending parallel active fault lineaments, the Attock and Campbellpur Faults, extending from the Attock-Cherat Range up to the Haripur Basin. These two faults correspond to the Khairabad and Hissartang Faults of Yeats and Hussain (1989). These faults are considered seismically active and a number of teleseismic events are cited along these fault zones. Figure-2 showing Regional Geotectonic Map of Northern Pakistan and Map 3-26 for Specific Geology and Structural Features of District Orakzai.



Map 3-52: A part of Geological Map of Pakistan by GSP showing the geology and structural features of District Orakzai

D. Punjal (Khairabad) Fault (KhF):

Khairabad Fault / Panjal Thrust is passing in the northward's proximity of District Orakzai East-West direction. The Khairabad fault is a thrust fault and forms a loop around the Hazara Kashmir Syntaxis. It follows the trend of MBT with a dip in North (Wadia 1931. Calkins et al. 1975). The analysis of satellite imagery and digital elevation model shows that the fault is still active as evidenced by deformed Quaternary deposits. However, the recorded instrumental seismic data indicate moderate to moderately high seismic activity for the last few decades. The vertical extent of the fault appears to reach up to the Indian Basement (Bossart et al. 1984, Greco 1991. Trcloaretal. 1989). Please refer to aboce map 3-27 Regional Tectonic Map of District Orakzai.

3.13.3.3 Earthquake Vulnerability

Pakistan is located in a region with significant seismic activity and has experienced several notable earthquakes throughout its history. The 1935 Quetta earthquake, with a magnitude of 7.5, caused over 30,000 deaths and extensive damage in Balochistan. The 2005 Kashmir earthquake, measuring 7.6 on the Richter scale, resulted in more than 80,000 deaths and widespread destruction in Balakot, Khyber Pakhtunkhwa, and the State of Azad Jammu and Kashmir (AJ&K). The 2013 Awaran earthquake, with a magnitude of 7.7, led to around 800 deaths and considerable damage in Balochistan. In 2015, the Malakand earthquake, measuring 7.5, caused about 300 deaths and affected the Malakand region in Khyber Pakhtunkhwa.

The District Orakzai falls in seismically active zone due to its proximity to the collisional zone between the two tectonic plates. The region wherein District Orakzai is located has been subjected to severe seismic shaking in the past due to earthquakes. The historical record mentioned a damaging earthquake which damaged Taxila in 25 A. D. Maximum intensity at Taxila was estimated as IX on modified Mercalli intensity scale. Another damaging earthquake occurred on June 04, 1669 which was strongly felt at Mandra just north of Gujjar Khan with maximum intensity of VI-X on modified Mercalli intensity scale. The recorded seismicity during the past century shows a large to small number of moderate earthquake originating in the area between Kohat-Attock and Islamabad which could be associated with Main Boundary Thrust, however it currently relatively less active in the area covering Kurram and Orakzai Agencies. However, MBT and its associated faults has the potential to produce hazardous earthquakes.

Pakistan is highly vulnerable to earthquakes due to its location at the convergence of several major tectonic plates, including the Indian, Eurasian, and Arabian plates. This seismic activity results in frequent earthquakes, some of these are rated to be moderate to large with a few rated as hazardous earthquakes. Seismicity, the study of earthquake frequency, type, and size in a region, shows that Pakistan is highly susceptible to seismic activity. Earthquake magnitude, which ranges from micro earthquakes (0 to 3) to Great earthquakes (8 and 9), depends on factors like fault rupture and energy release. The Modified Mercalli Scale measures earthquake intensity, ranging from I (not felt) to X (extreme damage), assessing impacts on people, buildings, and the ground surface. Intensity maps are crucial for understanding impact and planning responses.

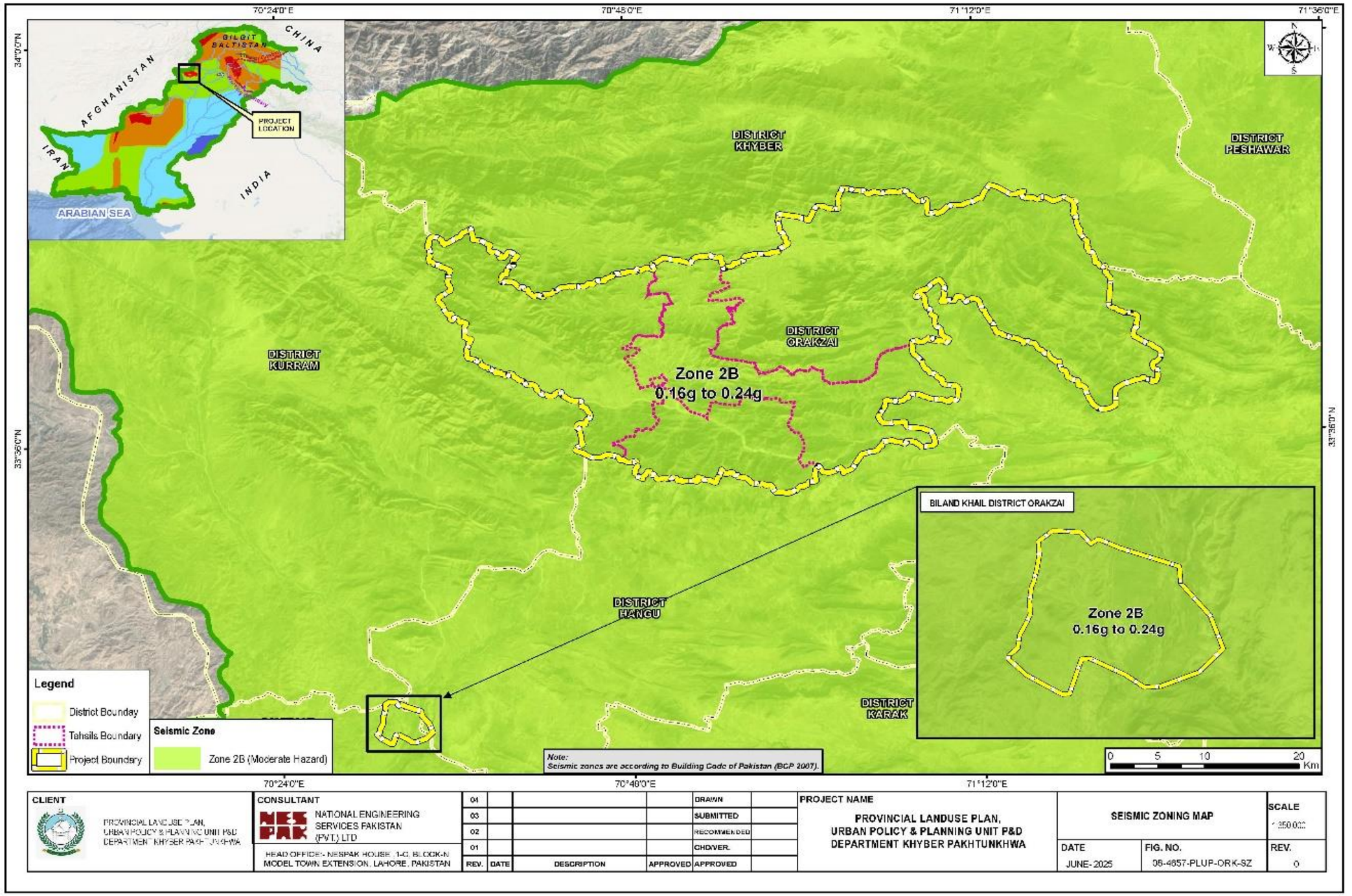
Pakistan's seismic activity is influenced by its location at the boundary of major tectonic plates, notably the Indian Subcontinent Plate and the Eurasian Plate. The collision of these plates has formed the Hindukush-Karakorum-Himalayan ranges and continues to cause seismic activity. Other plates, such as the Arabian, Tibetan, and Iranian Plates, also contribute. The Makran Subduction Zone, where the Arabian Plate slides beneath the Indian Plate, poses a risk for large earthquakes and tsunamis. Major fault zones like the Main Boundary Thrust, Main Mantle Thrust, Main Karakoram Thrust, Chaman-Ornach-Nal Fault and Chitral-Hunza Faults are key to Pakistan's seismicity, causing significant ground displacement. Seismic zonation helps identify

areas of varying risk, guiding building codes and emergency planning to enhance resilience against earthquakes.

3.13.3.4 Earthquake Preparedness and Response

District Orakzai is situated in a seismically active region with complex tectonic interactions. The district lies near the western edge of the Indian Plate, which converges with the Eurasian Plate. This tectonic boundary significantly contributes to the area's seismic vulnerability. The northern boundary of Orakzai is marked by the Hissartang fault and the southern boundary is marked by Main Boundary Thrust (MBT), a major geological feature known for its seismic activity.

The seismic risk in District Orakzai is reflected in the magnitude of past earthquakes, which have typically ranged between 3 and 5 on the Richter scale. According to the Seismic Zones of Pakistan, District Orakzai falls within Seismic Zone 2B. This zone is characterized by a Peak Horizontal Ground Acceleration (PHGA) of 0.16 to 0.24g, where 'g' denotes the acceleration due to gravity. This level of acceleration indicates a moderate seismic risk, necessitating appropriate building codes and preparedness measures to mitigate potential earthquake impacts. Please refer Figure 3-9 showing Seismic Hazard Zonation Map of KP, BCP, SP 2007 and below Map 3-37 for Seismic Zoning Map of District Orakzai.



Map 3-53: Seismic Zoning Amp of District Kurram

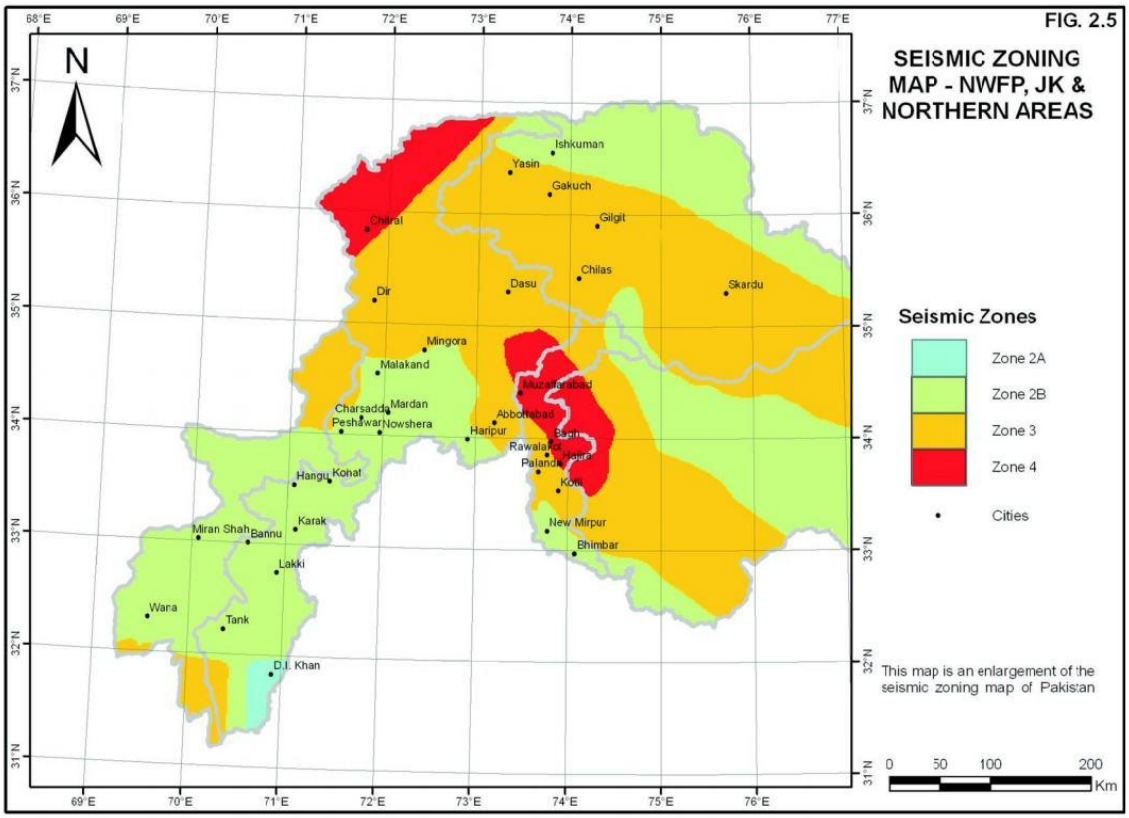


Figure 3-8 Showing Seismic Hazard Zoning of KP, BCP, SP 2007

For Seismic Sustainability of buildings, detachments and other civil engineering structures, the terrain of Pakistan has been identified under five distinct zones of seismic hazards. These zones are based on the peak ground acceleration with 10% probability of exceedance in 50 years. The peak ground acceleration (g) ranges are summarized in the Table 1. District Orakzai situates in Seismic Hazard Zone 2B having PGA values ranging from 0.16 g to 0.24 g for soil profile type S_B.

Table 3-129: Showing Seismic Hazard Zones of KP alongwith Peak Horizontal Ground Acceleration BCP, SP 2007.

Seismic Zones	Peak Horizontal Ground Acceleration
1	0.05 to 0.08g
2A	0.08 to 0.16g
2B	0.16 to 0.24g
3	0.24 to 0.32g
4	> 0.32g

3.13.3.5 Historical Preview of Instrumental Seismic Data of District Orakzai

Instrumental Seismic data within two hundred (200 km) radial distance of District Orakzai has been collected from variable and reliable national and international sources and earthquake monitoring agencies. The acquired seismic data was processed and synthesized with respect to the aerial distribution of regional and sub-regional active geological faults such as Main Mantle Thrust (MMT), Main Boundary Thrust (MBT), Hissartang Fault (HtF) and Punjal (Khairabad) Fault (KhF). This data pertains to a time window starting from 1985 to 2024 which reveals an alarming

situation that the seismic activity is relatively much more pronounced in the region from Peshawar Basin in the West to Parachinar in the East. In addition, most of the seismicity is of surficial thin-skin nature having focal depths ranging from 10 to 70 km.

In this context, a detailed Earthquake Catalogue of Instrumental Seismic Data of all the seismic events ranging from Mw 1.0 to a maximum magnitude of Mw 8.5 has been compiled and analyzed by employing geospatial techniques. Map 3-28 Seismotectonic Map of District Orakzai.

The instrumental Seismic Data revealed that since 1985 to 2024, a total number 19,750 earthquakes have occurred in District Orakzai and its Vicinity which implies a highly pronounced strike rate of 475 earthquakes per annum. Out of these, 19,750 seismic events, 18,967 events were feeble having magnitudes Mw 3.0 and above. The seismic tremors having Mw less than 3.0 are generally too small to be felt by people but contribute to the cumulative seismic record of the area.

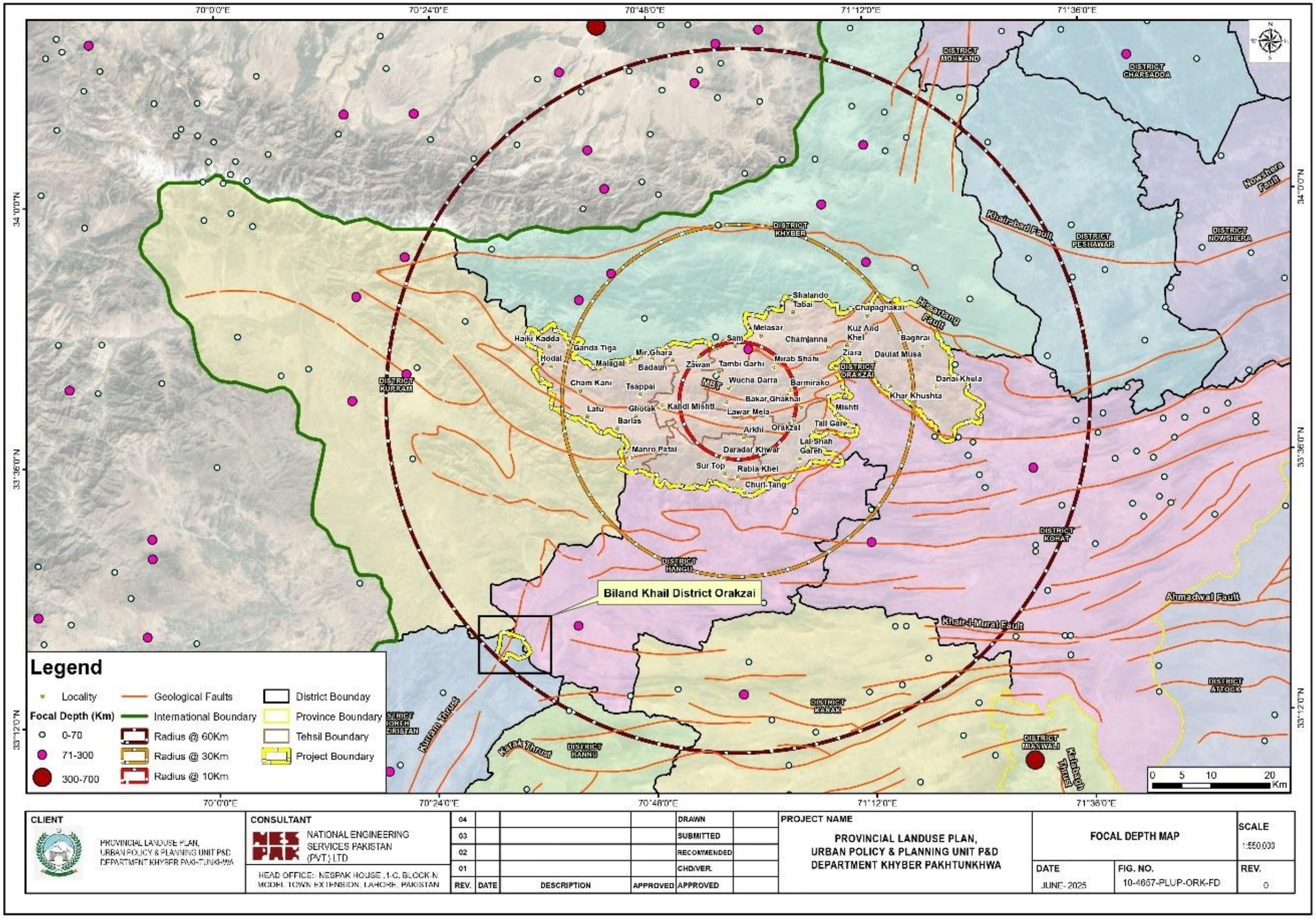
Please refer Table-2 which exhibits moderate earthquakes having magnitudes Mw ranging from 6.0 to 6.9 which includes one hundred and eleven (111) number of seismic events that occurred during the last forty (40) years which implies almost three moderate earthquakes per annum. Out of these one hundred and eleven (111) earthquakes, two (02) earthquakes Mw 6.9 and Mw 6.7 occurred in the years 1965 and 1974 respectively.

Table 3-130 Composite Earthquake Catalogue Showing Instrumental Seismic Events Magnitudes (Mw) Ranging from (6.0 to 6.9) of District Orakzai, KP

Sr. No.	Date			Time	Location		Depth (km)	Magnitude Type					Converted	Source
	Year	Month	Day		Latitude	Longitude		mb	M_s	ML	M_w	MJ	M_w	
1	1925	6	20	13:04:15	36.50	71.50	230.0		6.5				6.5	ISC
2	1925	12	18	18:10:25	36.50	71.00	230.0		6.0				6.1	ISC
3	1928	11	14	04:33:09	35.00	72.50	110.0		6.0				6.1	ISC
4	1929	3	3	03:11:02	36.50	71.00	250.0		6.2				6.2	ISC
5	1931	1	20	09:27:22	36.50	71.50	220.0		6.5				6.5	ISC
6	1935	7	28	05:23:58	36.00	71.00	150.0		6.0				6.1	ISC
7	1936	6	29	14:30:10	36.50	71.00	230.0		6.8				6.8	ISC
8	1937	11	7	19:07:40	35.00	73.00	100.0		5.8				6.0	ISC
9	1940	1	26	15:20:45	36.50	72.00	200.0		5.8				6.0	ISC
10	1941	3	11	21:48:55	36.50	71.00	210.0		6.0				6.1	ISC
11	1943	9	24	11:31:37	36.50	74.00	120.0		6.8				6.8	ISC
12	1950	9	12	61612	36.20	73.00		6.0					6.1	USGS
13	1955	08	23	14:09:21	31.00	71.00	64.0	6.5					6.6	ISC
14	1956	09	16	-	34.00	69.50				6.0			6.3	PMD
15	1956	10	13	-	36.50	71.00				6.1			6.5	PMD
16	1957	06	11	-	36.50	71.00	200.0			5.8			6.1	PMD
17	1957	08	20	-	36.50	71.00	200.0			5.9			6.2	PMD
18	1957	09	02	-	36.50	71.00	200.0			6.4			6.9	PMD
19	1958	03	28	-	36.50	71.00	200.0			6.1			6.5	PMD
20	1958	04	03	-	36.50	71.00	100.0			6.0			6.3	PMD
21	1958	04	08	-	33.00	67.50				5.8			6.1	PMD
22	1958	09	18	-	36.50	71.00				6.1			6.5	PMD
23	1959	05	19	-	32.80	68.30				5.8			6.1	PMD
24	1959	09	12	-	36.00	71.00	200.0			6.4			6.9	PMD
25	1960	01	29	-	36.00	71.00	200.0			6.1			6.5	PMD
26	1960	07	14	-	36.00	70.00	100.0			6.0			6.3	PMD
27	1961	03	20	-	36.60	71.10	121.0			6.0			6.3	PMD
28	1961	09	28	-	36.50	70.70	223.0			6.1			6.5	PMD
29	1965	03	14		36.40	70.70	219.0			6.4			6.9	PMD
30	1966	6	6	07:46:15	36.43	71.12	214.0	6.1					6.2	ISC
31	1969	08	08		36.40	70.90	193.0			5.8			6.1	PMD
32	1972	01	20		36.40	70.70	214.0			5.8			6.1	PMD
33	1972	9	3	16:48:29.50	35.94	73.33	45.2	6.2		6.3			6.3	ISC
34	1974	07	30		36.40	70.80	209.0			6.3			6.7	PMD
35	1974	12	28	12:11:46.60	35.06	72.91	45.2	5.9		6.2			6.0	ISC
36	1976	10	12		36.50	70.60	196.0			5.8			6.1	PMD
37	1976	11	27	21:42:12.13	36.52	71.05	190.2	6.2					6.3	ISC
38	1981	5	2	16:04:54.56	36.40	71.15	217.4	5.9					6.0	ISC
39	1981	9	12	07:15:53.80	35.68	73.60	29.7	6.1	6.0				6.1	ISC
40	1982	12	16		36.10	69.00	34.0			6.1			6.5	PMD
41	1983	9	12	15:42:08.28	36.52	71.10	204.7	5.9					6.0	ISC
42	1984	1	27	13:01:39.63	36.48	71.05	164.1	5.8					6.0	ISC
43	1984	02	01	14:22:09	34.57	70.48	44.5	5.9	5.9				6.0	ISC
44	1984	02	16		36.40	70.80	207.0			5.8			6.1	PMD
45	1984	07	01		36.50	70.90	204.0			5.8			6.1	PMD
46	1986	9	15	21:42:30.18	36.75	71.11	96.2	5.8					6.0	ISC
47	1987	05	05		36.50	70.70	202.0			5.8			6.1	PMD
48	1987	10	3	11:00:05.09	36.51	71.49	93.2	5.9					6.0	ISC
49	1988	8	6	09:03:21.86	36.52	71.07	192.6	5.9					6.0	ISC
50	1989	7	24	03:27:48.80	36.10	71.10	95.0	5.8					6.0	ISC
51	1990	02	05		36.70	71.20	223.0			6.1			6.5	PMD
52	1991	7	14	09:09:12.75	36.42	71.15	218.9	6.2					6.3	ISC
53	1992	05	20	12:20:32	33.35	71.33	16.3	5.9	6.0				6.1	ISC
54	1993	9	18	05:02:27.61	36.45	71.60	117.0	5.9					6.0	ISC
55	1994	6	30	09:23:22.22	36.41	71.16	232.1	6.0		6.5			6.1	ISC
56	1995	09	18		36.40	70.40	222.0			5.9			6.2	PMD
57	1997	5	13	14:13:46.25	36.48	71.00	198.1	5.9					6.0	ISC
58	1997	12	17	55129	36.55	72.09	110.0			5.9			6.2	MSSP
59	1998	03	21		36.50	70.30	228.0			5.9			6.2	PMD
60	1998	3	21	182242	36.55	71.65	110.0			6.4			6.9	MSSP
61	1998	12	11	201630	36.40	73.03	110.0			5.8			6.1	MSSP
62	1999	02	11	14:08:54	34.31	69.24	45.6	5.3	5.8	6.0			6.0	ISC
63	1999	6	29	23:18:04.59	36.66	71.39	179.5	5.8		5.6			6.0	ISC
64	1999	11	8	16:45:41.80	36.52	71.23	214.5	6.1		6.5			6.2	ISC
65	2000	01	19		36.30	70.30	207.0			6.0			6.3	PMD
66	2000	5	12	231028	36.05	72.63	110.0			6.3			6.7	MSSP
67	2000	07	17		36.20	70.90	141.0			6.0			6.3	PMD
68	2000	11	08		36.50	71.20				6.2			6.2	PMD
69	2001	11	23	20:43:03.61	36.40	71.48	-	5.8		6.1			6.0	ISC
70	2002	01	03		36.10	70.70	129.0			5.8			6.1	PMD
71	2002	1	3	7521	36.35	72.84	110.0			6.2			6.6	MSSP
72	2002	03	25		36.00	69.20	8.0			6.0			6.3	PMD
73	2002	11	20	21:32:27.43	35.35	74.59	13.0	5.7	6.4	6.0			6.4	ISC
74	2004	4	5	21:24:00.40	36.56	71.03	159.0	6.6	5.8				6.0	ISC
75	2005	02	26		35.50	71.50				5.9			6.2	PMD
76	2005	10	08	10:46:30	34.90	73.15	23.0	6.3	6.3				6.3	ISC
77	2005	10	08	04:26:12	34.76	73.16	25.0	6.0					6.1	ISC

Sr. No.	Date			Time	Location		Depth (Km)	Magnitude Type					Converted	Source
	Year	Month	Day		Latitude	Longitude		mb	Ms	ML	Mw	Md	Mw	
78	2005	10	08	04:02:27	34.62	73.37	33.0	5.9					6.0	ISC
79	2005	10	08	03:57:24	34.43	73.68	33.0	5.9					6.0	ISC
80	2008	10	5	22:56:28	33.88	69.47	10	5.7	6.0				6.1	USGS
81	2008	12	29	3:37:17	33.87	73.33	150	6.0					6.1	BGS
82	2009	1	3	20:23:18	36.62	70.61	206	6.0					6.1	BJI
83	2009	10	22	19:51:27.6	36.52	71.01	188.6	6.1					6.2	ISC
84	2009	10	29	17:44:32.1	36.38	70.77	213.9	5.8					6.0	ISC
85	2009	10	29	23:44:32	36.44	70.80	205			6.1			6.4	PMD
86	2010	2	28	4:21:11	35.90	70.11	68			6.2			6.6	PMD
87	2010	9	17	19:21:12.5	36.61	70.91		6.1			6.3		6.3	CSEM
88	2011	5	14	21:07:22.2	36.41	70.75	207.3	5.8					6.0	NEIC
89	2012	6	11	5:29:14	36.08	69.32	31.3	6.0					6.1	NNC
90	2012	7	12	14:00:34	36.50	70.88	190.2	6.0					6.1	CSEM
91	2012	7	12	19:00:33	36.52	70.98	169			6.1			6.5	PMD
92	2012	12	29	22:50:52	35.72	70.67	93			5.8			6.1	PMD
93	2013	4	4	11:31:32	36.48	71.18	227			5.9			6.2	PMD
94	2013	4	24	14:25:30	34.5	70.18	71			6.2			6.6	PMD
95	2013	6	20	2:29:01	32.61	70.56	10			5.8			6.1	PMD
96	2014	4	11	6:08:03	34.17	73.84	10			5.9			6.2	PMD
97	2014	6	14	8:58:41	36.42	70.25	10			6.0			6.3	PMD
98	2015	8	10	10:05:25.75	36.5326	71.2147	224	5.8		5.9	5.7		6.0	ISC
99	2015	11	22	18:16:04.71	36.4344	71.4233	102	5.8	4.7		5.8		6.0	ISC
100	2015	12	25	19:14:47.19	36.4935	71.1263	206	6.5	5.7	6.2	6.3		6.6	ISC
101	2017	4	25	21:38:34	32.78	70.45	10			6.3			6.7	PMD
102	2017	4	28	16:06:12	33.36	71.21	32			5.8			6.1	PMD
103	2017	4	28	15:30:07	33.31	71.86	10			5.9			6.2	PMD
104	2018	1	14	9:19:30 AM	36.4525	70.7313	199.5	5.8		2.0		2.1	6.0	ISC
105	2018	1	31	7:07:00 AM	36.5261	70.8507	193.7	5.9	5.5	5.8	6.1		6.1	ISC
106	2018	4	10	10:19:28 AM	30.91	71.57	75			6.2			6.6	PMD
107	2019	12	20	11:39:53 AM	36.54	70.46	212	6.1		6.0	6.2		6.2	ISC
108	2023	1	5	02:25:54 PM	36.396	70.856	203.9	5.6	5		6		6.0	ISC
109	2023	3	21	04:47:27 PM	36.3384	70.8833	207.4				6.5		6.5	ISC
110	2023	3	21	04:47:25 PM	36.46	71.001	198.7	6.3	5.9	6.9	6.6		6.6	ISC
111	2024	1	11	9:20:26 AM	36.46	70.69	201	5.9		6.4	6.5		6.5	ISC

Apart from the moderate earthquakes, there are still seventeen (17) number of major earthquakes having magnitude Mw ≥ 7 that occurred in District Orakzai and its vicinity during the past Forty (40) years starting from 1985. Please refer Table 3 which elaborates the necessary details of the aforementioned seismic events alongwith the reference of the source of information. This table indicates that out of these seventeen (17) seismic events, three (03) events have focal depths less than 70 km which implies that disastrous impacts of such events may create a havoc depending upon the level exposure of the built-up fabric, environment and lifelines. Please refer Map 3-54 Earthquake Focal Depth Map of District Orakzai.



Map 3-54 Earthquake Focal Depth Map of District Orakzai

Table 3-131 Composite Earthquake Catalogue Showing Instrumental Seismic Events Magnitudes (Mw) Ranging from (7.0 to 8.5) of District Orakzai, KP

Sr. No.	Date			Time	Location		Depth (Km)	Magnitude Type					Converted	Source
	Year	Month	Day		Latitude	Longitude		mb	Ms	ML	Mw	Md	Mw	
1	1885	5	30		34.60	74.38			7.0				7.0	USGS
2	1956	06	09	-	35.00	67.50				7.5			8.4	PMD
3	1956	6	9		34.30	69.10	60.0		7.6				7.6	USGS
4	1956	07	03	-	36.50	71.20	200.0			6.5			7.0	PMD
5	1956	11	14	-	36.00	71.00	200.0			6.5			7.0	PMD
6	1960	01	09	-	36.00	69.00	150.0			6.6			7.2	PMD
7	1960	02	19	-	36.00	70.50	200.0			6.8			7.4	PMD
8	1960	05	19	-	36.00	71.00	200.0			6.5			7.0	PMD
9	1962	09	12	-	36.50	69.20	50.0			6.8			7.4	PMD
10	1983	12	30		36.40	70.70	215.0			6.5			7.0	PMD
11	1991	02	01		36.40	70.80	-			6.8			7.4	PMD
12	1993	08	09		36.30	70.80	215.0			6.6			7.2	PMD
13	2002	03	03		36.50	70.40	225.0			6.7			7.3	PMD
14	2005	10	08	03:50:38	34.42	73.52	13.0	6.8	7.7	7.0	7.6		7.6	MSSP
15	2005	12	12	214746.07	36.36	71.09	224.0	6.5		6.8			7.4	USGS
16	2015	10	26	09:09:30.50	36.446	70.824	207	6.9		7.5	7.6		7.6	ISC
17	2016	4	10	10:28:59	36.52	71.27		7.0	5.9		6.6		7.0	ISC

3.13.3.6 Earthquake 2015

On October 26, 2015, a massive earthquake with a magnitude of 7.5 struck North-West Pakistan, originating from the Hindu Kush Range in Afghanistan at a focal depth of 212 kilometers. The earthquake had a disastrous impact, resulting in at least 280 deaths and over 1,773 injuries. The tremor was felt across neighboring countries, highlighting its widespread zone of impact.

The earthquake caused extensive damage in the Khyber Pakhtunkhwa province and the Federally Administered Tribal Areas (FATA) and at that time. Nine districts in Khyber Pakhtunkhwa, including Malakand, Chitral, Shangla, Upper Dir, Lower Dir, Torghar, Swat, and Buner, as well as Bajaur and Mohmand Agencies in FATA, were among the worst affected areas. The Earthquake damaged over 109,070 houses and 497 schools, with varying degrees of severity. In general, the damage was moderate, though some houses with ordinary construction were buckled and fissured, while those without bricks and iron were collapsed.

In the light of this disaster, several key considerations emerged for improving future preparedness and response. Strengthening building standards, Design Codes and construction practices, upgrading infrastructure to withstand seismic events, enhancing emergency preparedness and /or contingency plans and increasing community awareness about earthquake safety are crucial steps for better resilience in vulnerable regions.

3.13.3.7 Earthquake Preparedness and Mitigation

a) <u>Preparedness and Mitigation</u>

Mitigation and preparedness for earthquakes involve a blend of strategies to reduce damage and enhance safety. Mitigation includes developing earthquake-resistant buildings, adhering to modern building codes, and retrofitting existing structures. For exsiting Built-up fabric and infrastructure, it is imperative to opt for a rigorous mainstreaming of Disaster Risk Reduction (DRR). Community-based programs aim to increase awareness and readiness. Preparedness focuses on conducting evacuation drills, securing homes and workplaces with emergency supplies. By combining these efforts, communities can better withstand seismic events and minimize their impact.

b) <u>Mitigation</u>

Mitigation strategies focus on reducing earthquake damage and enhancing safety through several key approaches. One crucial measure is developing earthquake-resilient areas by integrating Safer Landuse Planning and re-development efforts. This includes constructing

buildings designed to withstand seismic activity, establishing clear evacuation routes, and preserving open spaces. Adhering to upgraded building codes and seismic standards is essential for minimizing damage, with new construction incorporating seismic design principles. Retrofitting existing structures and strengthening vital lifeline facilities, such as water, power, and communication systems, also play a significant role in enhancing resilience. Additionally, Community-Based Disaster Risk Reduction (CBDRM) programs contribute by raising public awareness, providing education and training, and developing local risk reduction strategies to bolster community preparedness and mitigate the impacts of earthquakes.

c) Preparedness

Preparedness involves proactive measures to ensure safety and an effective response during and after an earthquake. General preparedness includes conducting regular evacuation drills to improve community readiness. Individuals should secure their homes, maintain emergency supply kits, and plan evacuation routes to be better equipped for an earthquake. In schools, educating students and staff about earthquake safety, conducting regular drills, and developing comprehensive evacuation plans are crucial. Schools should also secure heavy furniture, maintain emergency supplies, and establish communication plans with parents. For offices, implementing emergency response plans, securing office equipment, and providing employee training are key factors to enhance resilience. Maintaining emergency kits and establishing communication systems for updates are also important. Developing a family emergency plan and addressing structural safety through regular inspections and retrofitting are also vital. In high-rise buildings, conducting seismic retrofitting, developing tailored emergency response plans, and establishing phased evacuation procedures are essential. Installing communication systems, stocking emergency supplies, and conducting regular drills ensure occupant preparedness and safety.

3.13.4 Flood Hazard

3.13.4.1 Preamble

District Orakzai is mostly comprised of a mountainous terrain which is bounded by East-West oriented sub-parallel linear valleys which are occupied by two east flowing rivers namely Mastura River in the North and Khanki Khwar (Kohat Toi) in the South. These valleys are about ten (10) km apart and or/ inter-passed by a number of important passes having elevations of 1500 to 2400 m.

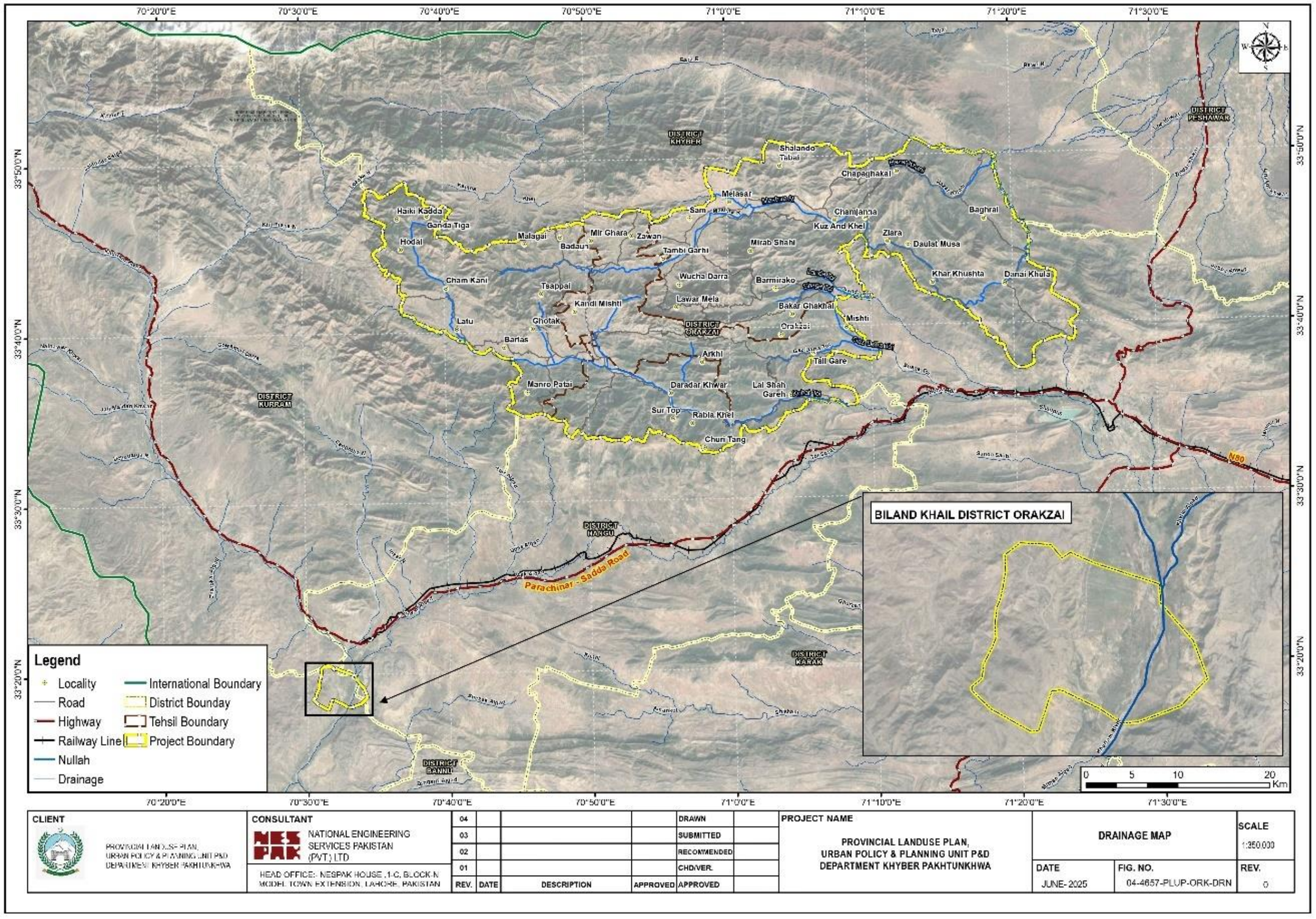
There is mostly very limited development of terraced land along these rivers which are fairly inhabited by both dispersed and clustered population and or the primary source of agriculture-based livelihood and other related commercial activities. However, during heavy rains in the monsoon, and also in perspective of the climate change impacts, the local communities and their livelihoods have persistently suffered from heavy loses to property and livelihood.

A flood occurs when streams and rivers overflow beyond adjoining flood plains and inundates onto land that is usually dry. This can happen during heavy rains, when water bodies like rivers, lakes, or oceans overflow their banks. Floods are often triggered by intense rainfall or rapid snowmelt and can lead to widespread destruction. The 2010 floods in Khyber Pakhtunkhwa were a significant climatic event that devastated many lives. According to data from the Federal Flood Commission of Pakistan, the combined flow of the Swat and Kabul rivers reached a record 400,000 cusecs, surpassing the previous peak of 250,000 cusecs recorded in 1929. In the 2022 floods, 309 people lost their lives, and 600,000 others were displaced. The flood water flows in Mastura River and Khanki Khwar were also unprecedented and resulted in extensive damage to property and liveliness. These floods affected several districts of KP, including District Orakzai, Karak, Lakki Marwat, Tank, Dera Ismail Khan, Malakand, Swat, Shangla, Dir Lower, Dir

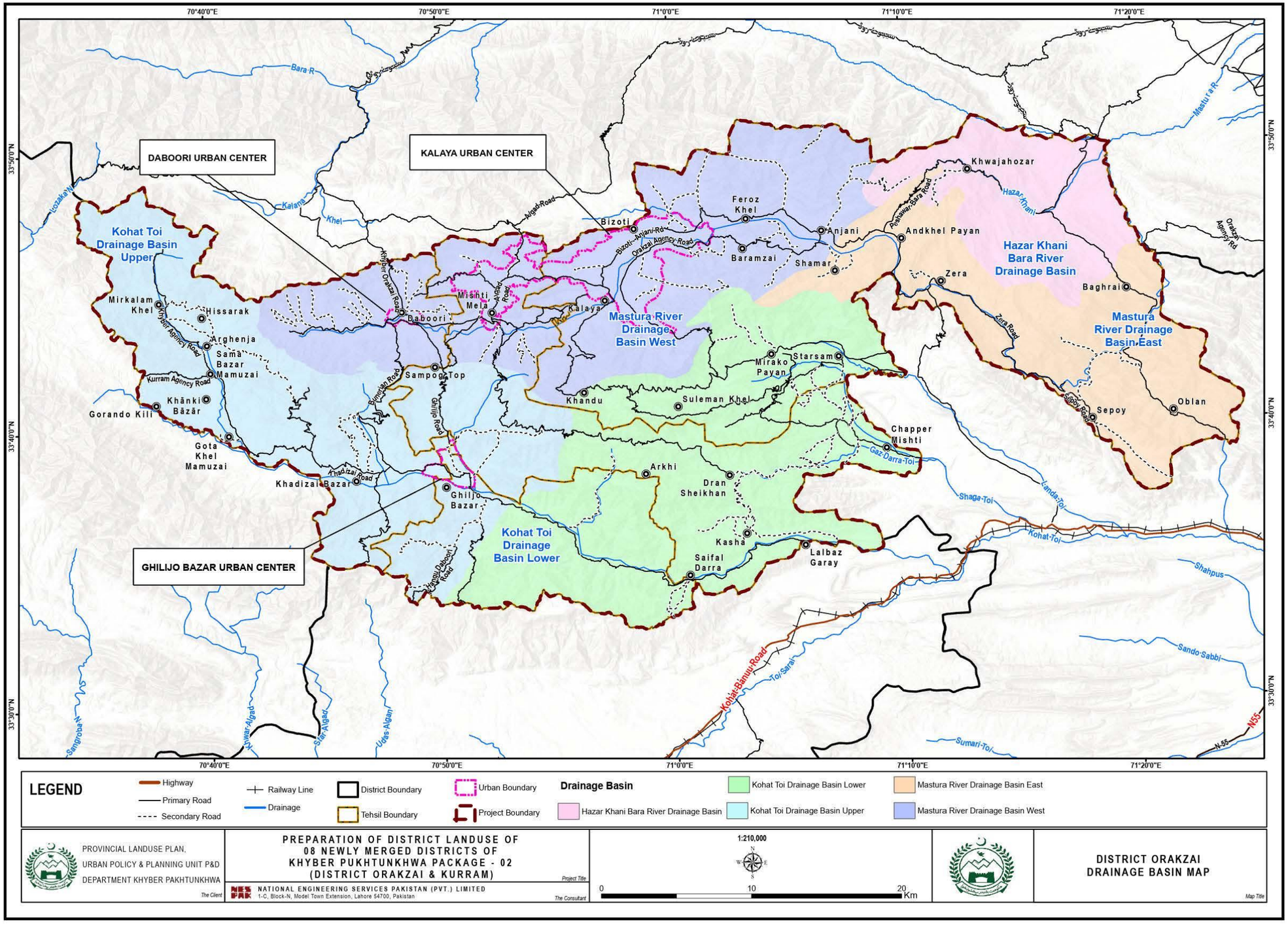
Upper, Chitral Lower, Chitral Upper, Kohistan Lower, Kohistan Upper, Swabi, Mardan, Nowshera, Charsadda, and Peshawar.

3.13.4.2 Surface Drainage System District Orakzai

The District Orakzai, nestled in the rugged trans-border region of Khyber Pakhtunkhwa, Pakistan, is characterized by a complex and dynamic topography. Its landscape, a product of the Himalayan orogeny, comprises a series of parallel mountain ranges, steep slopes, deep valleys, and narrow gorges. This distinct morphology directly governs the surface hydrology and drainage patterns of the region. For effective master planning against flood hazards, understanding these natural conduits of water is paramount. The district's surface drainage has been systematically classified into three major basins, with further subdivisions that reflect the intricate geological and topographical controls. The intensifying effects of climate change, including increased variability in precipitation patterns and a rising frequency of extreme weather events, are projected to exacerbate existing hydrological risks and introduce new challenges to this fragile mountain system. Please refer Map 3-55 Drainage Map of District Orakzai and Map 3-40 for Drainage Basin Map of District Orakzai.



Map 3-55 Drainage Map of District Orakzai



Map 3-56: Drainage Basin Map of District Orakzai

A – Mastura River Drainage Basin

The Mastura River is a central and vital drainage artery of District Orakzai. Mastura River flows through the heart of the district, carving its valley between the central mountain ranges.

To account for its spatial extent and varying topographic influences, it is subdivided into the Mastura River Drainage Basin East and Mastura River Drainage Basin West.

- **Mastura River Basin East**

This sub-basin encompasses the eastern tributaries flowing from the highlands towards the Mastura River. The slopes here are generally elongated and inclined, draining a significant area. The valleys are typically V-shaped, indicating the river's erosive power.

- **Mastura River Basin West**

This sub-basin covers the western tributaries. Its morphology can be slightly different, often featuring a mix of steep, short gullies and broader valleys, influenced by the specific alignment of the western mountain ranges.

B – Hazar Khani (Bara River) Drainage Basin

The Hazar Khani drainage Basin, synonymous with the headwaters of the Bara River, is the northeastern hydrological unit of District Orakzai. This basin is quintessential of the district's high-altitude morphology.

The basin originates from the high peaks and ridges that form the watershed between Orakzai and the Kurram District to the west and Khyber District to the north. The terrain is exceptionally steep, with elevations often exceeding 2,500 meters except the central basinal area which is relatively much plainer and is occupied by a North-West flowing Hazar Khani Toi. The high-relief landscape results in a well-defined trellis to parallel drainage which almost abruptly transforms into a dendritic drainage pattern in the basinal area. In the basinal area numerous small, steep-gradient and deeply incised streams drain into the Hazar Khani Toi.

The morphology of the Hazar Khani Basin makes it highly susceptible to flash flood hazards. Intense seasonal rainfall, particularly during the monsoon, is collected by the dense network of tributaries. The steep slopes facilitate rapid overland flow with minimal infiltration, leading to a very short concentration time. If a cloudburst occurs in the upper catchment the situation may further aggravated and it is anticipated a significant influx of water, laden with sediment and debris will create an emergent situation. This scenario pose a severe threat to settlements and infrastructure located along the riverbanks and alluvial fans at the base of the mountains. Climate change is expected to increase the intensity of rainfall events, making such cloudbursts more probable and severe, thereby heightening the flash flood hazard risk. Furthermore, changes in snowmelt patterns in the high peaks could alter the timing and volume of runoff, potentially leading to unexpected flood surges.

The primary flood hazard mechanism in the Mastura drainage Basin is channel overflow exacerbated by constrictions. As the river receives inflows from both eastern and western sub-basins, its discharge increases substantially. The natural narrow gorges at certain points act as bottlenecks, impeding the free flow of water during peak discharge events. This causes backwater effects and overtopping of banks in upstream and mid-stream sections. Furthermore, landslides, a common geohazard in this tectonically active, steep terrain, can temporarily dam tributaries, creating landslide-dammed lakes whose breach can lead to catastrophic outburst floods. Climate change acts as a threat multiplier in this basin. More intense and prolonged

rainfall can increase the frequency of channel-overtopping events and simultaneously heighten the probability of landslides, thereby increasing the risk of landslide-dam outburst flood hazards. This creates a compound hazard scenario where flood hazards and landslide risks are deeply intertwined.

C – Kohat Toi Drainage Basin

The Kohat Toi forms the southern drainage system of Orakzai, ultimately flowing into the Indus River system. Its basin is critically important as it drains the most populated and developed parts of the district, including the lower regions. It is subdivided into Upper and Lower Drainage basins, reflecting a clear transition in morphology.

- **Kohat Toi Drainage Basin Upper**

This sub-basin covers the northern, highland catchment areas of the Kohat Toi and its tributaries. The morphology is similar to the upper Hazar Khani basin highly dissected terrain with deep gorges and rapid runoff generation.

- **Kohat Toi Drainage Basin Lower**

As the Kohat Toi exits the highlands, it enters a more open, valley-like setting in the south. The slopes are relatively gentler, and the floodplain widens considerably compared to the valleys upstream. This area represents the zone of sediment deposition where the river, having lost most of the energy, begins to deposit its bedload, shaping alluvial plains.

The flood hazard transitions from a flash flood-dominated regime in the Upper basin to a more conventional riverine flood hazard risk in the Lower basin. In the upper reaches, the threat is from high-velocity, debris-rich flash flood hazards. In the lower basin, the risk shifts to widespread inundation. When high flows from the upper catchment reach the flatter topography, the river loses its confinement, spreads out, and inundates the floodplain. This poses a direct threat to agricultural land, villages, and the critical infrastructure located in this more accessible part of the district. Climate change impacts are felt throughout this basin. Increased precipitation intensity in the upper catchment will generate more powerful and sediment-laden flash floods. These will, in turn, lead to larger volumes of water and sediment being delivered to the lower basin, increasing the scale and frequency of inundation events and potentially causing rapid channel aggradation and shifts that can overwhelm existing flood defenses.

3.13.4.3 Flood Hazard Vulnerability

The division of District Orakzai's drainage into the Hazar Khani, Mastura, and Kohat Toi Drainage basins, with their respective subdivisions, is not merely a cartographic exercise. It is a fundamental recognition of the district's morphological diversity and its direct control on hydrological processes. This drainage basin-wise approach allows for targeted and effective flood hazard management. Interventions in the steep, upper basins (Hazar Khani, Upper Kohat Toi, upper Mastura tributaries) must focus on erosion control, landslide mitigation, and early warning systems for flash floods. In contrast, strategies for the lower, flatter areas (Lower Kohat Toi) must emphasize floodplain zoning, embankment protection, and channel capacity management. Critically, all these strategies must now be re-evaluated and reinforced to account for the amplified geohazards posed by climate change. Projections of increased rainfall intensity and variability necessitate more conservative safety margins in infrastructure design, updated floodplain maps, and enhanced early warning systems that incorporate climate models. This nuanced and climate-resilient understanding is the cornerstone of a resilient master plan for District Orakzai.

District Orakzai is susceptible to two main types of floods: the riverine floods and flash floods/hill torrents that may occur due to huge influx of water.

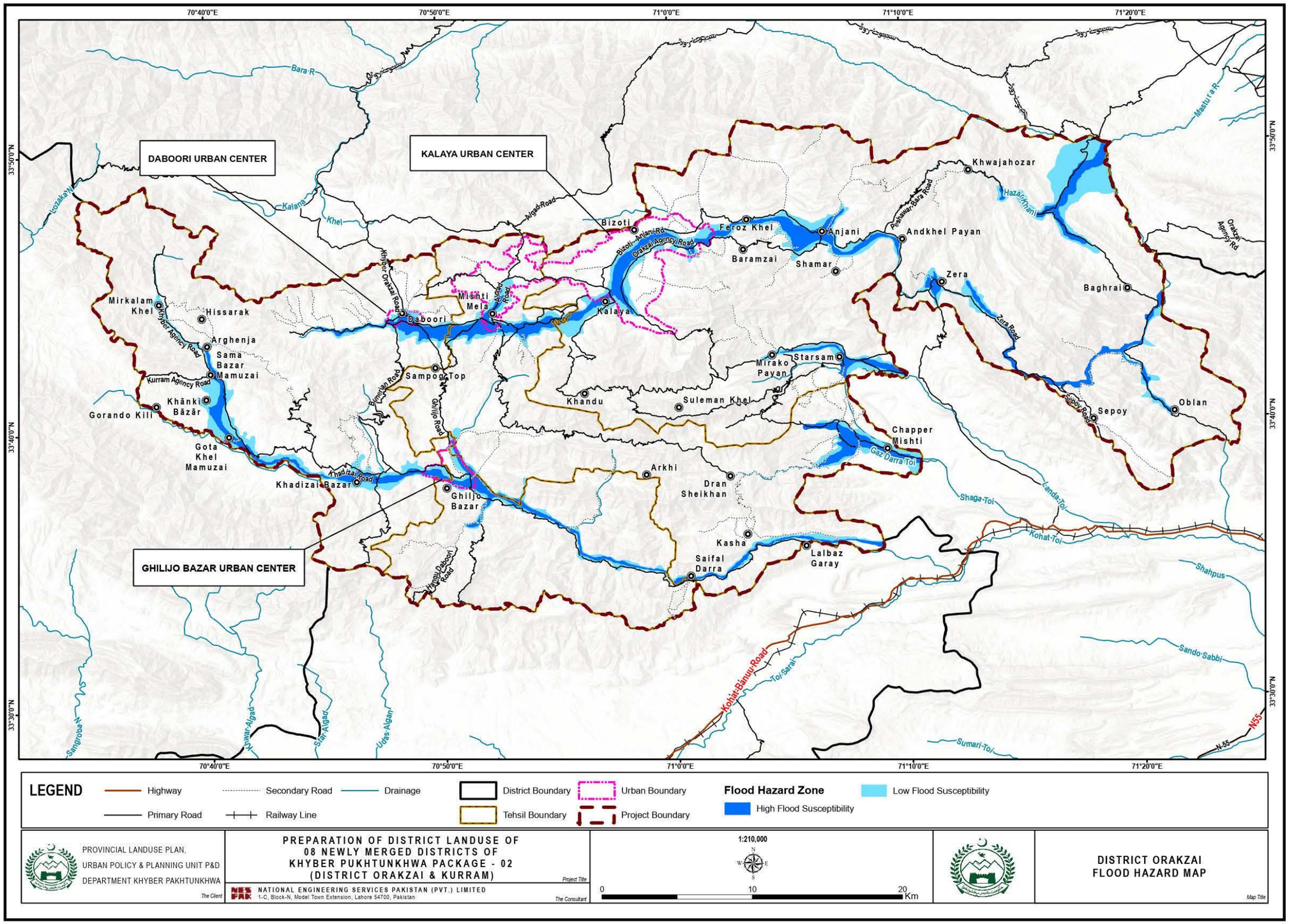
Riverine floods occur when rivers overflow their banks, inundating surrounding areas. Although riverine flooding is primarily caused by heavy rainfall, it can also result from snowmelt during the heat wave or cloud burst that may occur during the late monsoon months i.e., August and September. In District Orakzai, the widening of river spans and increased erosion, following the catastrophic 2010 and 2022 floods, have made the district more vulnerable. Population living near river banks and terraces face heightened risks during the monsoon season, with protective measures often compromised. Riverine floods can persist for days or even weeks depending on the terrain and the duration of the wet weather conditions.

Flash floods in District Orakzai are predominantly triggered by intense and short bursts of rainfall, particularly during the monsoon season. The mountainous and rugged terrain, coupled with seasonal streams increases the vulnerability to riverine floods.

3.13.4.4 Riverine Flood Hazard Susceptibility Zones of District Orakzai

The landscape of District Orakzai is fundamentally shaped by the powerful interplay of its mountainous topography and its three major drainage systems: the Mastura River, Hazar Khani Toi, and Kohat Toi. These fluvial systems and their tributaries create a complex hydrological network that directly determines the district's flood hazard patterns. The demarcation of Flood Hazard Susceptibility Zones classifies the terrain into High Flood Hazard (HFH) and Low Flood Hazard (LFH) zones, providing a critical spatial understanding of flood hazard risks. Please refer Map 3-41 for Flood Hazard Zoning Map of District Orakzai.

These zones reveal how the distinct characteristics of each river system influence flood behavior, where deep, incised valleys act as primary conduits for floodwaters, while the surrounding higher ground offers relative safety. However, this risk profile is not static; the accelerating impacts of climate change are projected to intensify the region's hydrological cycle, acting as a threat multiplier that exacerbates existing vulnerabilities across all three drainage basins and introduces new challenges to both high and low-risk areas.



LEGEND

Highway | Secondary Road | Drainage | District Boundary | Urban Boundary | Flood Hazard Zone | Low Flood Susceptibility

Primary Road | Railway Line | Tehsil Boundary | Project Boundary | High Flood Susceptibility

PROVINCIAL LANDUSE PLAN,
URBAN POLICY & PLANNING UNIT P&D
DEPARTMENT KHYBER PAKHTUNKHWA
The Client

PREPARATION OF DISTRICT LANDUSE OF
08 NEWLY MERGED DISTRICTS OF
KHYBER PUKHTUNKHWA PACKAGE - 02
(DISTRICT ORAKZAI & KURRAM)
Project Title

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED
1-C, Block-N, Model Town Extension, Lahore 54700, Pakistan
The Consultant

1:210,000
0 10 20 Km

DISTRICT ORAKZAI
FLOOD HAZARD MAP
Map Title

Map 3-57 Flood Hazard Zoning Map of District Orakzai

A – High Flood Hazard Zone

The High Flood Hazard (HFH) zones represent areas of greatest vulnerability to flood hazards, characterized by distinct linear patterns that precisely follow the active channels and floodplains of the district's major river systems. These zones form a dense, dendritic network that mirrors the drainage patterns of the Mastura River, Hazar Khani Toi, and Kohat Toi and their tributaries.

Along the Mastura River, the HFH zone exhibits particularly high risk due to the river's central position and large catchment area. The river's course through constricted gorges creates natural bottlenecks that amplify flood velocities and cause dangerous backwater effects during high discharge events. The convergence of multiple tributaries in this basin significantly increases the volume of floodwaters, posing substantial threats to settlements along its banks, including Kaskizar, Pakhtanai, Rangin Khel, Haider Khel, Aslam Garhi, Kharshah, Shiraz Garhi, Sultanzai, Anjani, Manzakhe, Dag Garhi, Kuz And Khel, Ziara, Pir Ziarat, Danai Khula, Bulahdar Mela, Babarki Ziarat, and Salaba Talao.

The Hazar Khani Toi Drainage Basin demonstrates characteristic flash flood behavior within its HFH zones. Steep gradients and confined valleys in this northwestern drainage system facilitate rapid concentration of runoff, resulting in short warning times and high-velocity flows. The dense network of tributaries feeding into the main channel creates multiple points of potential flood hazard initiation, especially during intense monsoon rainfall events, posing a critical threat to settlements such as Tariatang and Kata Kanari.

In the Kohat Toi Drainage Basin, the HFH zone shows distinct variations between its upper and lower reaches. The upper basin features confined, V-shaped valleys prone to flash flood hazards, while the lower basin transitions to broader floodplain inundation as the river loses topographic confinement. This southern drainage system poses significant threats to the more populated and developed areas in the lower district, where floodwaters can spread extensively across the widening valley, directly endangering the settlements of Tutanai, Guta Khel, Pacha Panra, Narik, Sarki Khel, Khwaga Tseri, Adu Garhi, Nari Caves, Katsa, Darra Algad, Bibi Zangala Ziarat, Mosone, Tuta Mela, Zaver Gareh, and Bahadari Mela.

Climate change is expected to intensify risks in all these river corridors significantly. The anticipated increase in frequency and intensity of extreme precipitation events will lead to more powerful and frequent flood hazards across all three systems. Changes in snowmelt patterns, including earlier melts and rain-on-snow events, will contribute to higher baseline river levels and sudden pulses of discharge, overwhelming these channels more frequently. Consequently, infrastructure, agriculture, or settlements within any of these river-specific HFH zones face escalating threats, demanding stringent development restrictions and robust protective measures tailored to each river's unique flood characteristics.

B – Low Flood Hazard Zone

The Low Flood Hazard (LFH) zones encompass the vast majority of the district's land area, representing terrain with significantly lower susceptibility to direct riverine flood hazard from the Mastura River, Hazar Khani Toi, and Kohat Toi systems. These areas comprise the higher ground including steep valley slopes, ridges, interfluves, and upland plateaus that form the catchment areas for the three major drainage basins.

However, the relative safety of these zones is being altered by climate change. While they remain safe from direct inundation by channel overflow of the major rivers, their role as runoff generators is intensifying. The slopes draining into the Mastura River are particularly crucial, as they feed the largest catchment in the district. More intense rainfall will increase surface water flow from these LFH zones into the Mastura system, potentially overwhelming its capacity during extreme

events. This dynamic poses a growing, indirect threat to low-lying areas such as Anjghalai, Janu Maya, Kar Mela, Jahanko, Kambar Namasai, Kanganai, Lar Kanre, Tambi Garhi, Zari Dar, Abdul Aziz Khel, Chamjanna, Tazi Khel, Daulat Musa, Ghulam Shah Pir Ziarat, Mandati, Khar Khushta, Lal Pura, Usai, Binai Garhi, Samain Darra, Spedara, Ublan, and Zagh Daria, where historically lower susceptibility is expected to be adversely affected by the amplified runoff from upstream.

In the Hazar Khani Toi catchment, the LFH zones on steep slopes face increasing risks of gully erosion and shallow landslides, which can transport substantial debris into the HFH channels below, posing a significant secondary hazard to areas such as Sawaikot Constabulary Guard and Baghrai.

Similarly, the Kohat Toi basin's LFH areas are experiencing heightened erosion rates that contribute to sediment loading in the main river channel, potentially reducing its capacity and increasing flood risks in downstream HFH zones, a process actively impacting slopes in areas such as Pakhar Nmasai, Latu, Barlas, Uribar, Gund Tseri, Ramadam, Haji Khan Garhi, Parshan Tang, Malang Garhi, Musa Mela, Taslo, Saifal Darra, Shakar Tangi, Khaori, Lal Shah Gareh, Lalbaz Gareh, Nawi Mela, and Mian Mela.

The LFH zones surrounding all three river systems now require careful geotechnical consideration in development planning. While they remain the most suitable areas for settlement expansion, their enhanced role in generating runoff and contributing to debris flow necessitates integrated watershed management strategies that address the interconnected nature of flood hazards across the entire district.

The clear demarcation between HFH and LFH zones reveals a sophisticated risk landscape directly governed by the behavior of the Mastura River, Hazar Khani Toi, and Kohat Toi drainage systems. Flood hazard zonation provides a vital tool for proactive risk management by confirming that the most significant flood risk is confined to river valleys. Although higher ground has traditionally served as a buffer, this layer of protection is being progressively compromised by climate change. Effective, long-term disaster risk reduction depends on river-specific planning that accounts for the unique hydrology of each drainage system. This necessitates preserving the HFH zones of all three major rivers as natural floodways, concentrating development on the stable terrain of LFH zones with careful consideration of their evolving role in the hydrological system, and implementing watershed management strategies that address the increased runoff and erosion driven by a changing climate. Ignoring these dynamics will render static hazard maps inadequate, increasing vulnerability to the growing and evolving flood threats across District Orakzai's complete river network.

3.13.4.5 Flood Hazard Management

Anticipatory actions are critical in reducing the impact of floods on vulnerable households by prioritizing which are most at risk. Recognizing the challenges posed by monsoon seasons, the Government of Khyber Pakhtunkhwa is actively utilizing available resources to mitigate disaster risks and enhance preparedness to minimize losses to lives and property. While the provincial government is committed to improving flood management systems, several constraints hinder progress. These include insufficient water storage facilities, ineffective regulations, and inadequate early warning systems.

Currently, the early warning and flood forecasting system in the province relies on telemetry equipment installed by the Provincial Disaster Management Authority (PDMA), WAPDA, and the Irrigation Department. However, the response times provided by this system are limited 24-48 hours for the Swat River, 5-7 hours for the Kabul River, and 36-48 hours for the Indus River at Dera Ismail Khan. These response times are insufficient for effective evacuation of vulnerable communities in flood-prone areas.

Drawing from past experiences and global best practices, anticipatory response actions are expected to save lives, protect assets, and reduce costs. These actions should focus on five key areas for success:

1. Implementing robust forecasting systems integrated with a clear decision-making process based on triggers.
2. Securing financial commitments from the government for contingency funding.
3. Ensuring broad geographic reach to maximize the number of beneficiaries.
4. Developing a collective, inter-agency action plan that includes cash compensation and other necessary interventions.
5. Learning from previous experiences to improve future responses.

In addition, flash floods in the province's mountainous regions remain a significant concern due to the lack of early warning systems. The province has seen minimal investment in water storage capacity, which could significantly reduce flood vulnerability. Existing storage facilities are further compromised by silting, a common issue that reduces their effectiveness in flood mitigation.

3.13.5 Landslides

3.13.5.1 Preamble

A landslide is the movement of a mass of rock, debris, or earth down a slope, driven either by gravity or during by a seismic activity. Landslide is one of the typical phenomenon of "mass wasting," which encompasses all types of down-slope movements of soil and rock. Landslide is a generic term which involves so many types of manifestations that result in the downslope movement of rock and /or soil mass such as rockfalls, rockslide, shallow or deep-seated slope failures, earth slumps, mudflows and debris flows. These natural hazards frequently occur in hilly terrains in conjunction with earthquakes, wet weather floods, and volcanic activity.

As regards, Khyber Pakhtunkhwa province, landslides have had significant impacts in recent years. On January 20, 2022, heavy rains caused severe landslides near Alpuri, the capital of District Shangla. This event resulted in the deaths of at least eight people, with five bodies recovered and one person reported missing. Six individuals were rescued, but the landslide blocked a major road and destroyed a family house.

Another major landslide occurred on April 18, 2023, near the Torkham border in District Khyber, which lies at the crossing between Pakistan and Afghanistan. This landslide caused at least three deaths, trapped several people, and buried 20 vehicles, including large trucks. The scale of this disaster was significant that required a massive operation for many weeks to reinstate the area and clearing of the rubble to make the road operational.

3.13.5.2 Landslide Hazard Vulnerability

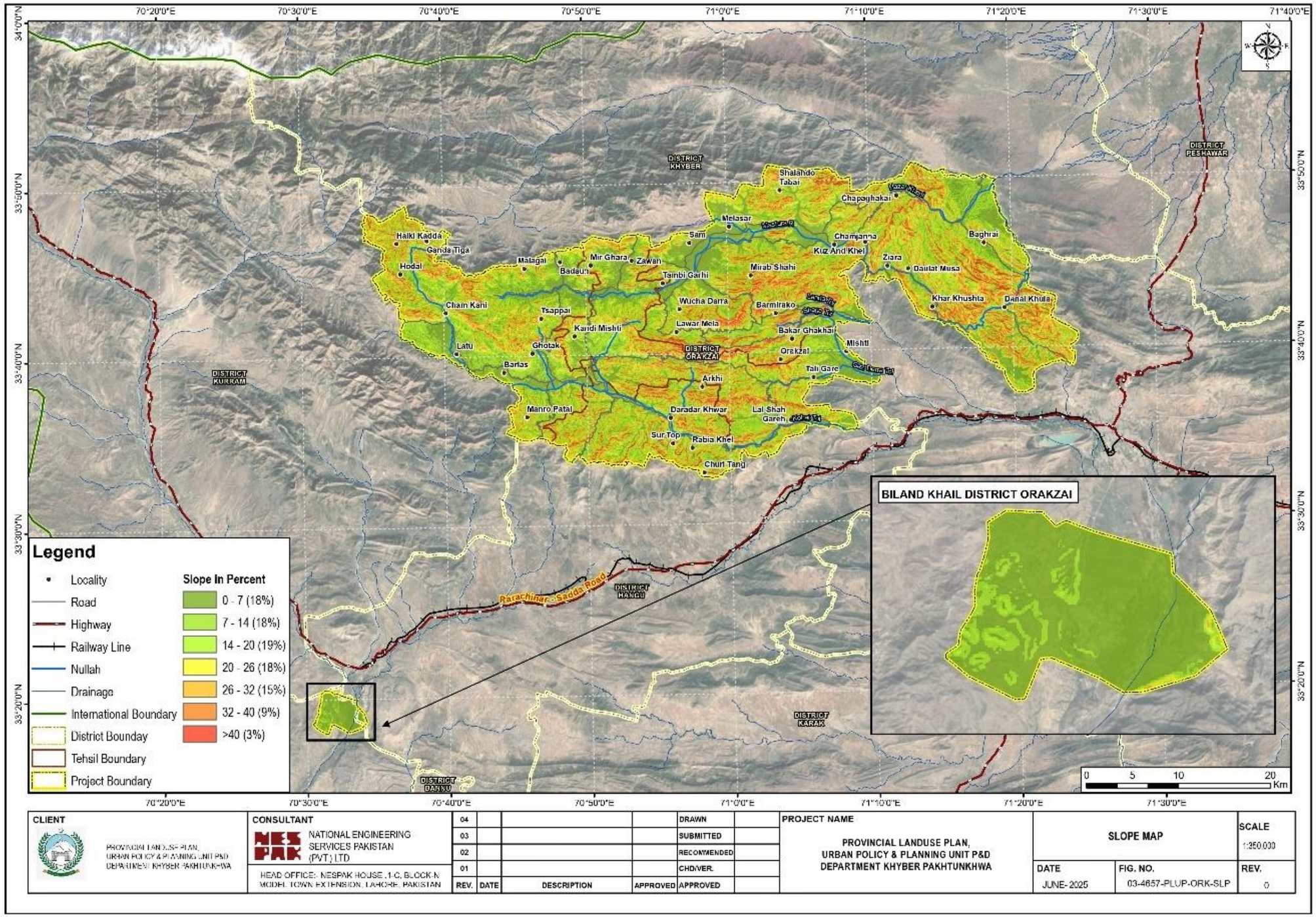
Identifying regions vulnerable to landslides involves analyzing geological, environmental, climatic, and human factors. Geologically, areas with loose soils, such as clay or sand, or fractured rock formations, are more prone to landslides. Steep slopes, especially near geological fault zones, increase the risk, particularly in earthquake-prone regions.

Vegetation plays a key role in stabilizing soil, so areas with little vegetation face higher risks. Poor drainage or excessive water saturation from heavy rainfall, flooding, or snowmelt can destabilize slopes, leading to landslides, as wet soils lose strength. The climate also contributes to landslide vulnerability, with regions experiencing heavy rainfall or rapid snowmelt being particularly susceptible. Human activities like construction, deforestation, and mining can further destabilize slopes, increasing the likelihood of landslides.

Historical data and landslide hazard maps are crucial for identifying at-risk regions, while technological tools like remote sensing and Geographic Information Systems (GIS) enhance monitoring and risk assessment. By combining these factors, it becomes possible to identify landslide-prone regions and implement preventive measures.

A landslide triggered by a blast at a coal mine, buried about 33 miners under mud in March 2018. Rescue teams and local tribesmen worked with shovels due to the lack of machinery, successfully pulling out 18 miners alive, though eight were critically injured and hospitalized. Officials estimated that 25 to 33 miners remained trapped, while locals reported over 40 people were inside the mine when the blast occurred.

Steep slopes are more prone to landslides, especially when they exceed a certain angle threshold, usually, it is around 20-30 degrees. District Orakzai has mainly hilly terrain which reach up to an elevation of more than 2500 meters. Due to this hilly terrain, the slope of some areas is greater than 20-30 degrees. Please refer to Map 3-58 Slope Map of District Orakzai.



Map 3-58 Slope Map of District Orakzai

Landslide Susceptibility Zoning

As part of the Master Planning for District Orakzai, a spatial assessment of landslide susceptibility has been carried out to guide sustainable Landuse and minimize disaster risks. District Orakzai lies within a dissected landscape, characterized by steep escarpments, narrow valleys, fragile lithologies, and active drainage networks, which together create conditions favorable for slope instability. Seasonal heavy rainfall, seismic activity due to proximity to tectonic zones, and unplanned human interventions such as road cuts and deforestation further amplify the risk of landslides in the region. The accelerating impacts of climate change, particularly through altered precipitation regimes, are a critical factor that is likely to increase landslide frequency and expand susceptible areas in the future.

Based on geomorphological interpretation, GIS-based delineation, and terrain analysis, the district area has been divided into four susceptibility zones:

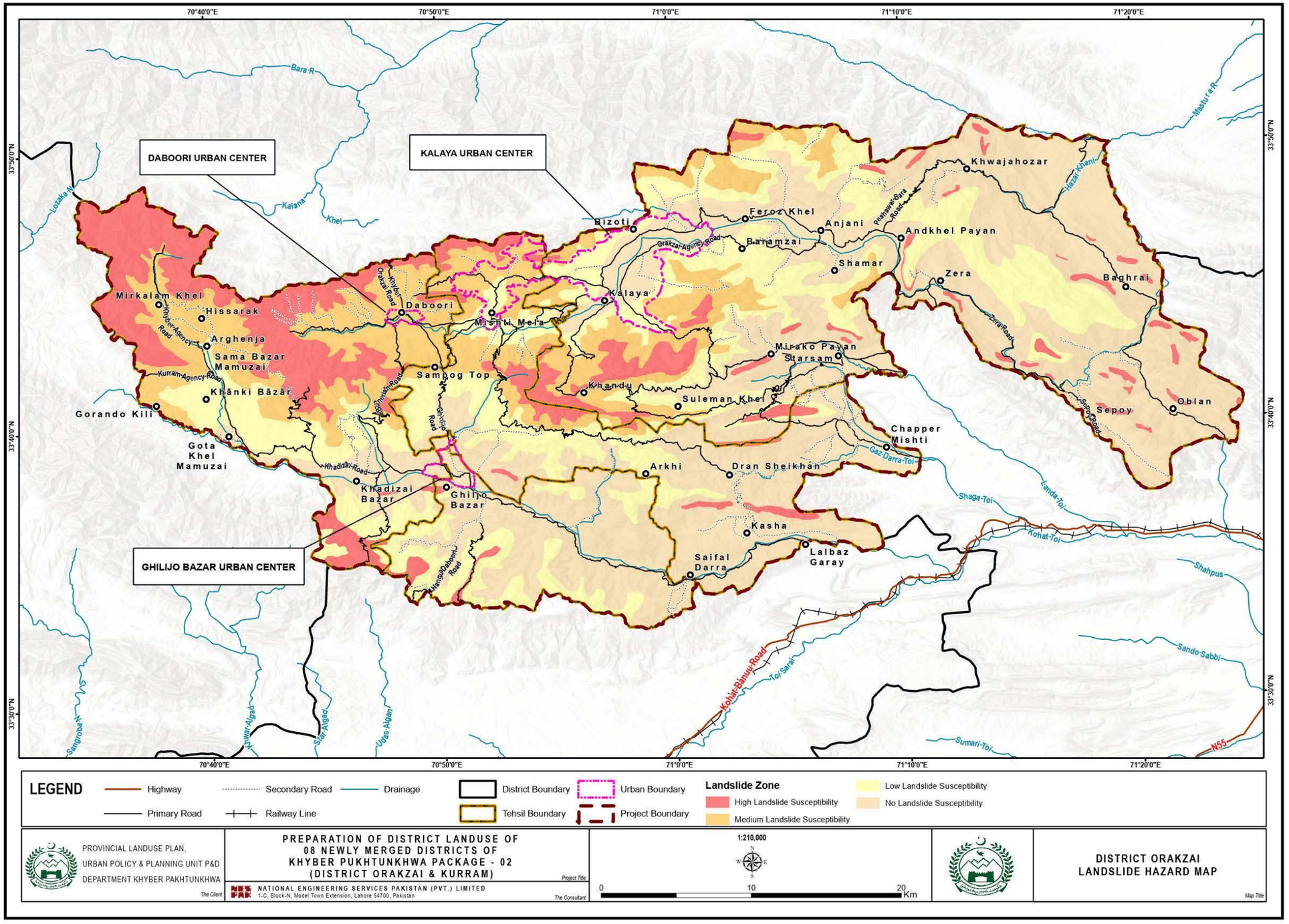
A – High Landslide Susceptibility Zone (HLS)

B – Moderate Landslide Susceptibility Zone (MLS)

C – Low Landslide Susceptibility Zone (LLS)

D – No Landslide Susceptibility Zone (NLS)

This classification provides a crucial planning layer to ensure that future development activities are aligned with the stability of the terrain. However, this static assessment must be viewed in light of the dynamic changes expected from a warming climate, which could push slopes in Moderate and even Low susceptibility zones toward failure. Please refer Map 3-43 Landslide Hazard Susceptibility Zones Map of District Orakzai.



LEGEND

Highway | Secondary Road | Drainage | District Boundary | Urban Boundary

Primary Road | Railway Line | Tehsil Boundary | Project Boundary

Landslide Zone

High Landslide Susceptibility | Low Landslide Susceptibility

Medium Landslide Susceptibility | No Landslide Susceptibility

PROVINCIAL LANDUSE PLAN,
URBAN POLICY & PLANNING UNIT P&D
DEPARTMENT KHYBER PAKHTUNKHWA
The Client

PREPARATION OF DISTRICT LANDUSE OF
08 NEWLY MERGED DISTRICTS OF
KHYBER PUKHTUNKHWA PACKAGE - 02
(DISTRICT ORAKZAI & KURRAM)
Project Title

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED
1-C, Block-N, Model Town Extension, Lahore 54700, Pakistan
The Consultant

1:210,000

0 10 20 Km

DISTRICT ORAKZAI
LANDSLIDE HAZARD MAP
Map Title

Map 3-59 Landslide Hazard Susceptibility Zones Map of District Orakzai

A – High Landslide Susceptibility Zone (HLS)

High susceptibility zone (HLS) represents the most hazard-prone areas within District Orakzai. These are primarily located along steep valley sides, road corridors that cut across unstable slopes, and areas subjected to toe erosion from rivers and streams. The combination of steep gradients, fractured rock masses, and intense rainfall makes these areas highly prone to rockfalls, debris flows, and shallow to deep-seated slope failures.

Any settlements or infrastructure falling within HLS zones face direct and immediate hazard risk, often requiring continuous maintenance or emergency interventions. Such areas should be recognized as the most unstable parts of the district, with slope instability processes shaping both land use and natural resource patterns. Climate change will disproportionately affect these zones. More frequent and intense rainfall events will increase pore-water pressure, saturate soils more thoroughly, and enhance erosion, leading to a higher frequency of slope failures and potentially expanding the spatial extent of HLS areas over time.

B – Moderate Landslide Susceptibility Zone (MLS)

The Moderate Landslide Susceptibility Zone (MLS) form transition belts between highly unstable and relatively stable terrain. These slopes are generally stable under normal conditions but are susceptible to failure during intense rainfall events, earthquakes, or unregulated anthropogenic activities. Activities such as road construction without slope reinforcement, deforestation, poor irrigation management, and quarrying can accelerate the shift from moderate to high hazard conditions.

In these areas, slope failures are often seasonal or event-driven. Slope failures may not be visible throughout the year but can be triggered rapidly when environmental or human-induced stress exceeds the slope's natural stability. Their presence highlights the need for careful consideration of natural thresholds in the district's land-use framework. The impact of climate change is particularly significant in MLS zones. These areas host a large number of "threshold slopes" that are currently marginally stable. Increased rainfall intensity and duration can be the decisive factor that pushes these slopes past their stability limit, effectively converting large MLS areas into High Susceptibility zones during extreme weather events.

C – Low Landslide Susceptibility Zone (LLS)

LLS zone represent relatively stable slopes with gentle to moderate gradients. Failures here are rare but can still occur in localized pockets, especially along stream banks, road embankments, or poorly drained sites. These areas are considered the primary target for planned expansion, as they balance availability of land with acceptable levels of hazard.

Localized landslides in these areas are usually shallow and small-scale, often associated with soil saturation, minor undercutting, or surface erosion. They pose limited widespread threat but still require awareness in order to maintain their current stability. Under climate change, the stability of LLS areas cannot be taken for granted. Prolonged wet periods can lead to progressive soil saturation, increasing the likelihood of shallow translational slides and soil erosion even on gentler slopes, thereby elevating the localized risk.

D – No Landslide Susceptibility Zone (NLS)

The No Landslide Susceptibility zone (NLS), comprising flat valleys, terraces, and stable ridges, are considered safe ground for intensive land-use activities. These areas present minimal risk of

slope instability and therefore form the most favorable locations for settlement expansion, agricultural intensification, and major infrastructure projects.

These landscapes remain stable due to their low relief and favorable drainage conditions, with minimal geomorphic processes acting to destabilize slopes. As a result, they provide the most reliable terrain within District Orakzai for sustaining long-term development and population growth. While climate change is unlikely to directly induce slope failures in these truly flat areas, its indirect effects are crucial. These NLS zones often coincide with floodplains, which are themselves projected to face increased inundation risks due to climate-driven hydrological changes. Therefore, the safety of NLS zones from landslides does not imply immunity from other climate-aggravated hazards like floods.

3.13.5.3 Landslide Safety Guidelines

When planning a trip to hilly regions, ensure your tour aligns with weather forecasts and advisories from the weather department or news channels. In case of a landslide, move quickly away from the landslide path or downstream valleys without wasting time. Keeping drains clear is essential; inspect them regularly for blockages such as litter, leaves, plastic bags, or rubble, and ensure that weep holes remain open. Planting more trees can help stabilize the soil, as tree roots provide natural reinforcement. Be vigilant for signs of landslides, such as rockfalls, subsidence of buildings, or cracks in the ground. Muddy river waters can also indicate landslides upstream. If you notice any of these warning signals, immediately contact the nearest Tehsil or District Headquarters.

Protect slopes by ensuring the toe of the slope is not cut and remains intact, and avoid uprooting trees unless re-vegetation is planned. Stay alert for unusual sounds, such as cracking trees or boulders colliding, as these can indicate an impending landslide. Follow the "3A's" rule: stay alert, awake, and active during the impact or when there's a likelihood of a landslide. Locate and go to designated shelters, and try to stay with your family and companions. After the danger has passed, check for injured or trapped persons. When trekking, mark your path to avoid getting lost, and familiarize yourself with emergency communication methods to signal helicopters or rescue teams.

To minimize risk, avoid constructing buildings or staying in vulnerable areas prone to landslides. Stay calm and conserve your energy instead of panicking. Avoid walking on loose materials or near damaged electrical wiring and poles. Building houses near steep slopes or drainage paths increases the risk of disaster. Refrain from drinking potentially contaminated water from rivers, springs, or wells; rainwater, if directly collected, is usually safer. Only move an injured person after administering first aid unless they are in immediate danger.

3.13.5.4 Conclusions

The landslide susceptibility assessment of District Orakzai highlights the strong influence of topography, geology, and human activity on slope stability. By distinguishing areas into high, moderate, low, and no susceptibility zones, the study provides a clear understanding of the district's landslide hazard distribution. The identification of these categories underscores the varying degrees of exposure and stability across the landscape, ranging from hazardous escarpments and active slopes to safe valley bottoms and terraces. Recognizing and mapping these conditions forms an essential foundation for informed decision-making, ensuring that geohazards are adequately considered in the future growth and development of the district.

3.13.5.5 Hill Torrents

Flash floods and Hill Torrents can develop rapidly, often within minutes or hours after heavy rainfall, causing sudden surges of water and debris through riverbeds, valleys, and low-lying

areas. The region's rapid climate changes, combined with the limited absorption capacity of the soil, further exacerbate the situation. Flash floods often overwhelm natural and man-made drainage systems, leading to severe impacts on communities, including damage to homes, infrastructure, and agricultural lands.

As Hill torrents are unpredictable and /or erratic in nature which usually occurs in Monsoon. Prolonged torrential rain during late summer monsoon (August to September) and steep gradient streams after a heavy and sudden downpour or a cloud burst often cause unprecedented hill torrents in the major and minor streams. The steep gradient and gorgeous incoming tributaries of Mastura River and Khanki Khwar are susceptible to generate hill torrents. Furthermore, the low-lying drainage basin areas of Mastura River and Khanki Khwar may generate hill torrents affecting the localities of Arya, Arghenja, Kharsha, Badgor along the Mastura River and Ghiljo Bazar, Anjawar along the Khanki Khwar are highly vulnerable.

3.13.6 LOSS OF CULTIVATED AND ARABLE LAND

In a mountainous area where the slopes are steeply inclined and have bedrock is exposed, very limited lands are available which can sustain development such as hillslope forming, construction of houses, and other infrastructures elements. In this perspective, when the developed land parcels are sparse, the less of such lands is very critical as it drastically affects the built-up areas, hillslope farming and cultivated riverine terraces.

The loss of cultivated and arable land is the result of land de-gradational processes which are primarily attributed to surface runoff, flood flows in streams/ rivers and differential erosion.

Land de-gradation caused by floods and erosion is a major natural hazard that reduces the productivity of the land and affects agriculture, livelihoods, human settlements and environment. In a broader sense, loss of sustainable and developable land is the result of land degradation processes and agencies which result in either decline in land quality or the physical loss of the land parcels by erosion resulting from floods.

- **Floods**: Floods can degrade land parcels through a number of processes such as erosion, water logging, deposition of debris and gully erosion.
- **Soil erosion:** Fast-moving flood waters in huge influx wash away the top soil cover saturates the top soil layer, which is the most fertile layer of soil.
- **Water logging:** excess water saturates the top soil layer which perish the crops and orchards resulting in the depletion or oxygen. The salt content in the soil is increased to enormous amounts and the land is ultimately redundant.
- **Deposition of Debris:** when flood water over run the lands developed for agriculture and when the flood water drains off, the land is covered by deleterious materials, wooden logs, debris and other waste materials. Therefore, a considerable effort is required to make the land suitable for cultivation.

3.13.6.1 Mitigation and Prevention

Protection works to prevent the loss cultivable and arable lands which requires certain measures a few of them are listed as under:

- Design of Engineering Solutions comprising protection works such as retaining walls, slope protection, runoff control, channelization of drainage, water diversion works etc.
- Soil conservation techniques such as contour plowing, terrace forming, tree plantation and vetiver grasses etc.
- A-Forestation and Re-Forestation: Tree Plantation of specific species whose roots hold soils at place and reduce runoff.

- Flood Control Measures: Construction of run of Dams, water storage ponds, leeves and check dams with appropriate drainage system.
- Sustainable Farming Practices: it requires indigenous species of crops, reduced tillage and mulching.
- Community Awareness Campaigns: Education of local community through workshops, seminars and short training courses to learn land conservation techniques.

3.13.7 Bank Collapse

Bank collapse along with land degradation is a very common and natural phenomenon where the natural streams traverse through a terrain covered by unconsolidated colluvial soils and terrace deposits. Assessment of bank collapse has been made using satellite image. The low lying terraced lands along the banks of Mastura river such as Anjani, Shiraz Garhi Kharshah , Hisar, Tazi khel, Dana Khwla and the localities of Shahu khel, Suleman Khel along Khanki Khwar or highly susceptible to bank collapse which progressively spoils and consumes the cultivable lands.

3.14 District Economy

Orakzai district is a mountainous tract dissected by numerous dry water courses especially in the south western part. The capital of Orakzai Agency is Kalaya Town. Orakzai District has a diverse and evolving economic landscape influenced by its cultural heritage, natural resources. The economy is based on subsistence level agriculture, livestock breeding, and small businesses conducted locally. People mostly seek employment in other areas of the country or outside Pakistan. Tourism is still an underdeveloped sector, especially in comparison to its potential. Apart from institutional, policy and shifting game, it also severely lacks infrastructure and services. Most of the tourist sites even do not have access and good quality restaurants and hotels. People have to survive on minimal standard of living which are discouraging signs for the development of tourism. The efforts of KP Government could promote the tourism sector, establish mineral processing and value addition facilities, oil and gas service industry in the district could flourish with the help of potential investors. The district would surely be profitable for investment in the long run. by harnessing its agricultural land and mineral resources and tourism potential, new job opportunities can emerge, reducing unemployment and improving living standards. As employment increases, poverty declines, fostering a more stable community. Growth in key sectors like agriculture, livestock, and mining also drives infrastructure improvements, enhancing roads, transportation, and energy supply. This connectivity boosts access to services such as healthcare, education, and markets, making the district more attractive to investors. Furthermore, economic development strengthens social progress, enabling investments in education, healthcare, and sanitation, leading to a cycle of continuous development and improved quality of life.

3.14.1 Agriculture Sector

3.14.1.1 GDP

Agriculture is a pivotal sector in the economy of Khyber Pakhtunkhwa, contributing 24.7% to the regional GDP and employing 31.8% (LFS 2020-21) of the workforce.

Table 3-132 GDP Estimates of Khyber Pakhtunkhwa (2015-22 - Rs. Million)[74]

S. No.	Description	Average (2015-2022)	% Share	CAGR
A	Agriculture Sector	899,973	24%	2.30%
B	Industries	1,044,300	27%	5.06%
C	Services Sector	1,866,199	49%	3.69%
GDP of Khyber Pakhtunkhwa		3,810,472	100%	3.72%

Despite its importance, the sector faces several challenges, including low productivity, outdated technology, and sustainability issues. These problems are compounded by inadequate research facilities and limited community capacity to manage agricultural calamities. The insufficient allocation of resources in the Khyber Pakhtunkhwa Annual Development Programme (ADP) has hindered progress in addressing issues related to productivity, food security, and rural livelihoods. In District Orakzai, agriculture remains a crucial industry, employing 27% of the local workforce, underscoring its significant role in the local economy.

[74] Development Statistics of KP 2023-24

3.14.1.2 Land Utilization

The agricultural land utilization in District Orakzai reveals of the district's total reported area of 153,761 hectares[75], only 17,862 hectares are actively cultivated. A substantial portion of the land remains uncultivated, with 2,254 hectares classified as culturable waste, 128,541 hectares unavailable for cultivation, and 5,104 hectares designated as forest.

Table 3-133: Land Utilization in District Orakzai

District	Reported Area (3+8)	Cultivated Area			Cropped Area		Un-Cultivated Area			
		Total (4+5)	Net Sown	Current Fallow	Total (4+7)	Area sown more than once	Total (9+10+11)	Culturable Waste	Forest	N.A for Cultivation
1	2	3	4	5	6	7	8	9	10	11
Orakzai	153,761	17,862	5,511	12,351	12,532	7,021	135,899	2,254	5,104	128,541

This indicates that while a considerable amount of land remains unused for agricultural purposes, there is potential for expanding farming activities. Enhancing irrigation infrastructure and implementing better land management practices could significantly increase the area available for cultivation and improve overall agricultural productivity.

3.14.1.2.1 Crop Production Profile

The production profile of crops in District Orakzai highlights both potential and challenges. Major crops in the district include wheat, Maize, Rice and Jowar. However, crop yields have experienced fluctuations over the years, influenced by factors such as climate change, water availability, and soil fertility. There is also cultivation of fruits and vegetables in the district as shown in. Table **3.96** however these are in very low numbers:

Table 3-134: Crops, Area, Production and Yield in District Orakzai[76]

Commodity	Wheat			Maize			Rice			Jowar		
District	Area (Ha)	Production (Tonnes)	Yield per Ha (Kg)	Area (Ha)	Production (Tonnes)	Yield per Ha (Kg)	Area (Ha)	Production (Tonnes)	Yield per Ha (Kg)	Area (Ha)	Production (Tonnes)	Yield per Ha (Kg)
Orakzai	4,768	8,690	1,823	5,335	5,949	1,115	386	703	1,821	125	71	568

These figures highlight the key crops in the district, with wheat and maize being the dominant crops in terms of both area and production.

Table 3-135 : Vegetable and Fruits Cultivation in District Orakzai

	Rabi Vegetables			Rabi Fruits			Kharif Vegetables			Kharif Fruits		
District	Area (Ha)	Production (Tonnes)	Yield per Ha (Kg)	Area (Ha)	Production (Tonnes)	Yield per Ha (Kg)	Area (Ha)	Production (Tonnes)	Yield per Ha (Kg)	Area (Ha)	Production (Tonnes)	Yield per Ha (Kg)
Orakzai	56	466	8,321	29	168	5,793	188	1,117	5,941	198	2,187	11,045

[75] Development Statistics of KP 2023-24
[76] Development Statistics of KP 2023-24

In Orakzai District, the area devoted to Kharif fruits (198 hectares) produced the highest yield per hectare (11,045 kg), followed by Rabi vegetables with a yield of 8,321 kg per hectare. Kharif vegetables and Rabi fruits also had respectable yields, with Kharif vegetables producing 5,941 kg per hectare and Rabi fruits producing 5,793 kg per hectare.

3.14.1.2.2 Challenges and Potential

The agriculture sector in District Orakzai faces significant challenges, including low productivity, outdated technology, and limited irrigation infrastructure. Addressing these issues is crucial for realizing the sector's economic potential. Improving irrigation infrastructure, adopting modern agricultural practices, and increasing investment in research and development are key strategies that could enhance productivity and support sustainable growth. The district's potential for expanding its cultivated area and improving crop yields presents an opportunity to boost the local economy, particularly in rural areas where agriculture is a primary source of livelihood.

The agriculture sector in District Orakzai substantial economic potential. By overcoming challenges related to low productivity and outdated practices, and by investing in modern infrastructure and technology, the district can significantly enhance its agricultural output.

3.14.1.2.3 Livestock Population and Opportunities for Growth

District Orakzai livestock population is not very high. The district is home to a total of 614,473 animals, which constitutes 1.7% of Khyber Pakhtunkhwa's. Table reveals that overall livestock population. Key livestock includes 78,152 cows, 58,003 sheep, and 112,989 goats, alongside smaller populations of buffaloes, camels, and other animals. While these numbers represent a relatively small percentage of the provincial totals, they highlight the district's potential for growth. With strategic investments in livestock farming, particularly in breeding and nutrition, Orakzai could expand its livestock production and enhance its contribution to the provincial economy.

Table 3-136: Livestock Population in District Orakzai

	Total	Cattle	Buffaloes	Sheep	Goats	Poultry	Camel	Horse	Donkey	Mules	Other
Khyber Pakhtunkhwa	**47,911,692**	**8,837,227**	**3,402,135**	**4,219,238**	**10,041,678**	**19,100,442**	**124,663**	**268,953**	**502,821**	**302,210**	**1,112,325**
Orakzai	614,473	78,152	28,877	58,003	112,989	329,425	577	114	3,827	614	1,895

The livestock population in Orakzai District is significantly smaller compared to Khyber Pakhtunkhwa as a whole. Goats and poultry represent the majority of livestock in the district, with cattle and buffaloes having much smaller populations. The district's livestock sector is an important part of its economy but operates on a smaller scale than the broader provincial figures.

3.14.1.2.4 Livestock Infrastructure

The district has established a solid infrastructure to support its livestock sector.

Table 3-137 Number of Hospital, Veterinary, Dispensaries, and centers[77]

District	2020-21				2021-22				2022-23			
	Total	Hospitals	Dispensaries	Centres	Total	Hospitals	Dispensaries	Centres	Total	Hospitals	Dispensaries	Centres
Orakzai	65	4	25	36	65	4	25	36	60	4	30	26

District Orakzai boasts 60 veterinary facilities, including hospitals, dispensaries and centres, which are essential for maintaining animal health and productivity. Mobile veterinary clinics complement these facilities by providing disease prevention, treatment, and vaccination services, ensuring that livestock remains healthy and productive. District currently has no slaughterhouse facility which shows lack compliance to health standards and meat processing facilities in the district.

3.14.1.2.5 Challenges and Potential

The livestock sector in District Orakzai holds considerable economic potential, particularly in light of the growing international demand for halal food products. However, with lack of slaughter house and limited diseases management utilization of livestock potential is limited. With appropriate policies and investments, this sector could become a cornerstone of the district's economy. Livestock farming plays a crucial role in providing essential products such as meat, milk, hides, wool, and bones, which are integral to local consumption and trade. Furthermore, livestock offers a consistent source of daily income and employment for farmers, serving as a buffer against agricultural uncertainties like crop failures.

3.14.2 Industries

District Orakzai, is characterized by hilly terrain, has untapped potential within its industrial sector. The current landscape comprises 9 small-scale industrial units, all within the primary sector, emphasizing the district's reliance on natural resources and agriculture. These industries, while modest in scale, provide an essential economic foundation, offering a pathway for future industrial growth and diversification.

Table 3-138 Number of Industries in Orakzai District[78]

District	2020-21			2021-22			2022-23		
	Total	Running Unit	Closed Unit	Total	Running Unit	Closed Unit	Total	Running Unit	Closed Unit
Orakzai	10	10	-	10	10	-	9	4	5

[77] Directorate General (Extention) Livestock & Dairy Development Khyber Pakhtunkhwa

[78] Development Statistics of KP 2023-24

3.14.2.1 Type of Industries

The existing industries in District is only connected stone crushing plant. currently there are four stone crushing plants in the district. other than small scale industrial units, there are four godowns in the district details of which is shown below in **Table 3-139**[79]

Table 3-139: Godowns in District Orakzai

Type	No of Godowns
Flour Sugar	2
Sweets/Biscuits	2

3.14.2.2 Trade and Commerce

Trade and commerce in Orakzai are centered around local markets or bazaars, which are essential for the exchange of goods and services. These markets are hubs for daily trading and have a significant role in local commerce. Some of the notable markets include:

- **Kada Bazaar**
- **Mishti Mela**
- **Ghaljo Bazaar**

These markets cater to the needs of local residents, with vendors selling agricultural produce, livestock, textiles, household goods, and other essentials. In addition, the markets provide a platform for the exchange of handicrafts and regional products, making them vital for local trade.

Orakzai's location near key trade routes also presents opportunities for cross-border trade, connecting to Afghanistan and other parts of Pakistan. Over the years, these trade routes have allowed goods like textiles, spices, and agricultural products to move between different regions.

3.14.2.3 Mining

District Orakzai has considerable deposits of minerals especially coal[80]. Coal is crucial for local energy production and various industrial processes, yet its extraction has been irregular, with notable peaks in production occurring sporadically. There is also some mining of latrite in the district but with limited quantity.

Table 3-140: Mining in District Orakzai (Tonnes)

Type of Minerals	Orakzai		
	2020-21	2021-22	2022-23
Coal	95,648	96,570	80,540
Latrite	9,261	1,540	325

3.14.2.4 Tourism

Orakzai is blessed with scenic landscapes and historical landmarks that could become significant drivers for tourism. The region's natural beauty, along with historical sites such as the Lockhart Fort and Gulistan Fort, could attract domestic and international tourists. The

[79] Directorate General of Industries and Commerce KP
[80] Development Statistics of KP 2023-24

development of these sites into tourist resorts or cultural hubs would generate income and create employment.

- Lockhart Fort: This historical fort, located on a hilltop, offers views of the surrounding areas and holds cultural and historical significance.
- Gulistan Fort: A strategic military fort that could be marketed as a heritage tourism site.

Promoting eco-tourism, heritage tourism, and adventure tourism (such as trekking and hiking in the region's mountains) could boost the district's economy.

3.14.2.5 Challenges and Potential

District Orakzai is rich in deposit of coal. however, mining is limited due to Poor infrastructure for mining and environment related concerns. these can be overcome by establishment of mining and mineral processing facilities for value addition and job opportunities. District also possess scenic landscapes and historical land marks like Lockhart fort and Gulistan Fort. There is considerable potential for tourism however these are limited due to lack of infrastructure and security concerns. there is need of ddevelopment of historical sites as tourist attractions.

Several challenges affect the trade and commerce sector in District Orakzai. There is an uneven distribution of commercial activities, with Urban Center dominating, potentially leading to economic disparities across smaller urban centers. Limited infrastructure in these smaller centers affects service availability and could hinder local development. Furthermore, traditional markets may struggle to compete with modern retail formats, and occasional markets require effective management to maintain quality and consistency.

Addressing these issues through improved infrastructure planning, balanced commercial development, and modernization of traditional markets will be crucial for fostering sustainable economic growth and enhancing the overall commercial potential of District Orakzai.

3.14.3 Key Economic Drivers

Key economic drivers are fundamental sectors, activities, or factors that significantly influence and sustain the economic performance and growth of a region, country, or industry. These drivers are crucial because they directly impact overall economic stability, development, and prosperity. They can be broadly categorized into primary and secondary drivers.

District Orakzai economy is supported by a combination of primary drivers such as agriculture, mining, with secondary drivers including cattle farming, and tourism.

3.14.3.1 Primary Economic Drivers

Primary economic drivers are the core sectors or activities that form the foundation of an economy. They typically include natural resources such as agriculture, mining, and energy production, as well as manufacturing and industry, which involve the production and processing of goods. These primary drivers provide the essential resources and outputs that fuel economic activities and growth.

3.14.3.1.1 Agriculture

Agriculture is the backbone of District Orakzai economy, supporting the livelihoods of a significant portion of the population. Key crops include wheat, Maze and various fruits and vegetables. The district's agricultural productivity is influenced by factors such as climate, soil quality, and irrigation practices. The sector contributes substantially to local employment and food security.

3.14.3.1.2 Livestock

Livestock farming is primary livelihood in the district due to district population being mostly rural. This contribute significantly to local livelihood and is the primary main economic driver in District

3.14.3.1.3 Mining

The mining sector plays a crucial role in Orakzai economy, with significant mineral resources such as coal and Laterite. These resources are essential for local industries, including energy production and construction. Mining activities also create job opportunities and contribute to regional development.

3.14.3.2 Secondary Economic Drivers

Secondary economic drivers are supportive sectors that enhance and complement the primary drivers. These include various services such as retail, healthcare, education, and tourism, as well as infrastructure like transportation, construction, and utilities. While not the primary sources of economic output, these secondary drivers play a crucial role in supporting and expanding the economic framework established by the primary sectors.

3.14.3.2.1 Tourism

While not as developed as other sectors, tourism has potential as a secondary economic driver in District Orakzai. Attractions such as local bazaars, cultural events like melas, and natural landscapes offer opportunities for tourism-related activities. Expanding tourism infrastructure and promoting local attractions can enhance economic growth and diversify revenue sources.

3.14.4 Current and Projected Employment Generation

The district economy significantly contributes to employment generation across various sectors, enhancing residents' livelihoods and driving local economic growth. The primary sector, which includes agriculture and mining, provides a substantial portion of jobs in many districts. In agricultural regions, activities such as farming, animal husbandry, and crop production not only offer numerous employment opportunities but also support ancillary businesses and services.

3.14.5 Employment

The Labor Force Survey (LFS) for 2020-2021 [81]provides critical insights into the current employment landscape in District Orakzai, reflecting broader national trends in labor distribution across various sectors. The survey reveals that Orakzai labor market is characterized by a strong rural presence, with the majority of the working-age population residing in rural areas. Employment in Orakzai is primarily concentrated in the services sector, mirroring the national shift towards tertiary activities. However, agriculture remains a vital source of employment in the district's rural areas, while industrial employment also plays a significant role. The data underscores the gender disparities in labor force participation, with women being significantly underrepresented across all sector

[81] Labour Force Survey 2020-21

Table 3-141 : Labour Force Data Orakzai District

S.No	Indicator	LFS 2020-21			
			Total	Male	Female
1	Working Age Population (000)	All Areas	175	83	92
		Rural	175	83	92
		Urban	-	-	-
2	Labour Force (000)	All Areas	55.4	43.6	11.7
		Rural	55.4	43.6	11.7
		Urban	-	-	-
3	Employed (000)	All Areas	51.5	40.0	11.5
		Rural	51.5	40.0	11.5
		Urban	-	-	-
4	Unemployed (000)	All Areas	3.9	3.6	0.2
		Rural	3.9	3.6	0.2
		Urban	-	-	-
5	Refined Participation Rate	All Areas	31.7	52.6	12.8
		Rural	31.7	52.6	12.8
		Urban	-	-	-
6	Unemployment Rate	All Areas	7.0	8.3	2.0
		Rural	7.0	8.3	2.0
		Urban	-	-	-
7	Employment to Population Ratio	All Areas	29.5	48.3	12.5
		Rural	29.5	48.3	12.5
		Urban	-	-	-
8	Employment by Sector (%)	Agriculture	27.0	33.0	6.5
		Rural	27.0	33.0	6.5
		Urban	-	-	-
		Industry	26.7	29.9	15.5
		Rural	26.7	29.9	15.5
		Urban	-	-	-
		Services	46.3	37.2	78.0
		Rural	46.3	37.2	78.0
		Urban	-	-	-

The Labour Force Survey (LFS) 2020-21 data provide an overview of employment and labor force indicators for a specific region, broken down by gender and sector.

- **Labour Force and Employment**: A total of 55.4% of the working-age population is in the labor force, with a slightly higher participation from men (43.6%) than women (11.7%). The employment rate is also higher for men (40.0%) than for women (11.5%).
- **Sectors of Employment**: The largest share of employment is in the **services sector** (46.3%), followed by **agriculture** (27.0%) and **industry** (26.7%). Women are predominantly employed in the services sector, while men are more equally distributed between agriculture, industry, and services.
- **Unemployment**: The unemployment rate stands at 7.0% overall, with a higher rate for men (8.3%) than for women (2.0%).

- **Gender Disparities**: There are notable gender disparities, with men having a significantly higher share of employment in agriculture and industry, while women dominate the services sector.
- These figures reflect key aspects of the labor market, highlighting both employment opportunities and gender-based differences in labor force participation.

3.14.5.1 Future Employment Generation

District Orakzai employment prospects are set to evolve significantly due to various factors driving economic development. The future employment landscape in District Orakzai will be shaped by economic diversification, infrastructure development, and sectoral growth. By leveraging these opportunities, the district can expect enhanced employment prospects and continued economic advancement.

3.14.5.2 Agriculture Sector

Currently, agriculture dominates the rural areas of the district, driven by a reliance on traditional farming and livestock. Future employment in this sector is expected to rise moderately with the introduction of modern farming practices, improved irrigation systems, and crop diversification. The integration of technology and enhanced market access are likely to boost productivity. Additionally, initiatives such as community-based forestry and agroforestry could further increase employment opportunities and income within the agricultural sector.

3.14.5.3 Industry Sector

The industrial sector in Orakzai, while currently underdeveloped, has significant growth potential due to the region's natural resources and the possibility of developing small-scale industries. Future growth is projected to be robust if there are investments in infrastructure, such as roads, energy, and industrial zones. Expansion in mining, construction, and manufacturing could drive employment and diversify the economy. Implementing skill development programs tailored to these industries will be crucial for supporting this anticipated growth.

3.14.5.4 Services Sector

The services sector is presently the leading contributor to employment, especially in urban areas, encompassing retail, healthcare, education, and government services. Anticipated growth in this sector will likely continue, fueled by urbanization, population growth, and increasing demand for services. The expansion of digital services, tourism, and transportation is expected to further bolster this growth. Investment in education and vocational training will be essential to meet the demand for skilled labor in the services sector.

3.14.6 Constraints

- Limited access to modern farming techniques and irrigation infrastructure hampers agricultural productivity and diversification efforts in rural areas.
- Gender disparities in labor force participation, particularly in agriculture and industry, limit economic opportunities for women.
- The industrial sector's underdevelopment is due to insufficient infrastructure, such as roads, energy, and industrial zones, hindering potential growth.
- The lack of heavy industries in the district, despite the proximity to raw materials, limits large-scale industrial development and associated employment opportunities.
- The absence of an agro-industrial zone reduces the potential for value addition to agricultural products, thereby limiting job creation and local economic enhancement.
- Insufficient investment in modern irrigation technologies, such as drip and sprinkler systems, prevents optimization of water use and crop yields.

- The services sector, though dominant, faces challenges in meeting the growing demand for skilled labor due to inadequate vocational training and education facilities.
- Limited infrastructure and access to modern farming techniques in the livestock sector reduce its productivity and growth potential.
- Lack of modern slaughter house hinder export potential of Halal meat
- The mining sector's growth is constrained by the need for modernization, advanced mining technologies, and better infrastructure to ensure safety and efficiency.
- Trade and commerce activities are unevenly distributed, with infrastructure constraints and reliance on traditional markets posing challenges to economic development.
- Dependence on traditional markets and infrastructure constraints limit the district's ability to develop into a regional commercial hub.
- Inadequate road networks, parking facilities, and public transportation within commercial areas reduce accessibility and hinder economic activity.

3.14.7 Recommendation

- Investing in modern agricultural techniques and providing farmers with access to better resources can increase productivity. Promoting cash crops and high-value agricultural products can also boost the local economy
- Enhance access to modern farming techniques and improve irrigation infrastructure to boost agricultural productivity and support diversification.
- Implement targeted programs to address gender disparities in labor force participation, especially in agriculture and industry, to expand economic opportunities for women.
- Develop infrastructure, such as roads, energy supply, and industrial zones, to support the growth of the industrial sector and attract investment.
- Establishing Special Economic Zones (SEZs) can attract foreign direct investment and stimulate industrial growth. SEZs offer fiscal incentives, simplified regulatory procedures, and necessary infrastructure to support industrial activities
- Promote the establishment of heavy industries by leveraging the proximity to raw materials, facilitating large-scale industrial development, and creating employment opportunities.
- Establish an agro-industrial zone to enable value addition to agricultural products, stimulate job creation, and enhance the local economy.
- Orakzai has untapped mineral resources. Setting up mineral processing and value addition facilities can create jobs and add value to the local economy
- Address the gaps in the services sector by investing in vocational training and education facilities to meet the growing demand for skilled labor.
- Upgrade infrastructure and introduce modern farming techniques in the poultry sector to enhance its productivity and growth potential.
- Investing in infrastructure such as roads, bridges, and communication networks can facilitate economic activities and improve connectivity with other regions.
- Modernize the mining sector by adopting advanced technologies and improving infrastructure to ensure safety, efficiency, and growth.
- Promote balanced trade and commerce by upgrading infrastructure and transitioning from traditional markets to modern commercial practices.
- Develop modern logistics and warehousing facilities to attract businesses and stimulate economic growth in the district.
- Improve road networks, parking facilities, and public transportation within commercial areas to increase accessibility and support economic activity.

3.14.8 Future Proposals for District Economy

The Orakzai District economy holds significant potential in agriculture, livestock, minerals, and trade, but remains constrained by infrastructure gaps, limited private investment, and low skill levels. The following proposals present implementable, result-oriented interventions designed to foster inclusive, resilient, and sustainable growth.

The major interventions for the district economy to grow are presented in following table:

Table 3-142: Major Interventions for the District Economy

Intervention Area	Objective	Key Actions / Description	Lead Stakeholders	Expected Outcomes
1. Agricultural Modernization and Value Chain Development	Enhance farm productivity and income diversification through technology and value chain strengthening.	• Introduce high-value crops (off-season vegetables, fruits, pulses). • Establish farmer field schools for modern techniques, soil testing, and irrigation management. • Promote small-scale agro-processing (dry fruit grading, seed cleaning, packaging units). • Link farmers with regional wholesale markets (Hangu, Kohat, Peshawar).	Dept. of Agriculture KP, KP Livestock & Dairy Development, NGOs, FAO, ADB	• Improved productivity and food security. • Employment for rural youth and women. • Enhanced export potential and market linkages.
2. Livestock and Rangeland Development	Stre ngthen livestock health, market access, and rangeland sustainability.	• Establish mobile veterinary clinics and vaccination campaigns. • Promote community-based rangeland management (fencing, reseeding, rotational grazing). • Introduce milk collection & chilling centers for small dairy producers. • Develop fodder banks and drought-resilient livestock programs.	Livestock Dept., BRSP, PPAF, FAO, NGOs	• Reduced animal mortality. • Increased dairy and meat output. • Sustainable pasture regeneration.

3. Establishment of Trade and Logistics Hub	Position Orakzai as a gateway for local and inter-district commerce and logistics.	• Develop a trade hub near Kalaya with warehousing, cold storage, and truck terminals. • Improve connectivity with Kohat–Hangu–Kurram roads and proposed KPEC network. • Facilitate cross-district trade fairs and investment forums.	KP Planning Dept., NESPAK, NHA, KPEC, Private Investors	• Increased trade flows. • Private sector investment attraction. • Job creation in transport and logistics.
4. Small and Medium Enterprise (SME) Development	Foster entrepreneurship and employment through skill-based small industries.	• Establish business incubation centers focusing on women and youth. • Provide micro-credit through BISP, Akhuwat, and Khushhali Bank. • Promote small-scale manufacturing (furniture, handicrafts, garments). • Develop e-commerce and online sales platforms.	SMEDA, KPBOIT, NGOs, Private Sector	• Enhanced local entrepreneurship. • Diversified income sources. • Reduction in migration.
5. Tourism and Cultural Heritage Development	Promote eco-tourism and cultural assets as new economic drivers.	• Develop tourist facilities (rest houses, signage, trekking trails). • Restore historical sites and cultural festivals (Orakzai Spring Festival). • Train youth as tour guides and hospitality workers. • Market Orakzai as a "Green Mountain District."	KP Tourism Dept., Archaeology Dept., PTDC, UNDP	• Tourism-led income generation. • Preservation of cultural identity. • New local enterprises in hospitality.

6. Mineral and Energy Sector Development	Unlock mineral wealth and introduce small-scale renewable energy solutions.	• Conduct mapping of coal, chromite, and limestone reserves. • Introduce transparent licensing and monitoring system. • Establish micro-hydel and solar mini-grids for off-grid villages. • Promote local mineral processing units.	KP Mines & Minerals Dept., PEDO, Private Sector	• Increased district revenue. • Reduced energy deficit. • Job opportunities in mining & energy.
7. Education, Skills, and Digital Transformation	Build human capital for emerging sectors and promote digital inclusion.	• Upgrade technical and vocational institutes (TVET). • Introduce digital literacy, ICT, and freelancing programs for youth. • Encourage public–private partnerships for skills certification. • Introduce STEM education at secondary level.	TEVTA, NAVTTC, Education Dept., NGOs, Donors	• Skilled and employable youth. • Digital economy integration. • Improved education outcomes.
8. Women Economic Empowerment	Enhance women's participation in economic activities through inclusive programs.	• Establish women business centers and cooperatives. • Promote home-based enterprises (embroidery, food processing, honey). • Offer digital banking and e-commerce training for women entrepreneurs. • Introduce childcare and community centers for working mothers.	Women Development Dept., NGOs, BISP, UN Women	• Increased female employment. • Reduced gender income gap. • Strengthened community resilience.
9. Infrastructure and Connectivity Development	Improve access and mobility to stimulate local and regional markets.	• Rehabilitate rural access roads linking villages with markets. • Ensure electricity	C&W Dept., NHA, KP Planning Dept., Donors	• Improved connectivity. • Reduced transport cost.

		and water supply to industrial and trade zones. • Expand broadband connectivity for remote communities.		• Attraction of new businesses.
10. Institutional Strengthening and Investment Facilitation	Improve governance, planning, and investment climate for sustained growth.	• Establish District Development Coordination Committee for integrated planning. • Develop investment promotion unit under DC Office. • Introduce one-window facility for business licensing and land allocation. • Strengthen data systems for monitoring and evaluation.	DC Office, KP Planning Dept., Donors, Private Sector	• Efficient governance and coordination. • Increased investor confidence. • Improved service delivery.

The proposed interventions collectively present a holistic roadmap for accelerating Orakzai District's transition from a subsistence-based to a diversified, resilient, and inclusive economy. Each intervention addresses a critical component of the district's economic ecosystem — from strengthening agriculture and livestock productivity to enhancing connectivity, enterprise development, and institutional capacity.

Agricultural modernization and livestock value chain initiatives aim to enhance farm-level productivity, improve food security, and generate stable rural incomes. Simultaneously, rangeland management and veterinary support will ensure environmental sustainability and livestock health, reducing vulnerability to climate and market shocks.

The establishment of a Trade and Logistics Hub near Kalaya, coupled with improved connectivity under the Khyber Pass Economic Corridor (KPEC) framework, will enable Orakzai to emerge as a regional node for commerce and transport, integrating its economy with national and cross-border markets. The development of SMEs and home-based industries will catalyze local entrepreneurship, encourage private investment, and create jobs, especially for youth and women.

Tourism and cultural heritage development can unlock new avenues of income through eco-tourism, hospitality, and cultural promotion, positioning Orakzai as a "Green Mountain Destination." Similarly, the Mineral and Energy Sector Development plan will help formalize resource extraction and introduce renewable energy solutions to power rural enterprises and households, thereby improving productivity and living standards.

Investments in Education, Skills, and Digital Transformation are vital to build human capital for a knowledge-based economy. By equipping youth with technical and digital skills, the district can bridge the employment gap and tap into remote work and freelancing opportunities. Parallel

efforts to promote Women's Economic Empowerment will further ensure inclusive growth and maximize community resilience through greater female participation in entrepreneurship, value chains, and microfinance systems.

Infrastructure improvements ranging from roads and energy supply to broadband connectivity will provide the backbone for sustained economic activity, while Institutional Strengthening and Investment Facilitation will improve governance, streamline business processes, and attract both public and private sector investments.

These interventions form an integrated development framework for Orakzai's future promoting sustainable livelihoods, market-oriented growth, environmental stewardship, and inclusive prosperity. With coordinated efforts from the Government of Khyber Pakhtunkhwa, development partners, and private investors, Orakzai can become a model of balanced regional development and a gateway for economic revitalization in the newly merged districts.

3.15 Land Management System

3.15.1 Land Management

Land serves as the foundation for human decisions, both social and economic, manifesting physically through land use. It is a primary source of human satisfaction, providing financial security, pleasure, and stability. Effective land management requires the organization of various activities in a structured and planned manner. The history of land management in the subcontinent dates back centuries, reflecting its significance in societal development.

Land management encompasses a regulatory framework, institutional arrangements, systems, and processes that govern the determination, allocation, administration, and documentation of land. This includes defining approved land uses, adjudicating rights, registering titles, recording transactions, and assessing land value and taxes. The three core components of land administration are:

- Land Rights Registration and Management
- Land Use Allocation and Management
- Land Valuation and Taxation

3.15.2 Land Management in Khyber Pakhtunkhwa

3.15.2.1 Administrative Setup

The Chief Land Commissioner oversees the recovery of government dues, including agricultural income tax, land revenue, water rates, ushr (religious tax), mutation fees, stamp duty, registration fees, copying fees, and arrears related to banks and cooperative societies.

The Director of Land Records (DLR), under the Chief Land Commissioner's supervision, manages land records across all districts in Khyber Pakhtunkhwa (KP). At the district level, the DLR is supported by a team comprising the Chief Settlement Officer, Settlement Officer, Tehsildar, Naib Tehsildar, Kanungo, and Patwari. The DLR supervises these agencies and inspects compiled records of rights and statistical data.

The Kanungo acts as a liaison between the Tehsil Officer and Patwari, overseeing their work. Each Tehsildar is assisted by an Office Kanungo who consolidates information on Patwari performance. The Patwari is responsible for maintaining land records at the grassroots level.

3.15.2.2 Legislative Framework

Several laws govern land management in KP that address landlord-tenant relationships, mortgages, tax assessments, agricultural income tax, local rates, and public land acquisition. Key legislation includes:

- Land Revenue Act 1967
- NWFP Tenancy Act 1887
- Pre-Emption Act
- Land Acquisition Act
- Registration Act 1908
- Land Consolidation Act 1960
- Transfer of Property Act 1982
- Land Reforms Act

Supporting rules and manuals include:

- Land Revenue Rules

- Settlement Manual Rules
- Land Record Manual
- Land Administration Manual

3.15.2.3 Land Administration Processes

The Board of Revenue (BOR) oversees various land administration processes at provincial and local levels (Patwar Circle). Common processes include:

- Fard Malkiyat (Ownership Document) Process
- Register Haqdaran Zamin (Land Registration) Process
- Fard Badar (Error Correction) Process
- Gardawari (Inspection) Process
- Mutation Process

3.15.2.3.1Types of Land Records

Land records are maintained at Tehsil offices with records established during settlement periods. The Patwari maintains various maps and registers including:

- Field Map
- Field Book
- Shajra Kishtwar
- Register Haqdaran-e-Zamin (Jammabandi)
- Register of Mutations
- Register Khasra Girdawari
- Lal Kitab (Village Notebook)
- Fard Bach
- Roznamcha Waqiati

3.15.3 Challenges in the Land Management System

3.15.3.1 Institutional Issues

The current Land Administration System (LAS) primarily focuses on fiscal aspects like tax collection rather than securing land rights. While land records identify taxpayers and tax values, they fail to clearly define ownership rights, leading to legal insecurity. The system's heavy reliance on Patwaris for transactions creates inefficiencies due to multi-level approvals involving Kanungos, Naib Tehsildars, and Tehsildars.

3.15.3.2 Technical Issues

Land records are maintained in outdated paper formats lacking updated geographical information. Cadastral maps do not include latitude/longitude data, creating discrepancies between maps and ground realities. Records of rights are updated only every 25–35 years—insufficient for modern development needs—and many registers are in poor condition.

3.15.4 Kurram Land Management

3.15.4.1 Land Ownership

In Orakzai District, land ownership is deeply rooted in tribal traditions where land (zmaka) is considered a valuable asset tied to identity and power. Communal land (shamilat) is collectively owned by tribes with income shared among members. Historically, land distribution has followed clan (khel), lineage (tappa), and household (kor) structures overseen by tribal elders (Mashar).

Urban areas predominantly feature communal land occupied by various lineages within the Kurram tribe both Shia lineages such as Parachinar area and Sunni-populated areas like Sadda area.

3.15.4.2 Land Transfer

Land transfer practices in Orakzai are distinct from other regions due to sectarian boundaries; Shia and Sunni communities rarely transact across sect lines. Transactions occur within clans with agreements documented on plain or stamped paper verified by tribal elders through Jirgas (tribal councils). The Political Administration oversees these processes to ensure transparency.

3.15.4.3 Land Entitlement

Acquiring land entitlement requires permission or a No Objection Certificate (NOC) from relevant authorities before any development work can proceed; however, the lack of formal ownership records complicates this process.

3.15.4.4 Government Land Entitlement

In former tribal areas like Kurram District, cultural norms discourage outright sales of communal lands; instead, these lands are often leased to the government for development projects with compensation negotiated through Jirgas.

3.15.4.5 Compensation Mechanisms

The government employs various methods for compensating landowners when acquiring land for public purposes:

- Purchasing land at market value for projects.
- Compensating with jobs or cash payments.
- Ensuring fair compensation through negotiated agreements with tribal elders.

3.15.5 Range Land Future Proposed Intervention

Rangelands in Orakzai District are vital for local livestock grazing, ecosystem services, and rural livelihoods, particularly in areas with limited cultivated land. However, overgrazing, deforestation, and land degradation have severely reduced the productivity and sustainability of these rangelands.

To restore and sustainably manage rangelands in Orakzai, the following future interventions are proposed:

3.15.5.1 Rangeland Rehabilitation and Reseeding

This intervention aims to restore degraded grazing lands by reseeding native grasses and improving soil conditions. Techniques like erosion control and moisture conservation will be used to enhance vegetation cover, which increases fodder availability and prevents further land degradation.

Objective	Key Actions / Components	Expected Impact	Lead / Supporting Agencies
Restore degraded pastures for livestock grazing	- Mapping degraded areas	- Improved fodder supply	Livestock Dept, Forest Dept, FAO, NGOs
	- Reseeding with native grasses	- Reduced erosion	
	- Erosion control & soil moisture techniques	- Regenerated vegetation	

3.15.5.2 Community-Based Rangeland Management Committees (CRMCs)

Locally formed committees will manage grazing activities, develop seasonal grazing plans, and promote rotational use of pastures. This encourages community ownership, reduces overgrazing, and ensures sustainable rangeland use.

Objective	Key Actions / Components	Expected Impact	Lead / Supporting Agencies
Local stewardship of communal grazing lands	- Form grazing committees	- Reduced overgrazing	Local Govt, Livestock Dept, BRSP, PPAF
	- Create seasonal grazing plans	- Increased local ownership	
	- Local monitoring and enforcement	- Sustainable land use	

3.15.5.3 Silvo-Pastoral System Development

This approach integrates trees with pasture and livestock systems. Fodder trees will be planted alongside grasslands to provide additional feed, shade, and fuelwood, while improving biodiversity and soil fertility.

Objective	Key Actions / Components	Expected Impact	Lead / Supporting Agencies
Integrate trees, fodder crops & livestock grazing	- Plant fodder trees (e.g., Acacia)	- Multi-purpose land use	Forest Dept, Livestock Dept, UNDP, GIZ
	- Mix pasture with legumes	- Resilience to climate shocks	
	- Promote agroforestry techniques	- Increased biodiversity	

3.15.5.4 Community Fodder Banks and Drought Resilience Zones

To ensure year-round fodder availability, fodder reserves will be established and preserved using silage and haymaking. This will help communities withstand dry seasons and reduce livestock losses during droughts.

Objective	Key Actions / Components	Expected Impact	Lead / Supporting Agencies
Ensure year-round fodder availability	- Establish fodder reserves	- Reduced livestock loss in drought	Livestock Dept, Agriculture Dept, FAO
	- Grow drought-tolerant fodder crops	- Improved animal health	
	- Train in fodder preservation (silage, hay)	- Increased resilience	

3.15.5.5 Capacity Building and Awareness Programs

Training programs will educate herders on sustainable grazing practices, pasture maintenance, and animal health. These sessions will improve rangeland use efficiency and long-term productivity.

Objective	Key Actions / Components	Expected Impact	Lead / Supporting Agencies
Educate herders on sustainable practices	- Field schools and mobile training	- Improved grazing practices	Livestock Dept, NGOs, TEVTA
	- Vet camps with pasture awareness	- Knowledge transfer	
	- Distribute grazing calendars	- Long-term range sustainability	

3.15.5.6 GIS-Based Rangeland Mapping and Monitoring

Advanced tools like satellite imagery and GIS will be used to map rangelands, track degradation, and support data-driven decision-making. This ensures better planning and timely interventions.

Objective	Key Actions / Components	Expected Impact	Lead / Supporting Agencies
Enable data-driven planning & monitoring	- Satellite & drone mapping	- Evidence-based decisions	KP Forest Dept, SUPARCO, Livestock Research Institute
	- Develop rangeland atlas	- Prevention of overuse	
	- Set up local monitoring teams	- Informed policy-making	

The proposed interventions collectively aim to restore degraded rangelands, promote sustainable grazing, and ensure year-round fodder availability for livestock-dependent communities in Kurram District. By combining ecological restoration, community-based management, and modern monitoring tools, these measures will enhance livestock productivity, protect the environment, and build resilience against climate shocks. With proper implementation, they will transform rangelands into a sustainable resource base, supporting both rural livelihoods and long-term economic stability in the district.

3.16 Potential Tourism Strategies

3.16.1 Vision Statement

A prosperous hub, committed to providing essential facilities and fostering diverse job opportunities. The vision entails holistic progress across sectors, with a dedicated focus on enhancing education, healthcare, and social services. Orakzai aspires to emerge as a premier tourism destination, harnessing its abundant natural resources to drive economic growth and transform into a modern, thriving district, offering tranquility and prosperity to all its residents by 2045

3.16.2 Strategic Objectives

- Promote eco-tourism, heritage, religious, and recreational tourism as economic growth sectors.
- Integrate tourism development into the District Land Use Plan through zoning and infrastructure improvements.
- Preserve and restore natural, cultural, and historical assets of Orakzai.
- Encourage community participation and public–private partnerships (PPPs) in tourism management.
- Ensure environmental sustainability and resilience through responsible development practices.

3.16.3 Potential Tourist Sites in Orakzai[82]

Samana

Samana is a picturesque hill station situated at an elevation of 6,762 feet above sea level. It experiences substantial snowfall and rainfall, attracting numerous tourists during the summer and winter months. However, the existing government-run hotel can only accommodate a small percentage of visitors. Samana is also home to three historic forts—Sanger Fort, Gulistan Fort, and Lockhart Fort—each offering unique attractions for tourists. A tourist resort in Samana has been approved with a budget of 55 million PKR. With proper development, Samana has the potential to draw a significant number of tourists from Khyber Pakhtunkhwa and beyond.

Sampog Hill

Sampog Hill is renowned as one of the most popular picnic spots in Orakzai, characterized by its high green hills. A project worth 75 million PKR for a tourist resort and public park at Sampog is currently underway. The hilltop attracts many local visitors and has the potential to draw tourists from across the country with further development. The scenic valleys of Dabori, Anjghali, Sheikhan, and Esakhel lie on either side of Sampog Point.

Godaro Ghara on Mastura River

Located near the borders of District Kohat and Hangu, Godaro Ghara is a scenic point along the Mastura River, surrounded by dense forests and tall mountains. A small rest house was constructed by the local government in the 1980s. The area boasts several beautiful valleys such as Undkhel, Sultanzai, Gul Dara, and Mandrakhel. Waterfall at Drak Village Mamuzai The Drak Waterfall is located in the upper parts of Orakzai and features four distinct waterfalls nestled between two narrow hills. The area is rich in biodiversity with old caves serving as breeding grounds for various bird species. Scenic valleys such as Sama Mamuzai, Banda Mamuzai, and Mir Kalam Khel Darra are located within a 15 km radius.

[82] https://orakzai.kp.gov.pk/page/about_1

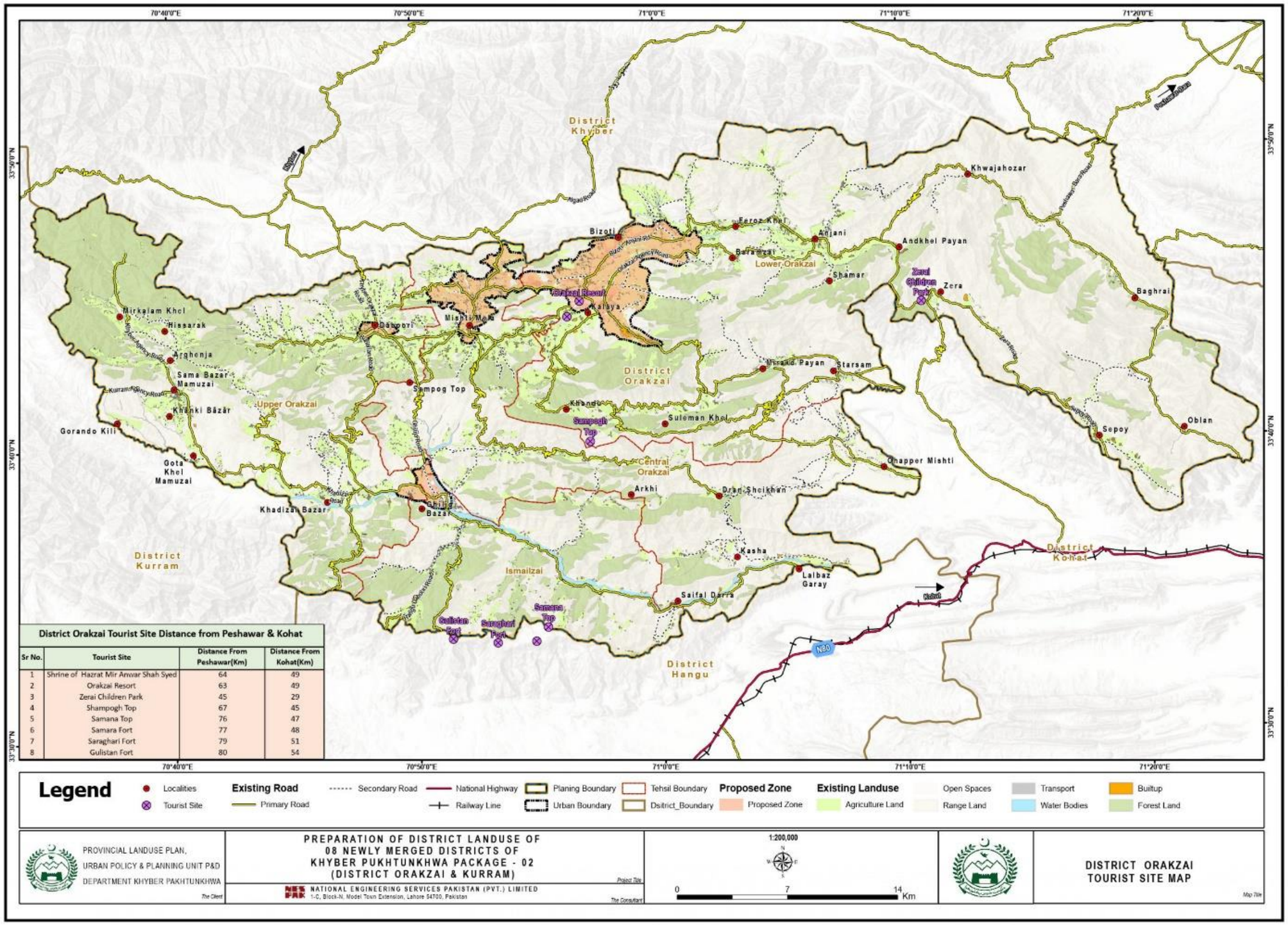
Jabar Ghakhy B.M Khel

Jabar Ghakhy top is one of the coldest locations in Orakzai, known for its heavy snowfall each year. It features natural springs surrounded by densely forested hills offering scenic views extending to Kalaya and Khandu Valleys. Chapper

Ali Khel Top

Chapper Ali Khel is one of the highest altitude points in upper Orakzai, providing panoramic views of the surrounding areas. It is situated near Dabori town and connects with Tera Maidan through the traditional Arhanga Pass. The area is ideal for developing a camping village that promotes eco-tourism through sustainable practices.

District Orakzai holds immense potential for tourism development that can significantly contribute to local economies while promoting cultural heritage and natural beauty. With targeted investments in infrastructure and facilities across these identified sites, Orakzai can emerge as a prominent tourist destination in Pakistan.



District Orakzai Tourist Site Distance from Peshawar & Kohat

Sr No.	Tourist Site	Distance From Peshawar(Km)	Distance From Kohat(Km)
1	Shrine of Hazrat Mir Anwar Shah Syed	64	49
2	Orakzai Resort	63	49
3	Zerai Children Park	45	29
4	Shampogh Top	67	45
5	Samana Top	76	47
6	Samara Fort	77	48
7	Saraghari Fort	79	51
8	Gulistan Fort	80	54

Map 3-60: Protentional Tourism Sites in District Orakzai

3.16.4 Tourism Potential and Key Destinations

The Following are the potential tourism and key destination of district Orakzai.

Table 3-143 Potential Tourism and key Destination Sites

Tourism Cluster	Major Attractions	Tourism Type
Highland Eco-Tourism Cluster	Samana Top, Sampog Hill, Ali Khel Top, Orakzai Resort	Eco-tourism, Adventure, Scenic Tourism
Heritage and Cultural Cluster	Samana Fort, Saragarhi Fort, Gulistan (Cavagnari) Fort, Jabar Ghakhy (B.M Khel)	Heritage & Cultural Tourism
Religious and Spiritual Cluster	Shrine of Hazrat Mir Anwar Shah Syed	Religious & Pilgrimage Tourism
Urban Recreation Cluster	Zerai Children Park, Shuhada Park	Urban and Family Recreation
Riverfront Cluster	Godaro Ghara (Mastura River)	Eco-recreation, Water-based Tourism

3.16.5 Tourism Zoning and Land Use Framework

3.16.5.1 Eco-Tourism and Recreation Zone

- **Areas:** Samana Top, Sampog Hill, Ali Khel Top, Mastura River, Orakzai Resort.
- **Permitted Uses:** Eco-lodges, campsites, hiking trails, rest areas, visitor centers.
- **Conditional Uses:** Small resorts, cable cars, adventure parks.
- **Prohibited Uses:** Industrial development, mining, or waste disposal.

Land Use Guidelines:

- Maintain at least 60% green cover.
- Use local materials (stone, timber) and eco-friendly designs.
- Apply EIA clearance for all construction above 2 hectares.

3.16.5.2 4.2. Heritage and Cultural Zone

- **Areas:** Samana Fort, Saragarhi Fort, Gulistan Fort, Jabar Ghakhy.
- **Permitted Uses:** Museums, cultural trails, artisan villages, interpretation centers.
- **Conditional Uses:** Controlled commercial outlets (craft shops, cafés).
- **Prohibited Uses:** Modern or high-rise structures within 200 meters of protected sites.

Guidelines:

- Conserve using original materials and traditional craftsmanship.
- Introduce guided heritage circuits connecting forts and historical routes.

3.16.5.3 Religious and Pilgrimage Zone

- **Area:** Shrine of Hazrat Mir Anwar Shah Syed and adjacent facilities.
- **Permitted Uses:** Religious accommodations, rest houses, ablution areas.
- **Conditional Uses:** Controlled commercial kiosks (food, religious goods).
- **Guidelines:**

- Provide gender-segregated facilities, parking, and public conveniences.
- Ensure spiritual ambiance; no entertainment zones within 500 meters.

3.16.5.4 Urban Recreation Zone

- **Areas:** Zerai Children Park, Shuhada Park, and proposed Kalaya Central Park.
- **Permitted Uses:** Family parks, jogging tracks, open-air stages, picnic lawns.
- **Conditional Uses:** Seasonal fairs, community events, cafés.
- **Guidelines:**
    - Maintain minimum 70% open green space.
    - Include children's play areas, benches, solar lights, and water features.

3.16.6 Policy Framework

3.16.6.1 Sustainable Tourism Development

- Integrate tourism with environmental protection and land use zoning.
- Enforce eco-friendly building codes for all tourism facilities.
- Ensure waste management, sanitation, and renewable energy use in resorts.

3.16.6.2 Cultural Heritage Conservation

- Declare all historical forts as Protected Heritage Monuments.
- Partner with KP Directorate of Archaeology for restoration and preservation.
- Promote heritage-based livelihoods such as handicrafts, traditional music, and folk festivals.

3.16.6.3 Community-Based Tourism

- Establish Village Tourism Committees (VTCs) to manage local sites.
- Encourage homestays, local guiding services, and handicraft markets.
- Provide capacity-building programs for youth and women in hospitality.

3.16.6.4 Infrastructure and Connectivity

- Upgrade road access to Samana Top, Saragarhi Fort, and Mastura River.
- Develop tourist information centers at Kalaya, Samana, and Saragarhi.
- Improve public amenities (restrooms, signage, parking, first aid).

3.16.6.5 Investment and Promotion

- Introduce Public–Private Partnership (PPP) incentives for resort and eco-lodge development.
- Offer tax reliefs or land leases for sustainable tourism investments.
- Promote "Visit Orakzai" branding and digital marketing campaigns.

3.16.6.6 Environmental and Social Safeguards

- Apply Environmental Impact Assessment (EIA) for all large tourism projects.

- Protect biodiversity through buffer zones around natural reserves.
- Ensure equitable benefit-sharing with local communities.

3.16.7 6. Proposed Action Plan (2025–2045)

Table 3-144 Proposed Tourism Action Plans

Time Period	Strategic Actions	Lead Agency	Expected Outcomes
Phase (2025–2030)	• Establish Orakzai Tourism Development Unit (OTDU) under LUBCA. • Rehabilitate Samana Fort and Saragarhi Fort. • Develop Samana Top Eco-Park and basic access roads. -nitiate community-based homestays and craft markets.	LUBCA, TCKP, Archaeology Dept.	Institutional setup and foundation infrastructure.
Phase (2030–2035)	• Launch Orakzai Resort and Mastura River eco-lodges. • Develop Kalaya Central Park and Shuhada Park Upgradation. • Introduce heritage trail circuit linking forts. • Implement digital tourist information system (mobile app, kiosks).	TCKP, LG Dept., PPP partners	Expanded facilities and increased tourist inflow.
Phase (2035–2040)	• Introduce cable car / chairlift at Samana Top • Construct small-scale hotels and training institute for hospitality. • Organize annual "Orakzai Heritage & Culture Festival.	LUBCA, Private Sector	Mid-term employment growth and event-based tourism.
Phase (2040–2045)	• Expand eco-tourism to new hilltops and Mastura tributaries. • Establish Orakzai Heritage Museum and Cultural Village. • Full integration with KP Tourism Corridor.	LUBCA, TCKP, Provincial Govt.	Matured, sustainable tourism economy and heritage preservation.

3.16.8 Implementation and Monitoring Mechanism

- **Lead Coordination:** Land use and Building control Authority.
- **Technical Partners:** Tourism Corporation KP (TCKP), EPA, Department of Archaeology.

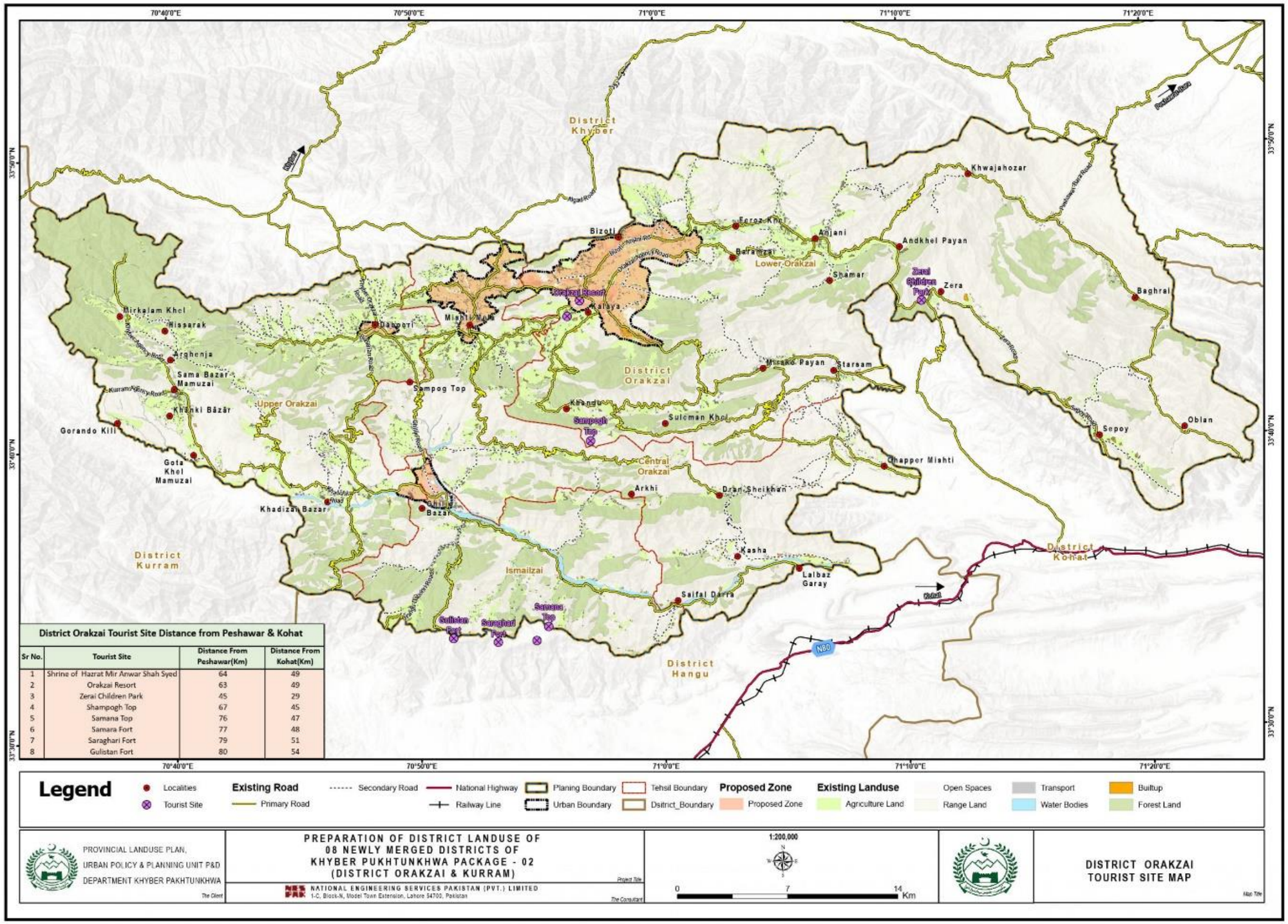
- **Monitoring Tools:**
    - Annual Tourism Development Report.
    - GIS-based mapping of tourist sites and zoning enforcement.
    - Key Performance Indicators (KPIs): tourist arrivals, local jobs, income generation, conservation progress.

3.16.9 Expected Long-Term Outcomes (by 2045)

- Tourist arrivals increased by 30-40%.
- 500+ new local jobs created in tourism, hospitality, and crafts.
- Preservation of all major forts and religious sites.
- District Orakzai established as a recognized eco-cultural destination in Khyber Pakhtunkhwa.
- Tourism contributing up to 3–5% of local GDP.

3.16.10 Development Guidelines Summary

- All tourism development shall adhere to District Land Use and Zoning Regulations.
- Maintain minimum buffer of 50–100 meters around ecological and heritage sites.
- Introduce Tourism Impact Fee to fund conservation and maintenance.
- Encourage PPP, community ownership, and NGO collaboration for sustainability.
- Encourage low-rise, local-material architecture (wood, stone, slate).
- Mandatory EIA/IEE for all tourism facilities.
- Introduce visitor caps during peak seasons to protect ecology.
- Develop digital visitor registry and data management via EMIS.



District Orakzai Tourist Site Distance from Peshawar & Kohat

Sr No.	Tourist Site	Distance From Peshawar(Km)	Distance From Kohat(Km)
1	Shrine of Hazrat Mir Anwar Shah Syed	64	49
2	Orakzai Resort	63	49
3	Zerai Children Park	45	29
4	Shampogh Top	67	45
5	Samana Top	76	47
6	Samara Fort	77	48
7	Saraghari Fort	79	51
8	Gulistan Fort	80	54

Map 3-61: District Orakzai Proposed Tourist Sites Map

4 Proposed Land Use Planning and Zoning

Land use planning serves as a foundational pillar of sustainable urban and regional development, providing a structured approach to the spatial organization and management of land resources. It defines how land is allocated for various complementary and competing functions such as residential, commercial, industrial, institutional, recreational, agricultural, and ecological purposes within an integrated planning framework. Through this process, land use planning establishes the conceptual and regulatory basis for zoning mechanisms, ensuring that development occurs in a rational, efficient, and context-sensitive manner aligned with long-term policy objectives.

A well-formulated land use plan minimizes conflicts between incompatible land uses by clearly delineating functional zones, promotes efficient utilization of available land and resources, and mitigates adverse environmental impacts. Moreover, it enhances social well-being by creating equitable, accessible, and livable environments that support sustainable livelihoods. Effective land use planning also underpins the coordination of infrastructure networks, transportation systems, and public utilities, thereby reinforcing the interconnections between spatial form, economic activity, and environmental sustainability.

Zoning, as a critical regulatory instrument derived from land use planning, operationalizes the spatial vision by legally defining the permissible uses, intensity, density, and built form within each designated zone. It is a key governance mechanism for managing growth, ensuring orderly urban expansion, and protecting public interests such as safety, health, and environmental integrity. By setting out clear and enforceable land-use parameters, zoning aligns individual development initiatives with collective planning objectives such as environmental conservation, economic vitality, and social inclusion.

The proposed land use plan and zoning framework have been formulated to respond proactively to projected demographic trends, spatial growth patterns, and evolving socio-economic needs over the next two decades. The plan adopts a balanced and adaptive approach, encouraging compact and sustainable urban growth where appropriate while conserving ecologically sensitive and agriculturally productive areas. This spatial strategy seeks to harmonize development with environmental stewardship, ensuring that urban expansion does not come at the expense of natural habitats or rural livelihoods.

Ultimately, the proposed framework aims to promote a resilient and inclusive spatial structure one that supports sustainable economic development, efficient service delivery, and environmental balance. By integrating land use planning and zoning into a coherent policy and implementation system, the plan aspires to shape a future built environment that is equitable, resource-efficient, and resilient to both demographic pressures and environmental change.

4.1 Proposed Zoning in Urban Area

The proposed zoning framework encompasses a comprehensive range of land use categories designed to accommodate future spatial requirements and foster balanced regional development. While zoning serves as the principal legal and regulatory instrument for guiding and controlling land development, land use planning provides the overarching strategic vision that integrates spatial, socio-economic, and environmental dimensions into a unified and forward-looking framework. Together, these mechanisms form the cornerstone of effective urban governance ensuring that future growth is not only technically feasible but also desirable in terms of livability, functionality, and long-term resilience.

The framework delineates a series of designated zones that collectively structure urban and rural development patterns. These include Residential, Mixed Use, Commercial, Institutional (encompassing Educational, Health, and Public Buildings/Amenities), Agricultural, Industrial, and Recreational zones. Each category is defined by specific objectives, intensity parameters, and development controls that correspond to its intended function within the spatial hierarchy.

This zoning typology establishes the institutional foundation for integrated and regulated land development, enabling the district to transition toward a more sustainable, inclusive, and economically dynamic spatial structure. By coordinating land allocation, infrastructure provision, and environmental management within these designated zones, the proposed framework seeks to optimize land use efficiency, minimize conflicts, and enhance overall spatial harmony.

The following section outlines the methodological approach and planning criteria adopted for each land use zone within the urban areas, detailing their purpose, regulatory provisions, and intended role in achieving the district's broader development vision.

4.1.1 Residential Zone

With the current estimated population living in proposed urban centers, the consultant analyzed household size trends from the earlier available census to propose a realistic household size for 2025 so as to obtain the approximate number of housing units available within the urban boundary. These housing units were then divided by the residential area within proposed urban boundary to get the current housing density.

Now for the plan period requirement, the additional population between 2025 and 2045 was divided by the proposed household size of 2045 to calculate the housing units needed to accommodate the additional population. The additional housing units required till 2045 were then divided by proposed housing density 2045 to get the area required for residential purposes. The housing density proposed for 2045 by the consultant was increased then that of 2025 with the objective to densify the urban growth and optimize land usage.

In the last step to ensure that the proposed residential area is equipped with adequate infrastructure and services, the consultant proposed half of the proposed amount of proposed residential amount (50%) of land for utilities/amenities including but not only limited to basic level private education and health facilities, Mohalla level recreational spaces, water supply network, road infrastructure, community places such as religious buildings, libraries, sewerage and solid waste infrastructure etc. as estimated of the residential zone.

The allocation of residential zones across various urban centers of District Orakzai is based on criteria, including accessibility, land availability, existing land use, proximity to employment centers, and access to basic utilities, amenities, and public services. Each proposed zone has been identified through careful analysis of urban growth trends, current development patterns, and future infrastructural expansion with maximum effort to preserve agricultural land wherever possible.

Table 4-1 Urban Area Housing Area Requirements

Area	Current urban area Population 2025	Projected Population 2045	Household Size	Current Estimated Housing Unit 2025	Housing Unit 2045	Required Housing Units	Additional Population 2045	Required Low Income Housing Units (3-5 Mrlas)	Required Middle Income Housing Units (5-10 Mrlas)	Required High Income Housing Units (10-20 Mrlas)	Required Residential Area
Kalaya	21632	31611	7.4	2923	5568	2645	19570	1603	861	180	145.95
Ghiljo	7338	9164	7.4	992	1437	446	3300	270	145	30	24.61
Dabori	5223	9215	7.4	706	2171	1466	10845	888	477	100	80.88

4.1.2 Commercial Zone

In formulating the proposal for the establishment of commercial zones within both the existing and proposed urban areas, the consultant has undertaken a comprehensive review of relevant national planning standards, with particular reference to the National Reference Manual of Planning and Infrastructure Standards. The assessment indicates that the existing commercial areas possess sufficient capacity, with a current surplus projected to adequately accommodate commercial needs up to the plan period of up to 2045. This conclusion is derived from the prescribed planning standard of one acre of commercial land per 1,000 population, as stipulated in the aforementioned national manual.

Building on this finding, the consultant has explored alternative strategies for future commercial development, incorporating lessons from international best practices regarding the proportional allocation and spatial distribution of commercial areas. These practices emphasize scaling commercial zones in accordance with existing infrastructure capacity, while simultaneously responding to population growth trajectories, market dynamics, and evolving consumer behaviors. Such a data-informed and adaptive approach ensures that commercial expansion remains balanced, efficient, and sustainable, optimizing both land use and economic outcomes.[83],[84].

The proposed strategy prioritizes long-term sustainability and operational efficiency, aligning the expansion of commercial areas with projected demand patterns and demographic shifts. By integrating internationally recognized planning methodologies, the proposal seeks to maximize accessibility, economic viability, and spatial coherence within the proposed urban framework. This ensures that commercial developments not only serve as economic anchors but also enhance urban livability through well-distributed, accessible retail and service centers.

In addition, the consultant has aligned the proposal with local policy directives, specifically the Khyber Pakhtunkhwa (KP) Urban Policy 2030. In accordance with this policy framework, a portion of the proposed commercial land has been strategically incorporated within the mixed-use zones, promoting integrated, multifunctional development that supports compact urban form and reduces travel demand. The remaining portion of the commercial allocation has been designated for flexible, need-based development, allowing for the emergence of scattered commercial nodes within residential sectors to meet localized retail and service needs.

This hybrid commercial zoning approach combining integrated and decentralized commercial typologies ensures that the urban area evolves into a resilient, accessible, and economically vibrant environment. It facilitates the creation of well-distributed commercial opportunities that are responsive to both macro-level growth projections and micro-level community demands, thereby reinforcing the overarching objectives of balanced urban development and sustainable land use management.

This approach ensures that commercial expansion remains both adaptable and aligned with the broader strategic objectives articulated in the local urban policy framework, thereby fostering a balanced, resilient, and responsive urban environment. By harmonizing spatial development with economic functionality, the proposed strategy supports efficient land utilization while promoting accessibility and economic inclusivity.

For urban centers where mixed-use zones have not been proposed, the consultant has recommended the establishment of Central Business Districts (CBDs) as focal points for

[83] Transformation of Residential Land Use, Concomitant Changes and Impacts on Neighborhood Quality in Port Harcourt Municipality
[84] Study on the Application of Crime Zoning Methods Based on Population and Land Use

concentrated commercial activity. These CBDs are envisioned as compact commercial hubs, strategically positioned to enhance urban functionality and ensure efficient service delivery. Their siting has been guided by a set of key locational criteria, including:

- Accessibility from major transportation corridors and arterial roads, facilitating ease of movement for both goods and people.
- Central positioning within the urban fabric, ensuring equitable access for surrounding residential and institutional areas.
- Availability of suitable and appropriately sized land parcels, prioritizing non-agricultural and underutilized areas to prevent encroachment on productive lands.

This targeted approach to commercial zoning and CBD development is intended to strengthen urban structure, encourage compact growth, and enhance the overall economic vitality of the district. By concentrating commercial activity within well-connected and strategically located areas, the proposal ensures efficient land use, reduces travel demand, and contributes to the creation of vibrant, economically sustainable urban centers that align with the long-term vision for regional development.

Table 4-2 District Orakzai Commercial Requirements

Year	Population	Existing Commercial (Acres)	Commercial Demand (Acres)	District Commercial Requirements 2045	Proposed Urban Commercial	Additional District Requirements
2025	403751	131.37	403.751	272		
2045	597233	-	597.233	466	437	29

Table 4-3 District Orakzai Proposed Urban Commercial Requirements

Urban Area	Year	Population	Existing Commercial (Acres)	Commercial Demand (Acres)	Additional Commercial Demand	Proposed Commercial Area
Kalaya	2025	31611	42.84	31.61	-11	
	2045	41,202	42.84	41.20	-2	393.3 As per KAMP
Ghiljo	2025	7338	17.12	7.34	-10	
	2045	10,637	17.12	10.64	-6	22.7
Dabori	2025	5,223	20.80	5.22	-16	
	2045	16,068	20.80	16.07	-5	20.5
Total	2025	44172	80.76	44	-37	0
	2045	67907	80.76	68	-13	437

4.1.3 Industrial Zone

The proposed industrial zones have been delineated based on the projection that approximately 5% of the district's total population will be engaged in industrial activities by the planning horizon year 2045. Recognizing the district's abundant mineral resources and its significant potential for future industrial expansion, the consultant has emphasized the strategic role of the industrial sector as a key driver of economic growth and employment generation. In view of this potential,

the proposal envisions a strengthened industrial base capable of accommodating the anticipated increase in the industrial workforce while contributing to regional competitiveness and self-sufficiency.

To support this projection, the consultant has adopted the planning standard of 1 acre of industrial land per 50 persons, in accordance with the National Reference Manual of Planning and Infrastructure Standards (NRM).[85] This ratio ensures adequate land provision for industrial operations, associated facilities, and future expansion needs. The allocation is designed to create an industrial environment that is spatially efficient, environmentally responsible, and economically viable, reinforcing the district's capacity to attract both investment and skilled labor.

The proposed industrial land use strategy integrates economic development objectives with sustainability principles, ensuring that industrial growth complements the broader spatial and environmental goals of the district. By aligning industrial zoning with long-term planning horizons, the framework seeks to promote diversified economic activity, employment generation, and balanced urban–rural linkages, contributing to the district's overall prosperity.

The spatial distribution of industrial zones has been guided by a series of key locational criteria, including:

- Accessibility to major transportation corridors and road networks, ensuring efficient movement of raw materials and finished goods.
- Proximity to existing industrial clusters, allowing for synergies and shared infrastructure.
- Availability of suitable, non-agricultural land to prevent displacement of productive farmland.
- Consideration of prevailing wind direction, minimizing potential environmental and health impacts on adjacent residential or institutional areas.

Through this carefully structured approach, the proposed industrial zoning aims to facilitate the development of a sustainable, well-connected, and economically vibrant industrial ecosystem that strengthens the district's role as a regional hub for production, trade, and innovation.

Table 4-4 District Orakzai Required & Proposed Industrial Areas

District Population 2045	Total Industrial Requirements	Existing Industrial Area	Proposed Urban LMZ	Proposed SIDE Site
529,326	454	24.1	343	79.44

[85] Ministry of Housing and Works, Environment & Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Section 5.3.1.2, Page 89. The Manual `recommends 50 industrial workers per acre.

Table 4-5 District Orakzai Urban Areas Required & Proposed Industrial Areas

Urban Area	Year	Population	Existing & Proposed Industrial (Acres)
Kalaya	2025	31611	1.37
	2045	41,202	327.3 (As per KAMP)
Ghiljo	2025	7338	0.00
	2045	10,637	0.00
Dabori	2025	5,223	0.18
	2045	16,068	16.00
Total	2025	44172	1.55
	2045	67907	343.30

4.1.4 Institutional Zone

The institutional zone has been systematically planned to accommodate essential public functions and social infrastructure that support the district's long-term development objectives. To ensure effective spatial organization and functional clarity, the institutional zone is subdivided into three distinct categories; Public Buildings, Health Facilities, and Educational Institutions. Each sub-zone serves a specialized role in promoting community welfare, accessibility to services, and equitable urban development.

This subdivision enables a more targeted allocation of land and resources, ensuring that institutional uses are optimally distributed in relation to population density, accessibility, and future growth patterns. The following sections discuss each of these institutional sub-zones in detail, outlining their planning rationale, locational criteria, and development objectives.

4.1.4.1 Educational Zone

Following a comprehensive assessment of the future demand for educational infrastructure, the consultant has proposed the establishment of a dedicated Educational Zone to facilitate the systematic expansion of learning facilities across the district. This zone is envisioned to accommodate higher-level educational institutions, including those offering post-matriculation and tertiary programs, as well as large-scale private sector educational establishments. The creation of this specialized zone ensures that the district remains well-prepared to meet the increasing demand for advanced education driven by demographic growth and socio-economic development.

In parallel, primary to matriculation-level educational facilities are proposed to be integrated within the residential zones, utilizing specifically allocated land parcels to ensure convenient access to schooling for local communities. This integrated approach supports the development

of a comprehensive, inclusive, and decentralized educational system, catering to the diverse learning needs of all age groups while promoting equitable access to quality education across urban and peri-urban areas.

By strategically locating educational institutions within proximity to population centers, the proposal enhances educational accessibility, community cohesion, and social mobility. This spatial distribution also minimizes travel distances for students, reduces pressure on urban transport systems, and contributes to the creation of child-friendly and education-oriented neighborhoods. The strategy aligns with both national educational objectives and the regional development vision, fostering a well-rounded educational infrastructure capable of supporting the district's long-term human capital development goals.

The allocation of the Educational Zone has been guided by a set of key locational criteria, including:

- Proximity to residential developments, ensuring accessibility for students and staff.
- Adjacency to existing educational clusters or open/green spaces, providing opportunities for campus expansion and shared amenities.
- Connectivity to major and secondary road networks, facilitating safe and efficient access.
- Availability of suitable, non-constrained land parcels, enabling future growth while minimizing environmental and spatial conflicts.

Through this balanced and forward-looking approach, the proposed educational zoning framework aims to create a robust, accessible, and future-ready educational landscape that supports the district's broader objectives of sustainability, inclusivity, and socio-economic advancement.

4.1.4.2 Health Zone

Following a comprehensive assessment of the future healthcare demand across the district, the consultant has proposed the establishment of dedicated Health Zones to ensure the systematic development of medical infrastructure capable of meeting both current and long-term population needs. These zones are strategically designated to accommodate large-scale healthcare facilities, including district-level hospitals, specialized medical centers, and major private healthcare institutions. The intent is to create health service hubs that can provide advanced medical care, specialized treatments, and emergency response facilities, forming a critical component of the district's social infrastructure.

In parallel, smaller-scale and primary healthcare facilities are proposed to be integrated within residential zones, utilizing available and appropriately located land parcels to support community-based healthcare services. This decentralized approach ensures that all segments of the population have equitable and convenient access to essential medical care, reducing travel distances and alleviating pressure on tertiary healthcare centers. By distributing health services across different spatial tiers, the proposal encourages a hierarchical healthcare system linking local clinics and basic health units to larger, specialized hospitals within the designated Health Zones.

This framework aligns with the district's broader objectives of sustainable urban development, social equity, and improved public health outcomes. It is designed to deliver a balanced and resilient healthcare network that supports population well-being and enhances the overall quality of life.

The site selection and allocation of Health Zones are guided by a series of key locational criteria, including:

- Accessibility from major and secondary road networks, ensuring efficient patient and emergency access.
- Proximity to existing healthcare facilities, enabling service clustering and resource sharing.
- Availability of suitable, unconstrained land parcels, allowing for future expansion of healthcare infrastructure.
- Adjacency to open or green spaces, promoting a healthy environment and providing opportunities for medical and wellness-related activities.
- Proximity to residential areas, ensuring that healthcare services remain easily accessible to local populations.

Through this structured and evidence-based approach, the proposed Health Facilities Zoning Framework seeks to establish a comprehensive, inclusive, and sustainable healthcare infrastructure that effectively meets the district's evolving medical and social needs while reinforcing its long-term urban development vision.

4.1.4.3 Institutional Zone

The proposed Institutional Zones, as guided by the standards outlined in the National Reference Manual of Planning and Infrastructure Standards (NRM), have been strategically designated in close proximity to existing public infrastructure and institutional nodes. This spatial strategy is intended to enhance accessibility, operational efficiency, and inter-agency coordination by clustering essential administrative and civic functions within well-connected areas that already possess supporting utilities and services.

By situating these zones near established public and governmental facilities, the proposal aims to optimize land utilization, reduce travel distances for users, and promote functional integration among complementary public services such as administrative offices, community centers, emergency response facilities, and civic institutions. This clustering approach not only strengthens institutional synergy but also contributes to the creation of vibrant civic hubs that serve as focal points for governance and community engagement.

The strategy aligns with the overarching principles of sustainable and inclusive urban development, ensuring that public amenities are well-integrated into the urban fabric and equitably distributed across the district. Such spatial coherence supports effective service delivery, minimizes redundancy in infrastructure investments, and enhances the overall quality of urban life.

The allocation and siting of Public Buildings Zones have been guided by a set of key locational criteria, including:

- Adjacency to existing public buildings or institutional clusters, enabling continuity and collaboration among government and civic services.
- Accessibility to major and secondary road networks, ensuring efficient public access and connectivity.
- Availability of suitable, serviced land parcels, providing adequate space for current needs and future expansion.

Through this carefully structured and context-sensitive approach, the proposed Public Buildings Zoning Framework supports the creation of an efficient, accessible, and well-coordinated network of civic institutions, reinforcing the district's capacity for effective governance, community service delivery, and sustainable urban management.

4.1.5 Recreational Zone

In formulating the recreational zoning strategy, the consultant has undertaken a comprehensive assessment of the existing recreational land use, encompassing public parks, playgrounds, and sports complexes. Utilizing Geographic Information System (GIS) analysis, the consultant evaluated the spatial distribution and total land area currently allocated for recreational purposes. This data formed the basis for calculating the existing proportion of recreational land relative to the total urban area. The findings were then compared with projected population growth over the plan period to assess future demand and ensure that the proposed recreational provisions remain adequate and equitable.

Through this analytical process, the consultant identified gaps and deficiencies in the current recreational infrastructure, particularly in terms of accessibility, spatial coverage, and diversity of recreational options. The assessment revealed a shortfall in facilities such as parks, playgrounds, and sports complexes, which will become increasingly significant given the district's growing population and urban expansion.

To address these deficiencies, the consultant has proposed the development of additional recreational zones that include both active and passive recreational facilities, in accordance with the recommended percentage ranges outlined in the National Reference Manual of Planning and Infrastructure Standards (NRM). This proposal ensures that future recreational spaces are adequately sized, equitably distributed, and functionally diverse, catering to the varied needs and preferences of different user groups. The approach emphasizes sustainability, inclusivity, and public well-being, recognizing recreational spaces as vital components of a livable and healthy urban environment.

The allocation and distribution of recreational zones across the urban centers of District have been guided by a set of key locational criteria, including:

- Accessibility for nearby residents, ensuring convenient public use.
- Connectivity through major and secondary road networks, enhancing overall accessibility and integration with other land uses.
- Availability of suitable and unconstrained land parcels, providing space for both current needs and future expansion.
- Strategic positioning central or peripheral within the urban structure, depending on the scale and intended function of the facility.

Furthermore, the recreational zones have been subdivided into three primary categories Public Parks, Playgrounds, and Sports Complexes each serving a distinct role within the broader recreational framework. Public parks primarily cater to passive recreation and environmental enhancement; playgrounds provide community-level spaces for children and families; while sports complexes accommodate larger-scale, organized recreational and athletic activities.

This integrated and evidence-based approach ensures that recreational planning not only supports physical activity and community interaction but also contributes to the district's overarching objectives of urban sustainability, livability, and environmental resilience.

4.1.6 Forestation Zone

Forestation refers to the strategic planning, development, and management of trees and green spaces within urban environments to promote ecological balance and enhance urban livability. This concept encompasses a diverse array of green infrastructure elements such as street trees, public parks, green corridors, gardens, and buffer plantations that collectively contribute to the formation of a sustainable urban forest ecosystem.

Urban forests are integral to sustainable city development, offering a multitude of environmental, social, and economic benefits. Environmentally, they improve air quality by filtering pollutants, reduce urban heat island effects through shading and evapotranspiration, and mitigate flooding by intercepting rainfall and enhancing stormwater infiltration. They also play a crucial role in biodiversity conservation, providing habitats for urban fauna and promoting ecological connectivity.

Socially, green spaces enhance community well-being and public health by offering recreational areas that foster physical activity, relaxation, and social interaction. Numerous studies have linked the presence of trees and greenery in cities to reduced stress levels, lower incidences of mental health issues, and greater community cohesion. Economically, urban forests contribute to increased property values, lower energy consumption through natural cooling, and reduced infrastructure maintenance costs by stabilizing microclimatic conditions.

As cities expand and densify, integrating and maintaining urban forests becomes essential for ensuring urban resilience, environmental sustainability, and climate change adaptation.

In the context of project area, a detailed spatial analysis was conducted using digitized rangeland data to identify potential areas suitable for urban forestation. This analytical approach focused on optimizing the use of underutilized or degraded rangelands, proposing their conversion into functional green assets that contribute to the district's ecological stability. By targeting dilated and unproductive portions of rangeland, the proposed initiative aims to restore environmental integrity, enhance microclimatic conditions, and strengthen the natural landscape within both urban and peri-urban areas.

The proposed Urban Forestation Framework for project area seeks to:

- Rehabilitate degraded lands and improve soil stability through vegetation cover.
- Increase biodiversity and ecological connectivity within urban zones.
- Reduce environmental risks, including soil erosion and flash flooding.
- Provide social and recreational benefits to residents through accessible green spaces.

Through this proactive and data-driven strategy, the urban forestation initiative is envisioned as a key environmental intervention, fostering long-term sustainability, resilience, and quality of life for the communities of the district.

4.1.7 Agricultural Zone

Within the broader context of proposed land use planning and zoning, the delineation of urban and rural agricultural zones plays a pivotal role in achieving sustainable and balanced spatial development. These zones serve as essential components of the district's environmental and economic fabric, contributing directly to food security, ecosystem stability, and community resilience. Both urban and rural agricultural zones perform distinct yet complementary functions, together forming an integrated system that supports the district's sustainable growth and long-term prosperity.

Urban agricultural zones, typically located within urban, suburban, and peri-urban areas, represent a strategic effort to integrate agricultural practices into the city's spatial and functional framework. By utilizing available spaces such as rooftops, vacant plots, and green belts these zones adapt to urban pressures while promoting localized food production, waste recycling, and green space preservation. In addition to providing fresh produce for nearby communities, urban agriculture contributes to microclimate regulation, carbon sequestration, and urban biodiversity enhancement. It also supports agri-tourism and educational initiatives, creating recreational and

learning opportunities for residents while strengthening the cultural connection between people and food production systems.

In contrast, rural agricultural zones encompass large tracts of farmland and rangeland that sustain traditional and mechanized crop and livestock production. These zones underpin rural livelihoods, food supply chains, and agro-based industries, forming the backbone of regional food security. They also play a crucial role in maintaining ecological integrity, supporting watershed functions, and conserving biodiversity. However, both urban and rural agricultural systems face mounting challenges urban zones confront land scarcity and competing development demands, whereas rural areas are increasingly vulnerable to land degradation, water scarcity, and unplanned urban sprawl.

In response to these challenges, the proposed land use and zoning plan for district emphasizes a strategic and sustainable approach to agricultural land management. Acknowledging that a significant portion of the district is already urbanized, the plan prioritizes the preservation of productive agricultural land while accommodating urban growth through efficient spatial allocation. To mitigate the loss of arable land, future development is directed toward non-productive and underutilized areas, including vacant land, barren tracts, and rangelands, rather than encroaching upon fertile agricultural zones.

Agricultural land is considered for development only in exceptional circumstances, where no feasible alternatives exist or where existing agricultural value has already been compromised. This policy ensures that urban expansion remains compatible with long-term agricultural sustainability and that critical food-producing areas are protected for future generations.

Furthermore, the proposed framework advocates for climate-resilient agricultural practices, modern irrigation systems, and soil conservation measures to enhance productivity and environmental performance. It also encourages the establishment of agro-industrial linkages and farm-to-market connectivity to strengthen the district's local economy and reduce post-harvest losses.

Ultimately, the Agricultural Zoning Framework for district seeks to achieve a balanced coexistence between development and conservation, reinforcing the district's commitment to sustainable land use, food security, and environmental stewardship. By integrating agricultural preservation into the core of spatial planning and zoning policy, the plan ensures that growth remains inclusive, resource-efficient, and ecologically sound.

4.2 Recommended Zoning for Urban Area

The proposed urban boundaries have been strategically delineated and divided into a series of functional zones, each designated for a specific land use purpose in accordance with established planning principles and regulatory standards. This spatial division provides a clear framework for guiding urban development, ensuring that future growth within the defined boundaries aligns with the district's planning vision, regulatory guidelines, and sustainable development objectives. The zoning framework serves as a core instrument for managing land use distribution, promoting efficient urban form, and ensuring compatibility among diverse land uses.

Each designated zone whether residential, commercial, industrial, institutional, recreational, or agricultural has been carefully identified based on its suitability, accessibility, and functional interrelationships with surrounding areas. The intent is to promote orderly, inclusive, and sustainable urban growth that balances economic vitality with environmental protection and social well-being. In line with contemporary urban design and planning principles, the proposed framework ensures equitable access to green and public spaces, encourages economic

productivity through mixed and commercial zones, and integrates essential public services and infrastructure in a manner that enhances livability, resilience, and urban efficiency.

The zoning regulations and implementation guidelines associated with each zone will serve as the primary tools for controlling land development, regulating density, and ensuring design consistency across the urban landscape. These controls are aimed at fostering a cohesive urban structure that optimizes land use efficiency while preserving community values, environmental integrity, and public welfare.

In the zoning delineation process, all existing built-up areas have been excluded from new zoning designations to prevent conflicts with established land uses and ensure continuity in existing settlements. The remaining vacant and developable land has been systematically allocated to the most appropriate zoning categories, guided by an in-depth evaluation of topography, infrastructure capacity, land suitability, and development potential.

This allocation methodology takes into account projected population growth, anticipated infrastructure expansion, and future demand for housing, public amenities, and economic facilities through the planning horizon year 2045. The resulting framework provides a comprehensive and adaptable foundation for managing urban expansion, facilitating investment, and guiding public and private sector decision-making.

Ultimately, the proposed urban boundary and zoning framework aim to create a well-balanced, functional, and resilient urban system, where growth is strategically directed, resources are efficiently utilized, and development contributes to the socio-economic advancement and environmental sustainability of the district.

Table 4-6 Urban Areas Projected Populations

Urban Center	Population 2025	Projected Population 2030	Projected Population 2035	Projected Population 2040	Projected Population 2045
Kalaya	21632	24985	27599	30418	41202
Ghiljo	7338	7888	8298	8723	10637
Dabori	5223	6308	7180	8144	16068

4.2.1 Kalaya Urban Center

The Kalaya Urban Center Land Use Plan has been formulated in direct alignment with the Kalaya Approved Master Plan, ensuring coherence between district-level development objectives and localized spatial planning frameworks. The integration aims to reinforce Kalaya's role as a strategic growth node within the district by optimizing land utilization, promoting balanced urbanization, and safeguarding the region's vital ecological and agricultural resources. The total planning area encompasses approximately 13,046 acres, combining both existing and proposed land uses within a sustainable and structured development framework consistent with Natural Reference Manual (NRM) standards.

4.2.1.1 Residential

The residential land use area occupies 1,511.51 acres, representing 11.59% of the total planning area. While this proportion falls below the NRM benchmark (24–50%), it intentionally reflects the compact urban development strategy advocated in the Kalaya Master Plan. The residential areas are concentrated within designated urban growth boundaries to prevent sprawl, protect agricultural land, and ensure proximity to essential services. The plan promotes high-density and mixed-income housing models, integrated with infrastructure and community amenities, in line with the master plan's vision for inclusive and sustainable urban living. This approach supports future population absorption while maintaining a balanced urban footprint.

4.2.1.2 Commercial and Economic Activity

The commercial sector, comprising 225.61 acres (1.73%), remains within the NRM guideline (0.5–5%) and demonstrates a clear alignment with the master plan's directive for economic diversification and localized employment generation. The introduction of a Mixed-Use Commercial Zone (182.77 acres) represents a major spatial policy derived from the master plan promoting integrated retail, office, and residential spaces that enhance land-use efficiency and reduce commuting distances. Kalaya's position as a district-level commercial hub is reinforced through the inclusion of specialized trading areas and services that complement the broader economic corridor strategy envisioned in the master plan.

4.2.1.3 Institutional and Public Facilities

Institutional land use accounts for 395.51 acres (3.03%), aligning with the NRM range (2–21%). The master plan emphasizes institutional strengthening as a foundation for sustainable urban growth, which is reflected in the proposed allocations for educational, health, and government buildings. The Educational Zone (110.74 acres) and Public Buildings (112.94 acres) ensure the spatial distribution of learning and administrative functions across the city. This clustering of institutional facilities supports efficient service delivery and promotes equitable access to education, healthcare, and governance, directly echoing the master plan's social development objectives.

4.2.1.4 Industrial

Industrial use expands significantly from 1.37 acres to 291.87 acres, resulting in a combined total of 293.24 acres (2.25%). This falls within the NRM range (2–20%) and is consistent with the master plan's policy of establishing a Light Manufacturing Zone to boost local production and employment opportunities. The designated industrial precinct follows environmentally sensitive siting principles, ensuring adequate buffering from residential areas and compatibility with adjacent land uses. This shift from scattered industrial activity to a planned industrial cluster marks a key milestone in achieving spatial efficiency, pollution control, and economic self-sufficiency.

4.2.1.5 Recreational and Open Space

The total land allocated for recreational and open spaces stands at 44.15 acres (0.34%), slightly below the NRM benchmark (0.5–7%). This category includes public parks and green open spaces, contributing to community wellbeing, urban aesthetics, and microclimate regulation. While the current allocation is modest, the master plan recommends incremental enhancement through urban forestry and linear green corridors, which are integrated within transport and institutional areas. This approach will enhance urban livability and ensure ecological continuity within the built environment.

4.2.1.6 Arterial Circulation and Transport Terminals

Transportation-related land use accounts for 307.59 acres (2.36%), conforming to the NRM range (2–29%). The expansion of the bus terminal (1.62 acres) and road networks supports improved mobility, inter-district connectivity, and access to economic zones. The Kalaya Master Plan emphasizes the development of sustainable and multi-modal transport systems, including improved pedestrian pathways, public transport hubs, and integrated road hierarchies. These interventions collectively aim to minimize travel time, improve accessibility, and enhance the efficiency of goods and passenger movement within the urban center.

4.2.1.7 Other Uses

The "Other Uses" category dominates the land allocation with 10,268.73 acres (78.71%), reflecting the master plan's strong commitment to agricultural preservation, environmental protection, and sustainable land management.

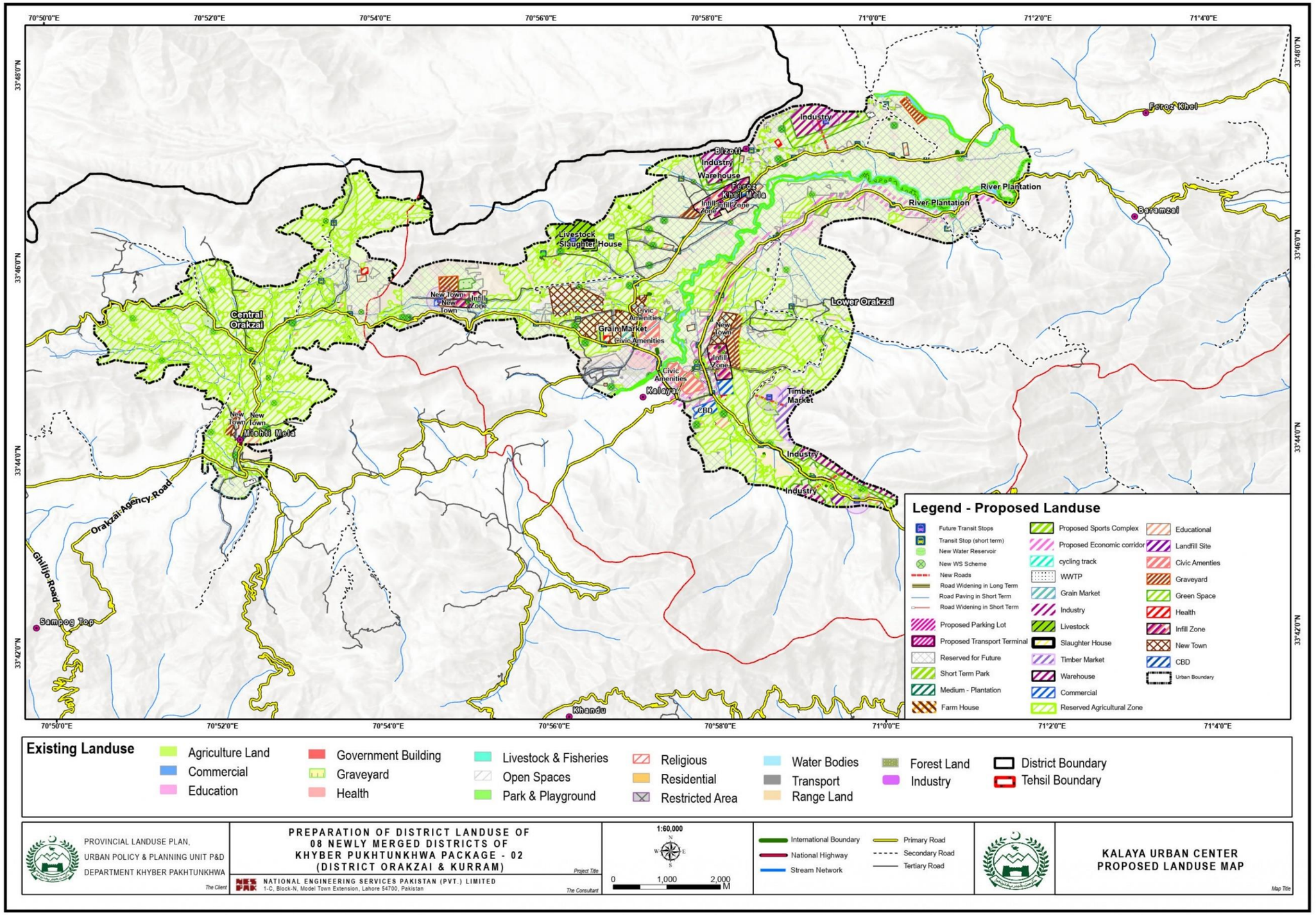
This includes:

- Preserve Agriculture (9,371 acres) safeguarding productive farmlands and ensuring long-term food security.
- Green and Open Spaces (214.82 acres) and Riparian Plantations (64.36 acres) providing ecological buffers and contributing to flood control and biodiversity.
- Urban Forestation (35.93 acres) and Livestock Areas (83.06 acres) supporting environmental and economic sustainability.
- WWTP (12.59 acres) and Landfill Sites (11.57 acres) integrating essential environmental infrastructure.

This substantial ecological allocation directly corresponds with the Kalaya Master Plan's sustainability framework, which prioritizes environmental resilience, climate adaptation, and green infrastructure integration across all urban functions.

Table 4-7 Kalaya Urban Center Existing and Proposed Land use Stats

Land use Class	Existing	Area (Acres)	Proposed	Area (Acres)	Sum of existing and proposed	Land use Percentages	NRM Percentages
Residential	Residential	1010.87	Residential	500.64	1511.51	**11.59%**	**24 - 50%**
	Total	**1010.87**	**Total**	**500.64**	**1511.51**		
Commercial	Commercial	42.84	Mix Use (Commercial)	182.77	**225.61**	**1.73%**	**0.5 - 5%**
	Total	**42.84**	**Total**	**182.77**			
Institutional	Education	60.09	Educational	110.74	**395.51**	**3.03%**	**2-21%**
	Health Facility	23.92	Health	21.51			
	Government Building	51.02	Public Buildings	112.94			
	Religious Building	15.29					
	Total	**150.32**	**Total**	**245.19**			
Industrial	Scattered Industry	1.37	Light Manufacturing Zone	291.87	**293.24**	**2.25%**	**2-20%**
	Total	**1.37**	**Total**	**291.87**			
Recreational/ Open Space	Park & Playground	13.36	Playground	0.00	**44.15**	**0.34%**	**0.5-7 %**
			Public Park	30.79			
			Sport Complex	0.00			
	Total	**13.36**	**Total**	**30.79**			
Arterial Circulation/Terminals	Bus terminal	0.58	**Bus Terminal**	**1.62**	**307.59**	**2.36%**	**2-29%**
	Transportation	305.39					
Other Uses	**Total**	**305.97**	Green and Open Space	214.82	**10268.73**	**78.71%**	**-**
	Agriculture	10308.49	Live Stock	83.06			
	Forest Land	53.48	Riparian Plantation	64.36			
	Graveyard	52.88	Urban Forestation	35.93			
	Open Spaces	198.12	WWTP	12.59			
	Range Land	750.28	Graveyard	126.97			
	Vacant Area	0.00	Landfill Site	11.57			
	Livestock & Fisheries	0.02	preserve Agriculture	9371.00			
	Restricted Area	60.43					
	Utilities	1.04					
	Water Bodies	97.44					
	Total	**11522.18**	**Total**	**9920.30**			
	Grand Total	**13046.90**	**Grand Total**	**11172**	**13046.33**	**100.00%**	



Map 4-1: Kalaya Urban Center Proposed Zonings

4.2.2 Dabori Proposed Urban

The proposed land use structure presents a holistic and balanced framework for the district's urban development, addressing both current deficiencies and future spatial requirements. The total land area of approximately 462.64 acres, has been strategically reorganized to achieve an efficient and sustainable pattern of urban growth. The formulation of this distribution is based on key planning principles, including compact development, accessibility, environmental conservation, and equitable provision of public facilities.

4.2.2.1 Residential

Residential land use in Dabori Urban Area totals 121.56 acres (25%), which falls within the NRM benchmark range of 24–50%. The proposed residential allocation includes 80.50 acres of new residential development, supplementing the existing 41.06 acres. This controlled expansion supports population growth while maintaining a compact urban form. Residential areas are planned in proximity to commercial, institutional, and transport facilities to enhance accessibility, reduce travel distances, and support efficient service provision.

4.2.2.2 Commercial

Commercial land use increases from 20.80 acres to 41.30 acres (9%), which exceeds the NRM guideline range of 0.5–5%. The proposed commercial structure includes a Mixed-Use Central Business District (15.50 acres), a fruit and vegetable market (2.50 acres), and a weekly bazar (2.50 acres). This higher commercial share reflects Dabori's emerging role as a local trade and service node for surrounding rural settlements. While above NRM norms, the allocation is justified by the need to strengthen local economic activity, reduce dependency on distant markets, and support small-scale commerce.

4.2.2.3 Institutional and Public Buildings

Institutional land use expands from 11.66 acres to 42.66 acres (8.93%), remaining well within the NRM benchmark range of 2–21%. Proposed allocations include educational facilities (5 acres), health facilities (11 acres), and public/government buildings (15 acres). This expansion addresses current service gaps and ensures adequate provision of social infrastructure to meet present and future community needs. The spatial distribution of institutional facilities enhances accessibility and reinforces Dabori role as a basic service center.

4.2.2.4 Industrial

Industrial land use increases from 0.18 acres to 16.18 acres (3%), aligning with the NRM recommended range of 2–20%. The introduction of a Light Manufacturing Zone (16 acres) formalizes previously scattered industrial activity and supports small-scale manufacturing, repair workshops, and agro-based enterprises. This allocation is designed to generate local employment while minimizing environmental impacts through appropriate zoning and scale control.

4.2.2.5 Recreational and Open Space

Recreational and open space land use totals 21.61 acres (5%), which lies within the NRM guideline range of 0.5–7%. Proposed facilities include playgrounds (5 acres), public parks (10 acres), and a sports complex (5.50 acres), complementing existing recreational areas. These spaces enhance urban livability, promote physical activity, and provide community gathering areas, while also contributing to environmental quality and urban cooling.

4.2.2.6 Arterial Circulation and Transport Terminals

Transportation and circulation functions occupy 25.57 acres (5%), aligning with the NRM benchmark range of 2–29%. The proposed bus terminal (2 acres) strengthens public transport accessibility, while existing road infrastructure supports internal mobility and regional connectivity. The compact scale of Dabori allows for efficient movement patterns with limited infrastructure expansion.

4.2.2.7 Other Uses

The 'Other Uses' category accounts for 208.78 acres (44%), highlighting the importance of agricultural land, environmental management, and natural systems within the urban boundary. Key components include:

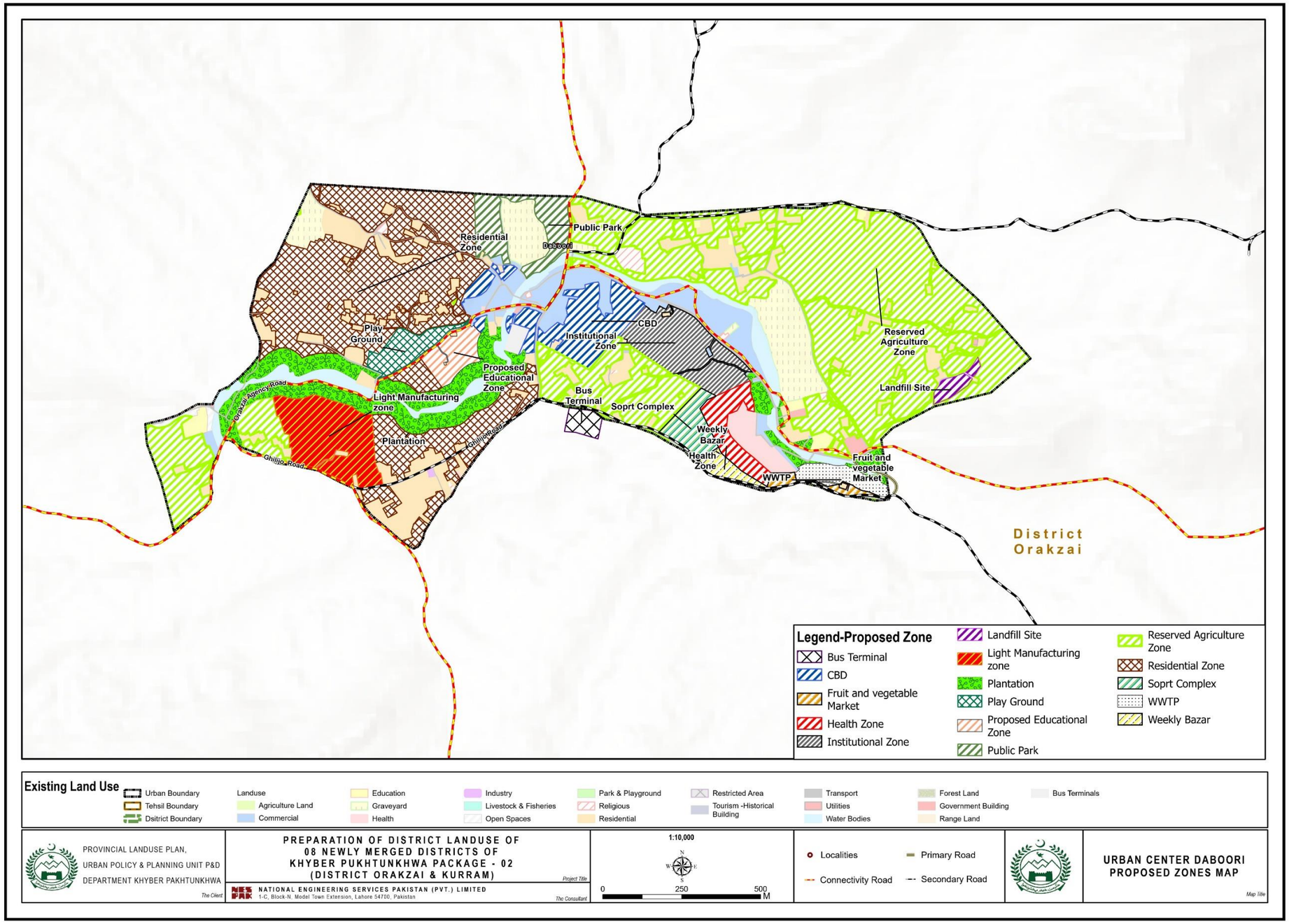
- **Preserved Agriculture** (113.81 acres) to protect productive land and sustain local livelihoods.
- **Riparian Plantation** (30.11 acres) supporting erosion control, flood mitigation, and ecological balance.
- **Water Bodies (17.52 acres)** contributing to hydrological stability.
- **Wastewater Treatment Plant** (4.11 acres) and **landfill site (2.91 acres)** ensuring environmentally sound sanitation and solid waste management.
- Existing graveyards, utilities, and restricted areas supporting essential community and safety functions.

This allocation reflects a deliberate planning emphasis on sustainability and environmental resilience alongside urban development.

.

Table 4-8 Dabori Urban Center Existing and Proposed Land use Stats

Land use Class	Existing	Area (Acres)	Proposed	Area (Acres)	Sum of existing and proposed	Land use Percentages	NRM Percentages
Residential	Residential	41.06	Residential	80.50	121.56	**25%**	**24 - 50%**
					0.00		
	Total	**41.06**	**Total**	**80.50**	**121.56**		
Commercial	Commercial	20.80	Mix Use (CBD)	15.50	**41.30**	**9%**	**0.5 - 5%**
			Fruit and Vegetable Market	2.50			
			Weekly Bazar	2.50			
	Total	**20.80**	**Total**	**20.50**			
Institutional	Education	3.36	Educational	5.00	**42.66**	**8.93%**	**2-21%**
	Health Facility	4.61	Health	11.00			
	Government Building	1.26	Public Buildings	15.00			
	Religious Building	2.43					
	Total	**11.66**	**Total**	**31.00**			
Industrial	Scattered Industry	0.18	Light Manufacturing Zone	16.00	**16.18**	**3%**	**2-20%**
	Total	**0.18**	**Total**	**16.00**			
Recreational/ Open Space	Park & Playground	1.11	Playground	5.00	**21.61**	**5%**	**0.5-7 %**
			Public Park	10.00			
			Sport Complex	5.50			
	Total	**1.11**	**Total**	**20.50**			
Arterial Circulation/Terminals	Bus terminal	1.22	**Bus Terminal**	**2.00**	**25.57**	**5%**	**2-29%**
	Transportation	22.35					
Other Uses	**Total**	**23.57**	Agriculture	113.81	**208.78**	**44%**	**-**
	Agriculture	320.15	WWTP	4.11			
	Forest Land	0.00	Landfill Site	2.91			
	Graveyard	22.12	Riparian Plantation	30.11			
	Open Spaces	18.20					
	Range Land	1.02					
	Vacant Area	0.00					
	Tourism -Historical Building	0.07					
	Restricted Area	0.02					
	Utilities	0.18					
	Water Bodies	17.52					
	Total	**379.28**	**Total**	**150.94**			
	Grand Total	**477.66**	**Grand Total**	**319**	**477.66**	**100%**	



Map 4-2 Dabori Urban Center Proposed Zonings

4.2.3 Ghiljo Proposed Urban

The proposed land use framework for the district delineates a comprehensive spatial reorganization designed to achieve a sustainable balance between urban expansion, ecological preservation, and socio-economic growth. Covering a total area of approximately 1,294.87 acres, the plan integrates both existing and proposed allocations, responding to projected demographic trends, environmental considerations, and the principles of Natural Reference Manual (NRM).

4.2.3.1 Residential

Residential land use in Ghiljo Urban Area totals 94.01 acres (7%), which is significantly below the NRM benchmark range of 24–50%. The proposed residential allocation includes 25 acres of new residential development, supplementing the existing 69.01 acres. This restrained residential growth reflects Ghiljo low population density, limited in-migration, and a deliberate policy choice to avoid premature urban expansion. The compact residential footprint supports efficient service delivery while safeguarding surrounding agricultural and natural lands.

4.2.3.2 Commercial

Commercial land use increases from 17.12 acres to 39.86 acres (3%), remaining within the NRM guideline range of 0.5–5%. The proposed commercial framework includes a Mixed-Use Central Business District (10.24 acres), a fruit and vegetable market (6.50 acres), and a weekly bazar (6 acres). These allocations strengthen Ghiljo function as a local market and service center for nearby rural settlements, promoting small-scale trade and improving access to essential goods without creating excessive commercial concentration.

4.2.3.3 Institutional and Public Buildings

Institutional land use expands from 16.94 acres to 57.44 acres (4%), aligning well with the NRM benchmark range of 2–21%. Proposed facilities include educational uses (11 acres), health facilities (6 acres), and a dedicated institutional zone (23.50 acres) for public and government buildings. This expansion addresses existing service gaps and ensures adequate provision of education, healthcare, and administrative functions, reinforcing Ghiljo's role as a basic service node.

4.2.3.4 Industrial

No industrial land is proposed for Ghiljo Urban Area, keeping industrial land use at 0%, which is below the NRM recommended range of 2–20%. This planning decision is consistent with Ghiljo's rural character, limited labor market, and environmental sensitivity. By excluding industrial development, the plan minimizes land-use conflicts and environmental risks, while allowing the settlement to function primarily as a residential-service and agricultural support center.

4.2.3.5 Recreational and Open Space

Recreational and open space land use totals 60.40 acres (5%), which lies comfortably within the NRM guideline range of 0.5–7%. Proposed facilities include playgrounds (5.16 acres), public parks (12 acres), and a sports complex (21.57 acres), supplementing existing recreational spaces. These allocations enhance quality of life, promote physical activity, and provide community gathering spaces, while also contributing to environmental benefits such as urban cooling and stormwater management.

4.2.3.6 Arterial Circulation and Transport Terminals

Transportation and circulation functions occupy 42.16 acres (3%), which falls within the NRM benchmark range of 2–29%. The proposed bus terminal (2 acres) complements the existing

transportation network, supporting basic mobility needs and regional connectivity. The compact urban form limits travel distances and reduces the need for extensive transport infrastructure.

4.2.3.7 Other Uses

The 'Other Uses' category dominates land allocation with 1,000.67 acres (77%), reflecting a strong emphasis on agricultural preservation and environmental conservation. Key components include:

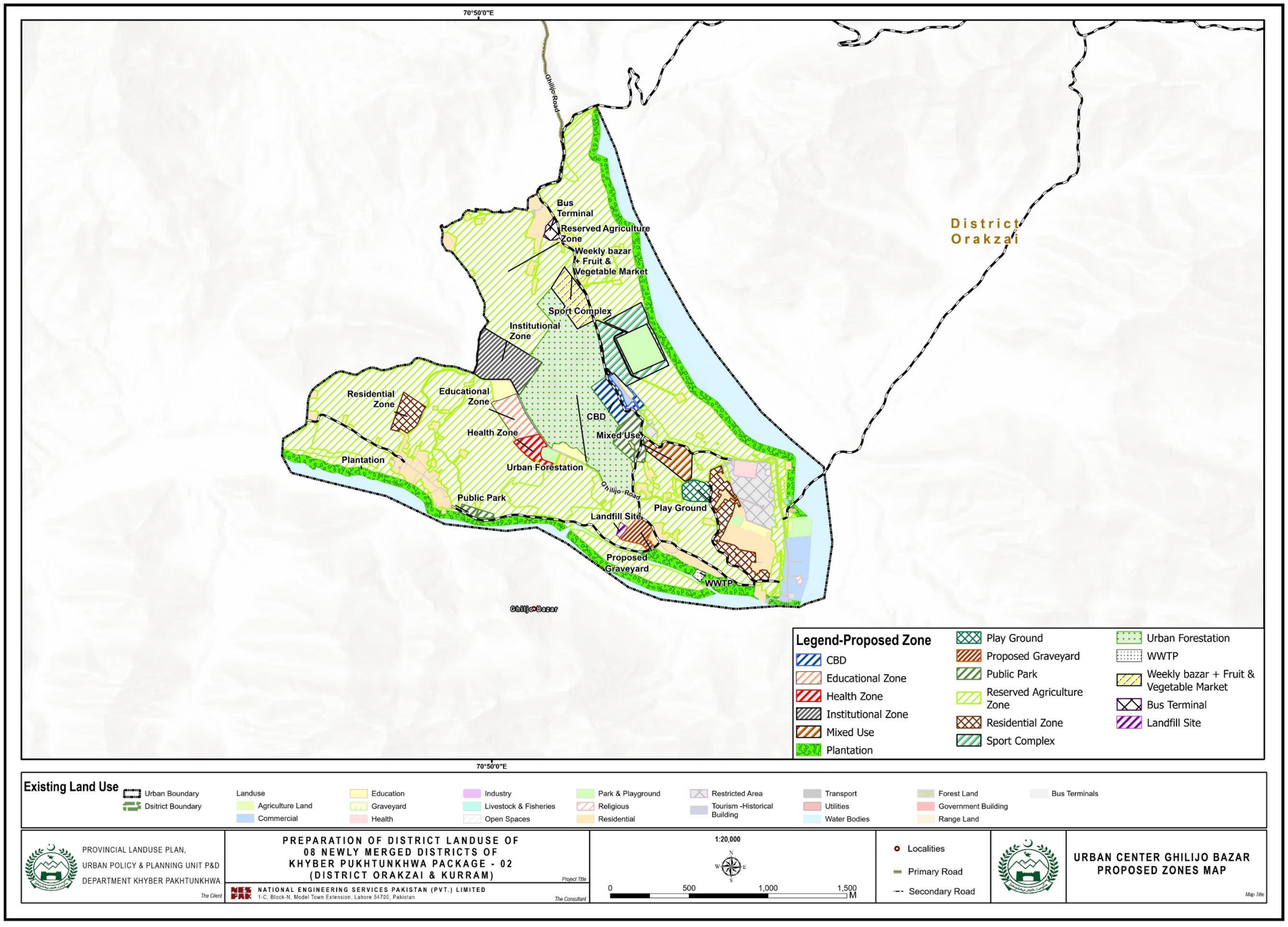
- **Preserved Agriculture** (624.32 acres) to protect productive farmland and sustain local livelihoods.
- **Urban Forestation** (107.78 acres) to enhance biodiversity, improve air quality, and regulate micro-climatic conditions.
- **Riparian Plantation** (78.63 acres) supporting erosion control and watercourse protection.
- **Water Bodies (161.40 acres)** contributing to hydrological balance and flood mitigation.
- **Wastewater Treatment System** (0.88 acres), **landfill site (0.93 acres)**, and a proposed graveyard (6 acres) to address essential environmental and community needs.

This dominant allocation clearly positions sustainability and resource conservation as the core planning priorities for Ghiljo.

.

Table 4-9 Dabori Urban Center Existing and Proposed Land use Stats

Land use Class	Existing	Area (Acres)	Proposed	Area (Acres)	Sum of existing and proposed	Land use Percentages	NRM Percentages
Residential	Residential	69.01	Residential	25.00	94.01	**7%**	**24 - 50%**
	Total	**69.01**	**Total**	**25.00**	**94.01**		
Commercial	Commercial	17.12	Mix Use (CBD)	10.24	**39.86**	**3%**	**0.5 - 5%**
			Fruit and Vegetable Market	6.50			
			Weekly Bazar	6.00			
	Total	**17.12**	**Total**	**22.74**			
Institutional	Education	11.54	Educational	11.00	**57.44**	**4%**	**2-21%**
	Health Facility	3.78	Health	6.00			
	Government Building	0.27	Institutional Zone	23.50			
	Religious Building	1.35					
	Total	**16.94**	**Total**	**40.50**			
Industrial	Scattered Industry	0.00	Light Manufacturing Zone	0.00	**0.00**	**0%**	**2-20%**
	Total	**0.00**	**Total**	**0.00**			
Recreational/ Open Space	Park & Playground	21.67	Playground	5.16	**60.40**	**5%**	**0.5-7 %**
			Public Park	12.00			
			Sport Complex	21.57			
	Total	**21.67**	**Total**	**38.73**			
Arterial Circulation/Terminals	Bus terminal	0.00	**Bus Terminal**	**2.00**	**42.16**	**3%**	**2-29%**
	Transportation	40.16					
Other Uses	**Total**	**40.16**	Preserve Agriculture	624.32	**1000.67**	**77%**	**-**
	Agriculture	541.78	Urban Forestation	107.78			
	Forest Land	0.00	WWTS	0.88			
	Graveyard	0.00	Landfill Site	0.93			
	Open Spaces	200.25	Riparian Plantation	78.63			
	Range Land	205.16	Propose Graveyard	6.00			
	Vacant Area	0.00					
	Livestock & Fisheries	0.00					
	Restricted Area	20.74					
	Utilities	0.32					
	Water Bodies	161.40					
	Total	**1129.65**	**Total**	**818.54**			
	Grand Total	**1294.55**	**Grand Total**	**946**	**1294.55**	**100%**	



Map 4-3 Ghiljo Urban Center Proposed Zonings

4.3 Review of Kalaya City Master Plan (2024–2042)

4.3.1 Kalaya urban center

The project area of Kalaya comprises three Neighborhood Councils, encompassing a total planning jurisdiction of approximately 53 square kilometers. Within this area, the existing urban core presently occupies about 5.84 square kilometers of built-up land, accommodating a population of 20,011 persons, as recorded in the Population and Housing Census 2017.

Based on projected demographic trends, spatial growth patterns, and urban service demand, the Parachinar Master Plan (Horizon Year 2042) estimates that the urban population will increase to approximately 31,930 residents. To effectively manage this anticipated growth in a sustainable and orderly manner, the plan proposes the strategic allocation and zoning of an additional 53.25 square kilometers (13158.36 Acres) of land for future urban expansion.

This proposed expansion area is intended to support planned residential development, along with complementary land uses such as commercial centers, public facilities, transport infrastructure, open spaces, and utilities. The land-use and zoning framework aims to optimize land consumption, prevent unplanned sprawl, and ensure balanced urban density, while safeguarding environmentally sensitive areas and promoting efficient service delivery.

The spatial distribution of future growth has been aligned with accessibility, infrastructure capacity, and socio-economic needs, ensuring that urban expansion contributes to a compact, resilient, and well-integrated urban structure for kalaya up to the year 2042.

Table 6-1: Land Allocation for Proposed Land Uses in Kalaya City

Proposed Land Use (Recommended area is based on multiplying percentages with the total area which is 53.0 sq.km.)	NRM Standard (% for 25000-49000 population range)	Recommended Area – min (sq. km.)	Recommended Area – max (sq. km.)	Required (Recommended Area (min) – Existing Land Use) (Sq. km.)	Required (Recommended Area (max) – Existing Land Use) (sq.km)	Existing Land Use Area (sq. km.) (2021)	Proposed Area (sq. km.)
Residential Zone	26 to 50	13.78	26.50	10.52	23.24	3.26	**0.82**
Commercial Zone	0.5 to 3	0.27	1.59	0.09	1.41	0.18	**0.25**
Industry Zone	3 to 11	1.59	5.82	1.58	5.82	0.004	**1.59**
Civic Amenities (Institutional)	2 to 21	1.06	11.12	0.83	10.89	0.23	**0.43**
Economic Corridor/Mixed Use Zone							**1.25**
Graveyard	1 to 4	0.53	2.12	0.50	2.09	0.03	**0.50**
Reserved Agriculture	-	-	-	-	-	-	**18.74**
Livestock and Dairy Development Zone	-	-	-	-	-	-	**0.39**
Green Space (recreational open spaces)	0.5 to 2	0.26	1.06	0.24	1.04	0.02	**2.04**
Landfill	-	-	-	-	-	-	**0.05**
Reserved for future	-	-	-	-	-	-	**27.19**

Table 6-1: Land Allocation for Proposed Land Uses in Parachinar City

Proposed Land Use (Recommended area is based on multiplying percentages with the total area which is 34.0 sqkm.)	NRM Standard % for 50000-99000 population range	Recommended Area – min (sq. km.)	Recommended Area – max (sq. km.)	Required (Recommended Area (min) – Existing Land Use) (Sq. km.)	Required (Recommended Area (max) – Existing Land Use) (sq.km)	Existing Land Use Area (sq. km.) (2021)	Proposed Area (sq. km.)
Residential Zone	27 to 43	9.18	14.62	4.94	10.38	4.24	**3.96**
Commercial Zone	1 to 5	0.34	1.7	-0.04	1.32	0.38	**0.09**
Industry Zone	2 to 20	0.68	6.8	0.65	6.77	0.03	**0.7**
Civic Amenities (Institutional)	3 to 11	1.02	3.74	-0.42	2.30	1.44	**0.2**
Economic Corridor/Mixed Use Zone							**1.25**
Graveyard	0.5 to 6	0.17	2.04	0.12	1.99	0.05	**0.14**
Reserved Agriculture	-	-	-	-	-	-	**7.79**

4.3.2 Master Plan Review

4.3.2.1 Residential

The existing residential footprint of Kalaya covers approximately 3.26 sq. km, accommodating 4040 housing units with an average household size of 8.15 persons. According to NRM planning standards, residential land should typically constitute 26% to 50% of the total urban area, depending on settlement size, density, and socio-economic composition.

For the planning horizon of 2042, the approved master plan proposes 0.82 sq. km (202.62 acres) of additional residential land, based on a projected household size of 8.11 persons and the provision of 3936 new housing units. However, a critical review of these figures reveals a major inconsistency. The implied average land consumption per housing unit is approximately 2.42 kanals, which is not aligned with realistic urban plot sizes, particularly when compared with the plan's proposed plot categories of 9, 17, and 30 marlas for low-, middle-, and high-income groups.

Furthermore, findings from the HIS Survey indicate that 72% of Kalya population belongs to the low-income group, 22% to the middle-income group, and only 6% to the high-income group. This socio-economic distribution necessitates a stronger focus on compact, affordable, and appropriately sized residential development. The over-allocation of residential land in the approved master plan does not reflect this reality and risks inefficient land consumption and urban sprawl.

4.3.2.2 Commercial

The existing commercial land in Parachinar covers 44.47 acres, while the current demand, based on population and activity levels, is only 20.01 acres, indicating a surplus of commercial land even under present conditions. Projections up to 2042 suggest that the existing commercial area remains largely sufficient.

Despite this, the approved master plan proposes an additional 22.23 acres for commercial use and introduces a mixed-use commercial corridor spanning 308 acres. When commercial land demand is recalculated strictly for the incremental population growth, the requirement as per NRM standards is only 19.31 acres.

4.3.2.3 Industry

Parachinar currently has only 0.98 acres of industrial land, which is significantly below the existing estimated requirement of 31.93 acres for plan period. To address this gap, the approved master plan proposes a substantial increase, allocating 392.89 acres for industrial use.

However, a reassessment using NRM standards shows that for the projected 2042 population, the total industrial land requirement is approximately 76.48 acres. This indicates that while some expansion is necessary, the industrial land proposed in the approved master plan is excessive and not demand-driven.

4.3.2.4 Green Space/Recreational

The existing land-use survey highlights a severe shortage of green and recreational spaces in Kalaya. Currently, parks cover only 0.02 sq. km (4.94 acres), while the sports complex occupies 0.06 sq. km (14.82 acres).

The approved master plan proposes 1,450.50 acres of green and open spaces, citing WHO standards. However, WHO recommends 9 square meters of open space per capita. When applied to the projected 2042 population, the actual requirement amounts to approximately 170.08 acres.

4.3.2.5 Education:

Within the Education sector of the Kalaya Master Plan, a critical methodological inconsistency has been identified concerning the population projections used for demand estimation. Specifically, Table 6-22 applies a projected 2040 population of 146,506, whereas all other sectors of the Master Plan consistently adopt 31,930 as 2040 population projection. This discrepancy significantly undermines the validity of the education sector analysis, as the calculation of school requirements and associated land-use standards is premised on an overstated population base, rendering the resulting projections unreliable.

With respect to the existing educational infrastructure, Kalaya currently accommodates 86 schools, comprising 74 primary schools, 6 middle schools, and 6 high schools. When benchmarked against the actual 2022 demand, which requires only 5 primary schools, 1 middle school, and 1 high school, substantial surpluses are evident across all categories. Furthermore, projections based on the correct 2040 population estimate of 31,930 indicate no requirement for additional educational facilities. The existing stock already exceeds future demand by a considerable margin, with surpluses of 61 primary schools, 2 middle schools, and 2 high schools projected for 2040.

This assessment demonstrates that Kalaya is already adequately and in fact excessively served in terms of educational facilities. Consequently, the education-related proposals within the Master Plan, having been derived from an inflated and inconsistent population projection, do not accurately reflect current conditions or realistic future requirements, and therefore warrant revision to align with verified demographic assumptions and on-ground realities.

Alternatively, when applying Elementary & Secondary Education Department standards, land requirements are calculated as:

- Primary school: 2 kanals
- Secondary / Higher secondary school: 4 kanals

Based on these standards, the total educational land requirement for 2042 is approximately 104 kanals (13 acres). The DLUP revision adopts these need-based and department-aligned standards to avoid exaggerated land allocation.

Table 6-21: Government education institutes in urban center of Parachinar

Schools	Boys	Girls	Total	Gap
Primary	8	4	12	4
Middle	1	-	1	1
High	2	2	4	0
Higher Secondary	-	-	-	0
Total	11	6	17	5

Source: Household Information Survey, 2021

4.3.2.6 Health

The Health sector of the Kalaya Master Plan provides an overview of existing healthcare facilities and identifies significant accessibility constraints. At present, the urban area is served by 16 health facilities, which is insufficient relative to the existing population. While the section incorporates household survey findings, analyses of travel distance and cost burdens, and spatial mapping of service gaps, it does not extend this analysis to future demand.

Notably, the Health chapter lacks any projection of healthcare facility requirements for the 2040 planning horizon. There is no quantitative assessment of the number of Basic Health Units (BHUs), Community Health Centers (CHCs), hospitals, or Maternal and Child Health Centers (MCHCs) required to serve the projected population, nor is there any estimation of land requirements based on applicable NRM or departmental planning standards. In the absence of such demand forecasting, the proposed health infrastructure interventions are not supported by a measurable, population-based planning rationale.

In summary, while the section effectively highlights existing service deficiencies and spatial accessibility issues, it falls short of translating these findings into a structured, standards-based framework for future health infrastructure provision. As a result, the proposed health facilities are not clearly aligned with demographic projections or quantified service benchmarks, limiting the plan's effectiveness as a forward-looking health infrastructure strategy for Kalaya.

4.4 District Land Use Zoning Plan

The areas situated beyond the proposed urban boundaries, categorized as rural zones, have been delineated and zoned on a broader spatial scale to reflect the distinct functional and environmental characteristics of the district's rural landscape. The zoning process for these areas was informed by a comprehensive analysis of the existing land use patterns, as extracted from the district's current land use map, with additional consideration given to potential areas suitable for inclusion within each land use category.

Based on this assessment, the predominant land uses in the rural landscape were designated as independent zones, each representing a specific functional category consistent with the district's natural and socio-economic characteristics. Rural settlements were identified and classified as Rural Residential Zones, providing for the housing and communal needs of dispersed rural populations. Meanwhile, existing industrial sites located outside urban limits were designated as

Rural Industrial Zones, allowing for small to medium-scale industrial and processing activities, particularly those related to resource extraction, agro-industries, and cottage-based enterprises.

The resulting rural zoning framework reflects a balanced approach acknowledging the district's limited industrial base, significant agricultural activity, and abundance of natural resources. This spatial strategy aims to harmonize rural development with the district's natural endowments, ensuring that urban expansion does not undermine the ecological and economic vitality of rural areas. The framework promotes functional linkages between urban centers and their surrounding hinterlands, enabling the district to evolve as a cohesive and interdependent regional system.

However, the rural areas of the district face notable environmental and socio-economic challenges, including a semi-arid climate, limited water availability, and restricted economic diversification. These constraints highlight the pressing need for sustainable land use practices, efficient resource management, and climate-resilient rural planning. Strengthening water conservation systems, supporting agricultural innovation, and encouraging sustainable livelihood opportunities are vital to ensuring that the district continues to grow economically while preserving its natural resources and environmental integrity for future generations.

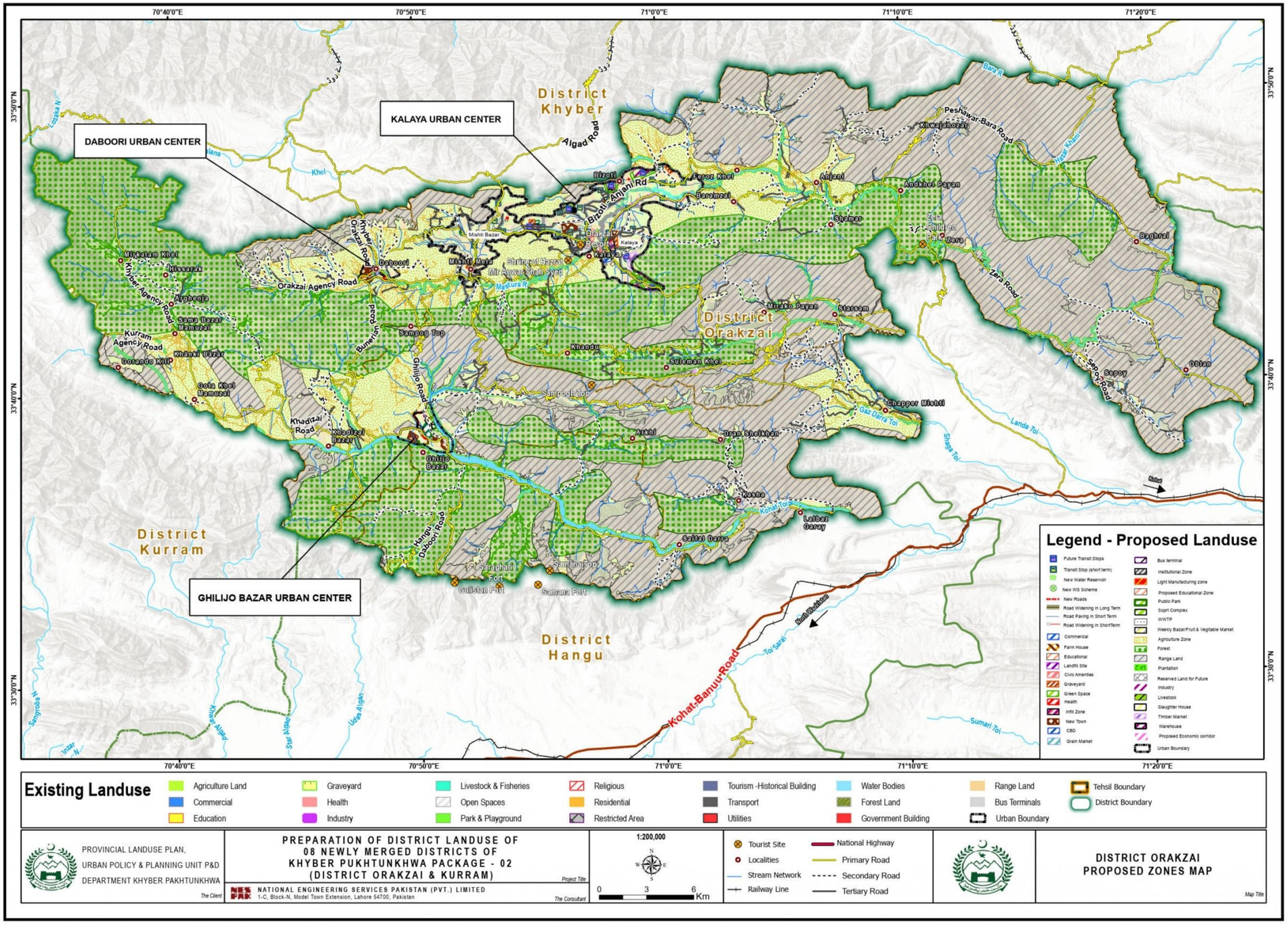
The proposed zoning framework for the rural areas thus provides a foundation for integrated rural development, balancing economic advancement with ecological stewardship. The statistical summary of proposed land use zoning for the entire district is presented in the table below, accompanied by a map visualizing the spatial distribution of the proposed zones. Together, these components offer a comprehensive overview of how the district land has been planned to accommodate growth while maintaining environmental sustainability and spatial balance.

Table 4-10 Population Projections

	Population 2023	Population Projection (2025)	Population Projection (2030)	Population Projection (2035)	Population Projection (2040)	Population Projection (2045)
ORAKZAI DISTRICT	387561	403751	446441	492614	542712	597233
RURAL	387561	403751	446441	492614	542712	597233
URBAN		0	0	0	0	0
CENTRAL TEHSIL	92819	96784	107206	118421	130516	143590
RURAL	92819	96784	107206	118421	130516	143590
URBAN	-	0	0	0	0	0
ISMAIL ZAI TEHSIL	39328	40156	42276	44473	46752	49115
RURAL	39328	40156	42276	44473	46752	49115
URBAN		0	0	0	0	0
LOWER TEHSIL	125944	130015	140586	151756	163574	176095
RURAL	125944	130015	140586	151756	163574	176095
URBAN		0	0	0	0	0
UPPER TEHSIL	129470	136796	156373	177964	166619	228432
RURAL	129470	136796	156373	177964	201869	228432
URBAN		0	0	0	0	0

Table 4-11 District Proposed Zones Stats

Proposed Zones	Area in Acres
Agriculture	643.46
Bus Terminal	13.88
Educational	126.74
Fruit and Vegetable Market	8.50
Health	31.51
Light Manufacturing Zone	307.87
Mix Use/ Commercial/ CBD	208.01
Play Ground	10.16
Public Buildings	151.05
Public Park	47.79
Reserve	56.00
Residential	606.14
Riparian Plantation	172.14
Sport Complex	27.16
Urban Forestation	142.93
Weekly Bazar	8.97
WWTP	20.59
Landfill Site	17.75
Graveyard	132.97
Green Space	207.94
Live stock	83.06
Open Space	6.88
Agriculture	44243.33
Forest	114114.66
Range Land	144735.24
Plantation	4763.68
Existing Buildup	27645.99
Total	**338534.40**



Map 4-4 District Orakzai Proposed Zones Map

4.4.1 Agriculture Zone

For the delineation of the Agricultural Zone, the consultant conducted a comprehensive assessment of existing agricultural land use patterns across the district. This process involved detailed field surveys, land use mapping, and consultations with local stakeholders and agricultural experts to identify areas where crop cultivation and livestock farming represent the predominant land uses. Based on this multi-layered analysis, the agricultural zone was strategically delineated to encompass areas exhibiting high agricultural productivity and long-term potential for sustainable cultivation.

The designation of this zone seeks to safeguard prime agricultural lands from non-agricultural encroachment, promote sustainable and climate-resilient farming practices, and ensure the continued viability of the district's agricultural economy. By aligning the zone boundaries with existing land use patterns and agronomic suitability, the proposed plan facilitates targeted interventions to improve crop yields, livestock productivity, resource optimization, and rural livelihood resilience.

The proposed Agricultural Zone covers approximately 44,243 acres, underscoring its critical role in district economy and food security. Agriculture in the district is primarily concentrated in fertile valleys and lower-lying areas, where soil conditions and access to groundwater-based irrigation systems mainly through tube wells support the cultivation of both food and cash crops. These areas represent the agricultural backbone of the district, contributing significantly to local employment and subsistence.

The district's agricultural profile is characterized by the cultivation of wheat, maize, potato, and cannabis, along with extensive livestock farming. Among these, cannabis is the most widely cultivated crop, followed by wheat and maize, which are grown in alternating seasons maize during warmer months and wheat during cooler periods. Livestock rearing, including goats, sheep, and cattle, remains a major economic activity, particularly in the hilly and semi-arid regions where conditions are favorable for grazing. Goats and sheep dominate due to their adaptability to the district's rugged topography and limited vegetation cover, providing valuable outputs such as meat, milk, and wool.

However, the agricultural sector in district faces a range of environmental and structural challenges. The semi-arid climate, coupled with the limited availability of surface water, constrains agricultural productivity and heightens dependence on groundwater extraction for irrigation. Over-reliance on tube wells has resulted in declining groundwater tables, while soil erosion, nutrient depletion, and loss of fertility remain pressing concerns due to erratic rainfall and insufficient soil management practices. Furthermore, climate variability including unpredictable rainfall patterns and prolonged dry spells poses significant risks to crop yields, livestock health, and overall food security.

In the context of land use planning, integrating environmental conservation and climate adaptation measures within the agricultural zone is vital to mitigate these vulnerabilities. Establishing buffer zones along watercourses and steep slopes can help reduce soil erosion, prevent sedimentation, and protect water quality. Similarly, land use regulations must discourage the conversion of agricultural lands for non-agricultural purposes such as urban expansion, industrial development, or infrastructure projects that threaten the sustainability of farming activities.

To address these challenges and strengthen the district's agricultural base, the consultant recommends the adoption of sustainable and resource-efficient agricultural practices. These include:

- Enhancing irrigation efficiency through drip irrigation, sprinkler systems, and solar-powered pumps to conserve water and improve yields.
- Implementing soil conservation techniques such as contour plowing, terracing, and agroforestry to minimize erosion and maintain soil fertility.
- Promoting climate-resilient and drought-tolerant crop varieties suited to the semi-arid environment.
- Encouraging diversification of livelihoods through agro-based industries, value-added processing, and market linkages.

The delineation of the Agricultural Zone thus represents a strategic intervention within the district's broader land use planning and zoning framework. It ensures that agricultural productivity is preserved and enhanced while maintaining a balance between economic growth, environmental sustainability, and social equity. By protecting fertile lands, promoting innovation, and integrating environmental safeguards, the proposed framework aims to secure the long-term sustainability, resilience, and prosperity of the agricultural sector in District Karak.

Land use planning should also promote diversification of agricultural activities and support infrastructure development such as rural roads, storage facilities, and market access to strengthen the agricultural value chain. Engaging local communities and stakeholders in participatory planning processes ensures that agricultural zoning reflects local knowledge and addresses farmers' needs, thus improving compliance and effectiveness.

Despite these challenges, the agriculture zone in district remains a vital part of the district's economy, supporting the livelihoods of many rural households and providing essential resources for the local community. Proper zoning and planning combined with sustainable practices will enhance the resilience and productivity of agriculture in the district for future generations.

4.4.2 Forest Zone

For the proposed Forest Zone, the consultant conducted a comprehensive preliminary assessment of both designated and observed forested areas as part of the district's overall land use analysis. This assessment incorporated field observations, spatial mapping, and land use classification data to identify areas of significant ecological value and natural vegetation cover. The proposed Forest Zone has been delineated to include these identified forested areas along with their immediate surrounding buffer zones, thereby ensuring the preservation of environmental integrity, ecological connectivity, and biodiversity across the district.

This zoning approach demonstrates a strong commitment to environmental stewardship by prioritizing the protection of natural habitats and ecological resources that are vital for maintaining soil stability, water regulation, carbon sequestration, and wildlife conservation. By incorporating both officially designated forest lands and additional adjoining areas of ecological sensitivity, the proposal establishes a comprehensive conservation buffer. This buffer is intended to mitigate the adverse impacts of human activities such as deforestation, overgrazing, and unsustainable mining, thereby strengthening the district's capacity for sustainable resource management and climate resilience.

The proposed Forest Zone covers approximately 114,114.66 acres, making it one of the most extensive land use categories in district. The forested areas are predominantly concentrated in the northwestern and southwestern regions of the district, where mountainous terrain and rugged topography naturally limit intensive agricultural or industrial development. The forest landscape primarily consists of scrubland, woodland patches, and semi-dense vegetation, with surrounding mountain ranges forming natural ecological boundaries. These forests are crucial in maintaining the district's ecological balance supporting biodiversity, conserving soil, and regulating hydrological cycles.

The northern and western parts of the district, characterized by higher elevations and steeper slopes, contain some of the most extensive and ecologically rich forest tracts. These zones play a critical role in mitigating soil erosion, preventing land degradation, and buffering against seasonal floods and droughts. Smaller, more fragmented forest patches are interspersed within western agricultural and grazing lands, serving as secondary habitats and ecological corridors that enhance overall landscape connectivity.

Despite their ecological importance, the forested areas of District face significant and ongoing threats from deforestation, agricultural encroachment, unregulated grazing, illegal logging, and mining activities, particularly in mountainous regions. These pressures jeopardize the forest ecosystem's ability to sustain local wildlife populations, including various bird species, small mammals, and native flora, while undermining the forests' role in soil conservation, groundwater recharge, and climate regulation.

The fact that a substantial portion of the district's land area is classified as forest highlights its environmental and economic significance. To ensure the long-term sustainability of these forest resources, the proposed zoning framework calls for the implementation of comprehensive conservation and management measures, including:

- Reforestation and afforestation programs to restore degraded forestlands.
- Sustainable timber harvesting practices that balance resource use with regeneration.
- Designation of protected forest reserves to preserve biodiversity and ecological functions; and
- Community-based Forest management initiatives that involve local populations in conservation and monitoring activities.

Additionally, promoting alternative livelihood opportunities such as eco-tourism, non-timber forest products (NTFPs), and small-scale sustainable agriculture can reduce dependency on forest exploitation while enhancing local economic resilience.

Through these measures, the proposed Forest Zoning Framework aims to safeguard District natural heritage, maintain ecological stability, and ensure that forest ecosystems continue to provide environmental, social, and economic benefits for both present and future generations.

4.4.3 Range Zone

The Rangeland Zone in District covers an extensive area of approximately 144,735 acres, representing one of the most significant land use categories in the district's spatial framework. These lands are primarily utilized for grazing and pastoral activities, forming a critical component of the district's rural economy and supporting the livelihoods of numerous households engaged in livestock rearing. Characterized by open, uncultivated terrain with sparse natural vegetation, rangelands provide ideal grazing grounds for livestock such as goats, sheep, and cattle, which are well adapted to the region's semi-arid climate and rugged landscape.

The district's rangelands are predominantly concentrated in the southern and southwestern parts of district, where the topography is composed of hills, plateaus, and arid valleys. These areas, though unsuitable for intensive crop cultivation due to limited water availability and poor soil fertility, are well-suited for extensive grazing systems. The natural vegetation cover, consisting mainly of grass, shrubs, and drought-resistant plant species, sustains the district's pastoral economy by providing forage for livestock, especially in regions where terrain and climatic constraints limit other forms of land use.

Rangelands play a vital role in the district's agricultural and economic landscape, underpinning food security, local trade, and livelihood diversification. Livestock farming particularly the rearing of goats, sheep, and cattle remains a cornerstone of rural subsistence and income generation. These animals supply meat, milk, and wool, while also serving as trade commodities in local and regional markets, thereby contributing substantially to household economies and the district's GDP.

However, the rangeland ecosystem faces a series of environmental and management challenges. Overgrazing has emerged as a critical concern, leading to land degradation, loss of vegetation cover, and soil erosion. Increasing population pressures and expanding herds have intensified grazing demands, further stressing the fragile semi-arid ecosystem. Additionally, climate change manifested through prolonged droughts and irregular rainfall has exacerbated the depletion of natural forage and water resources, reducing the productivity and resilience of rangeland areas.

To safeguard these vital ecosystems and ensure their long-term sustainability, the proposed zoning framework emphasizes the need for sustainable rangeland management and conservation practices. Key recommended measures include:

- Rotational grazing systems to allow vegetation recovery and prevent overexploitation of grasslands.
- Development of water harvesting and storage systems, including ponds and check dams, to improve water availability during dry seasons.

- Establishment of fodder cultivation areas to supplement natural forage and reduce pressure on grazing lands.
- Rehabilitation of degraded rangeland areas through reseeding and controlled grazing; and
- Community-based rangeland management programs to engage local pastoral groups in monitoring, awareness, and conservation efforts.

These strategies aim to balance economic necessity with ecological sustainability, ensuring that livestock production continues to thrive without compromising the natural regenerative capacity of the land.

In conclusion, the Rangeland Zone of District constitutes an indispensable natural and economic asset, sustaining both livelihoods and ecological functions. Its prudent management through zoning, sustainable grazing practices, and community participation is essential to prevent further degradation and to secure the environmental resilience and economic stability of the district for future generations.

4.5 Tehsil Wise Land Use Zoning

4.5.1 Tehsil Upper Orakzai

The proposed land use plan for Tehsil Upper Orakzai covers a total area of 76,767.20 acres and presents a spatial framework that emphasizes environmental conservation, agricultural sustainability, and controlled urban development. The zoning distribution reflects the predominantly mountainous and ecologically sensitive nature of the tehsil, with a strong focus on preserving natural resources while accommodating essential urban functions and future growth.

A dominant feature of the land use structure is the extensive allocation to forest areas, which cover 47,044.60 acres (61.28%) of the total area. This highlights the critical importance of forest ecosystems in Upper Orakzai for biodiversity conservation, watershed protection, and slope stabilization. In addition, rangelands covering 7,216.32 acres (9.40%) support livestock grazing and pastoral livelihoods, which are integral to the local economy. Plantation areas (819.55 acres, 1.07%) and urban forestation (11.92 acres) further reinforce environmental sustainability by enhancing vegetation cover and ecological resilience.

Agriculture also plays a significant role in the land use framework. Agricultural zones cover 16,983.60 acres (22.12%), reflecting the importance of farming activities for local livelihoods and food security. Furthermore, reserved agricultural zones (2,094.11 acres, 2.73%) are designated to protect high-value farmland from unplanned urban encroachment and ensure long-term agricultural productivity.

Urban and built-up development is relatively limited but strategically planned. Existing built-up areas cover 2,313.47 acres (3.01%), representing current settlements within the tehsil. To accommodate future growth, residential zones (88.66 acres) are proposed alongside a Central Business District (15.57 acres) to serve as a focal point for commercial and administrative activities. Supporting economic development, light manufacturing zones (16.02 acres) and a proposed Small Industrial Development Estate (SIDE) covering 79.44 acres are included to promote local industry and employment opportunities.

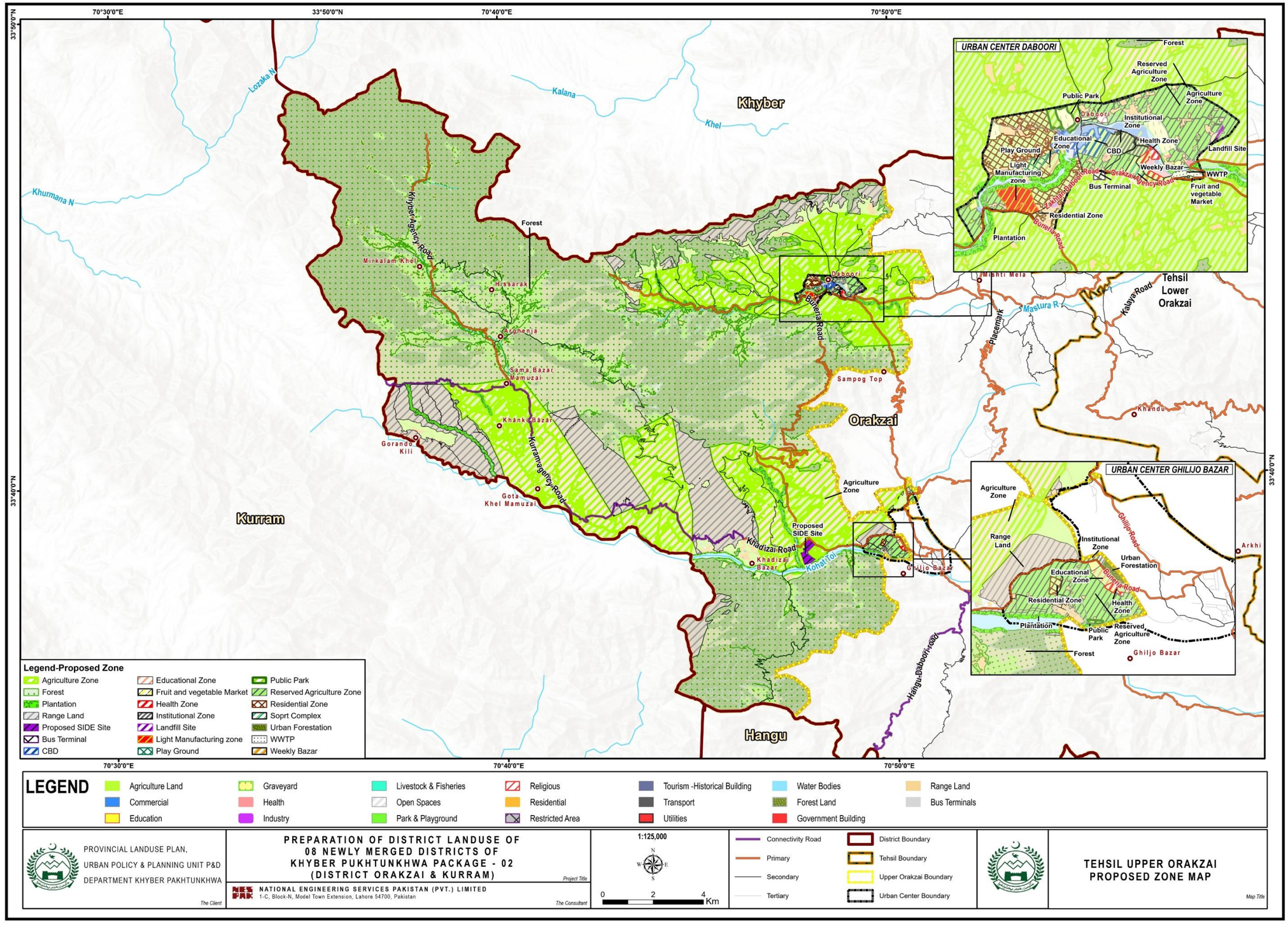
The plan also incorporates essential public and institutional land uses to improve service delivery and community welfare. Educational facilities (15.65 acres), health zones (13.83 acres), and institutional areas (22.38 acres) are allocated to strengthen social infrastructure. In addition, public parks (11.93 acres), playgrounds (4.99 acres), and sports complexes (4.96 acres) are designated to enhance recreational opportunities and overall livability.

To support local economic activities, fruit and vegetable markets (1.94 acres) and weekly bazaars (2.52 acres) are included, facilitating agricultural trade and small-scale commerce. Environmental and municipal infrastructure is also addressed through landfill sites (1.84 acres) and wastewater treatment plants (3.88 acres), which are essential for sustainable waste management and environmental protection.

Overall, the proposed zoning plan for Tehsil Upper Orakzai reflects a balanced and sustainable planning approach, where the preservation of forests, rangelands, and agricultural land is prioritized alongside the provision of essential urban, economic, and social infrastructure. The plan supports controlled and compact urban development while maintaining the ecological integrity and rural character of the tehsil, ensuring long-term environmental sustainability and improved quality of life for its residents.

Table 4-12: Tehsil Upper Orakzai Proposed Zones Stats

Sr No.	Proposed Zone	Area Acre	Percentages
1	Agriculture Zone	16983.60	22.124%
2	CBD	15.57	0.020%
3	Educational Zone	15.65	0.020%
4	Forest	47044.60	61.282%
5	Fruit and vegetable Market	1.94	0.003%
6	Health Zone	13.83	0.018%
7	Institutional Zone	22.38	0.029%
8	Landfill Site	1.84	0.002%
9	Light Manufacturing zone	16.02	0.021%
10	Plantation	819.55	1.068%
11	Playground	4.99	0.007%
12	Proposed SIDE Site	79.44	0.103%
13	Public Park	11.93	0.016%
14	Range Land	7216.32	9.400%
15	Reserved Agriculture Zone	2094.11	2.728%
16	Residential Zone	88.66	0.115%
17	Sport Complex	4.96	0.006%
18	Urban Forestation	11.92	0.016%
19	Weekly Bazar	2.52	0.003%
20	WWTP	3.88	0.005%
21	Existing Built up	2313.47	3.014%
Total		**76767.20**	**100.000%**



Map 4-5 Tehsil Upper Orakzai Proposed Zones Map

4.5.2 Tehsil Central Orakzai

The proposed land use plan for Tehsil Central Orakzai covers a total area of 69,576.30 acres and presents a spatial framework focused on environmental conservation, agricultural sustainability, and controlled urban development. The zoning structure reflects the predominantly rural and mountainous character of the tehsil, while introducing limited but strategic allocations for urban expansion, infrastructure, and public services.

A major proportion of the land is allocated to natural landscapes, underscoring the ecological sensitivity of the region. Forest areas dominate the land use pattern, covering 30,977.93 acres (44.52%), which highlights their importance in biodiversity conservation, watershed protection, and slope stabilization. In addition, rangelands covering 18,626.22 acres (26.77%) support livestock grazing and pastoral livelihoods, which are essential to the local economy. Plantation areas (1,050.60 acres, 1.51%) and urban forestation (12.91 acres) further contribute to enhancing vegetation cover and ecological resilience across the tehsil.

Agriculture forms another key component of the land use structure. Agricultural zones cover 9,659.05 acres (13.88%), reflecting the role of farming in supporting local livelihoods and food security. Additionally, reserved agricultural zones (5,978.46 acres, 8.59%) are designated to protect productive farmland from unplanned urban expansion and to ensure the long-term sustainability of agricultural activities. Together, these allocations emphasize the importance of preserving fertile land within the tehsil.

Urban development is relatively modest and carefully planned to maintain the rural character of the area. Existing built-up areas account for 2,732.23 acres (3.93%), representing current settlements. To accommodate future growth, a new town area (18.00 acres) is proposed, which will provide a structured framework for residential and urban expansion. Additional provisions such as land reserved for future development (460.82 acres, 0.66%) allow flexibility for long-term planning and phased urban growth.

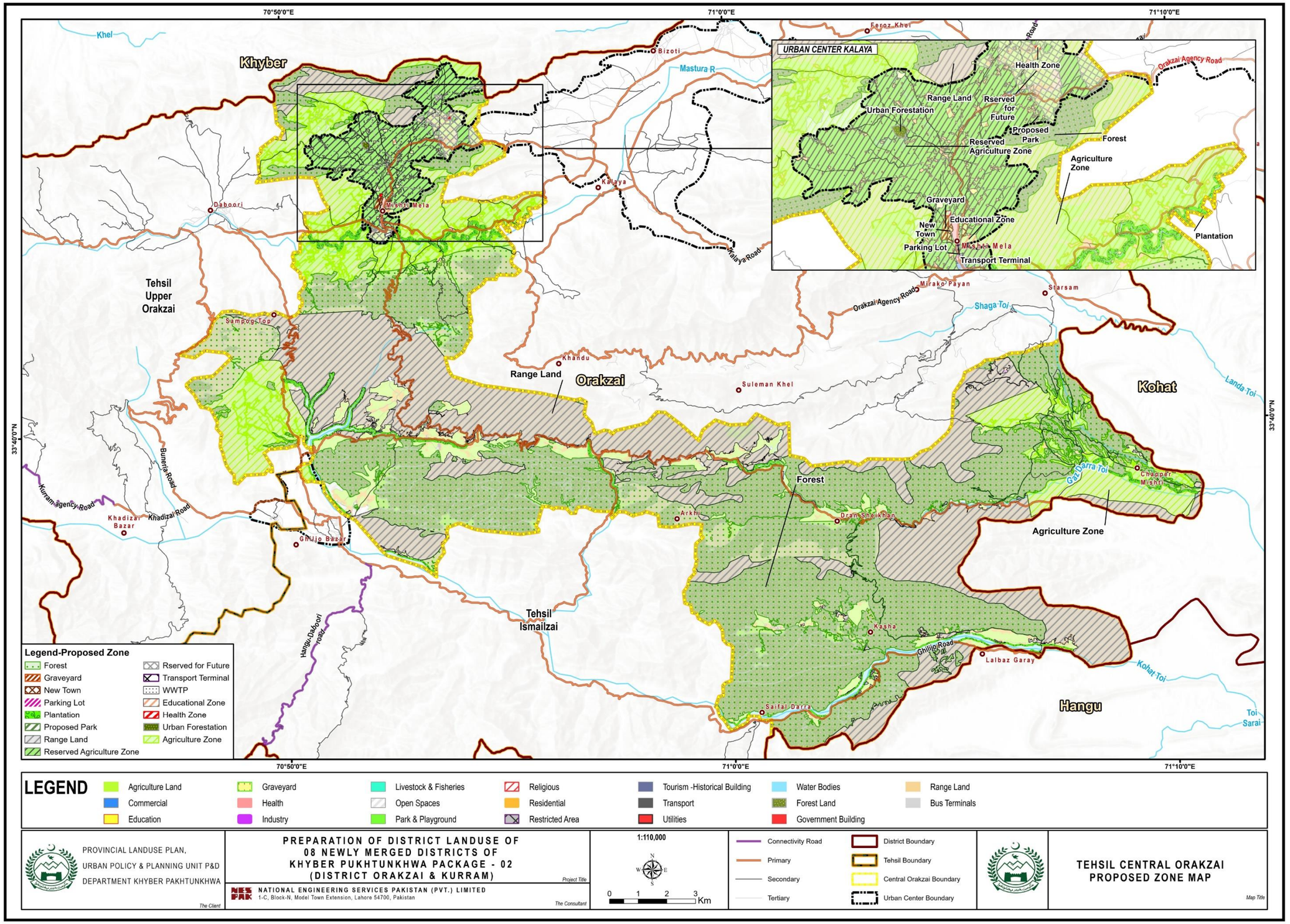
The plan also incorporates essential public and institutional land uses to improve service delivery and community well-being. Educational facilities (34.70 acres) and health zones (6.50 acres) are designated to enhance access to social services. Community-related uses such as graveyards (12.50 acres) are also included to meet local needs. Recreational and environmental amenities are provided through proposed parks (0.76 acres) and urban green spaces, contributing to improved livability.

Infrastructure and urban services are addressed through targeted allocations. Transport terminals (0.44 acres) and parking areas (0.49 acres) are included to support mobility and accessibility. Environmental management infrastructure such as wastewater treatment plants (4.71 acres) ensures improved sanitation and sustainable waste management practices.

Overall, the proposed zoning plan for Tehsil Central Orakzai reflects a balanced and sustainable land use strategy. It prioritizes the conservation of forests, rangelands, and agricultural land while accommodating limited and controlled urban development. By integrating environmental protection with essential infrastructure and future growth provisions, the plan supports long-term socio-economic development while preserving the ecological integrity and rural character of the tehsil.

Map 4-6 Tehsil Central Orakzai Proposed Zones Stats

Sr No.	Zone	Area Acre	Percentages
1	Agriculture Zone	9659.05	13.883%
2	Educational Zone	34.70	0.050%
3	Forest	30977.93	44.524%
4	Graveyard	12.50	0.018%
5	Health Zone	6.50	0.009%
6	New Town	18.00	0.026%
7	Parking Lot	0.49	0.001%
8	Plantation	1050.60	1.510%
9	Proposed Park	0.76	0.001%
10	Range Land	18626.22	26.771%
11	Reserved Agriculture Zone	5978.46	8.593%
12	Reserved for Future	460.82	0.662%
13	Transport Terminal	0.44	0.001%
14	Urban Forestation	12.91	0.019%
15	WWTP	4.71	0.007%
16	Existing Built up	2732.23	3.927%
Total		**69576.30**	**100.000%**



Map 4-7 Tehsil Central Orakzai Proposed Zones Map

4.5.3 Tehsil Lower Orakzai

The proposed land use plan for Tehsil Lower Orakzai covers a total area of 167,387.31 acres and outlines a comprehensive spatial framework that prioritizes environmental conservation, sustainable resource management, and controlled urban development. The zoning structure reflects the predominantly mountainous and rural character of the tehsil, while incorporating strategic provisions for economic growth, infrastructure development, and improved service delivery.

A defining feature of the land use distribution is the dominance of natural landscapes, particularly forests and rangelands. Forest areas constitute the largest share, covering 108,790.72 acres (64.99%), highlighting their critical role in biodiversity conservation, watershed protection, and ecological stability. Rangelands cover 32,086.31 acres (19.17%), supporting livestock grazing and traditional pastoral livelihoods. In addition, plantation areas (1,763.16 acres, 1.05%) and proposed urban forest areas (22.88 acres) contribute to enhancing vegetation cover and strengthening environmental resilience across the tehsil.

Agricultural land uses also form an important component of the spatial structure. Agricultural zones cover 9,017.68 acres (5.39%), supporting crop production and rural livelihoods. Furthermore, reserved agricultural zones (6,225.54 acres, 3.72%) are designated to protect fertile land from unplanned urban expansion and ensure long-term agricultural sustainability. These allocations reinforce the importance of maintaining agricultural productivity alongside environmental conservation.

Urban development within the tehsil is relatively limited but strategically planned to accommodate future growth. Existing built-up areas cover 3,472.66 acres (2.08%), representing current settlements. To guide future expansion, new town development (303.73 acres) and infill development zones (172.49 acres) are proposed to promote compact and efficient urban growth. Additionally, land reserved for future development (4,024.26 acres, 2.40%) provides flexibility for long-term planning and phased urban expansion.

The plan incorporates a range of economic and commercial land uses to stimulate local development. A proposed industrial area covering 487.25 acres is designated to promote industrial activity and employment generation, while a proposed Central Business District (25.55 acres) will serve as a commercial and administrative hub. The Kalaya Economic Corridor (371.29 acres) is a key strategic intervention aimed at enhancing connectivity, facilitating trade, and promoting regional economic integration.

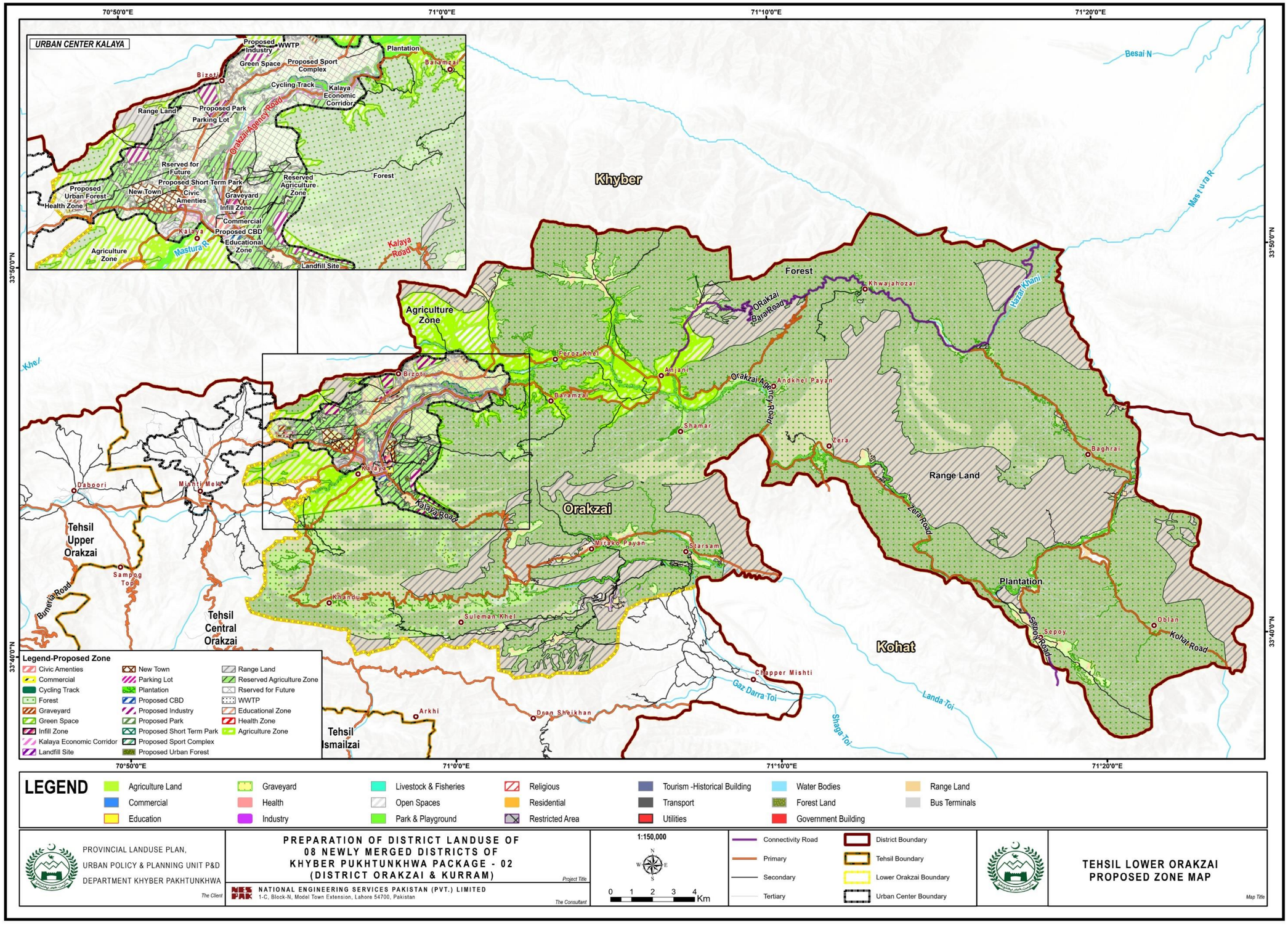
Provision of public and institutional facilities is an integral part of the plan. Educational zones (75.30 acres), health facilities (14.77 acres), and civic amenities (110.10 acres) are allocated to improve access to essential services. Community-related uses such as graveyards (107.22 acres) are also included. Recreational and green spaces, including green spaces (205.60 acres), proposed parks, and sports complexes, are designated to enhance livability and provide opportunities for community interaction.

Infrastructure and environmental management are addressed through the inclusion of essential facilities such as landfill sites (11.52 acres) and wastewater treatment plants (4.22 acres), which will support improved sanitation and environmental protection. Transportation-related provisions, including parking areas (0.60 acres) and cycling tracks (36.68 acres), aim to enhance mobility and promote sustainable transport options.

Overall, the proposed zoning plan for Tehsil Lower Orakzai reflects a balanced and forward-looking planning approach. It prioritizes the conservation of forests, rangelands, and agricultural land while enabling structured urban growth and economic development. By integrating environmental protection with infrastructure provision and future growth areas, the plan ensures sustainable development and improved quality of life for the population while preserving the ecological integrity and rural character of the tehsil.

Map 4-8 Tehsil Lower Orakzai Proposed Zones Stats

Sr No.	Zone	Area Acre	Percentages
1	Agriculture Zone	9017.68	5.387%
2	Civic Amenities	110.10	0.066%
3	Commercial	30.11	0.018%
4	Cycling Track	36.68	0.022%
5	Educational Zone	75.30	0.045%
6	Forest	108790.72	64.993%
7	Graveyard	107.22	0.064%
8	Green Space	205.60	0.123%
9	Health Zone	14.77	0.009%
10	Infill Zone	172.49	0.103%
11	Kalaya Economic Corridor	371.29	0.222%
12	Landfill Site	11.52	0.007%
13	New Town	303.73	0.181%
14	Parking Lot	0.60	0.000%
15	Plantation	1763.16	1.053%
16	Proposed CBD	25.55	0.015%
17	Proposed Industry	487.25	0.291%
18	Proposed Park	4.84	0.003%
19	Proposed Short Term Park	22.65	0.014%
20	Proposed Sport Complex	0.18	0.000%
21	Proposed Urban Forest	22.88	0.014%
22	Range Land	32086.31	19.169%
23	Reserved Agriculture Zone	6225.54	3.719%
24	Rserved for Future	4024.26	2.404%
25	WWTP	4.22	0.003%
26	Existing Builtup	3472.66	2.075%
Total		**167387.31**	**100.000%**



Map 4-9 Tehsil Lower Orakzai Proposed Zones Map

4.5.4 Tehsil Ismail Zai

The proposed land use plan for Tehsil Ismail Zai covers a total area of 37,430.08 acres and reflects a highly conservation-oriented spatial framework, given the tehsil's predominantly mountainous and forested landscape. The zoning distribution emphasizes environmental protection, limited and controlled urban development, and the provision of essential community and economic functions within a largely natural setting.

A defining characteristic of the land use structure is the overwhelming dominance of forest areas, which cover 31,779.83 acres (84.90%) of the total area. This highlights the critical ecological importance of the tehsil in terms of biodiversity conservation, watershed protection, and climate regulation. In addition, rangelands covering 1,545.31 acres (4.13%) support livestock grazing and traditional pastoral practices. Plantation areas (376.30 acres, 1.01%) and urban forestation (95.06 acres, 0.25%) further enhance vegetation cover and contribute to ecological resilience and environmental sustainability.

Agricultural land use is relatively limited in spatial extent but remains strategically protected. While general agriculture occupies only 0.06 acres, a significant allocation of 1,663.20 acres (4.44%) is designated as reserved agricultural zones, ensuring the protection of cultivable land and supporting long-term food security. This approach reflects a planning strategy that prioritizes conservation while safeguarding essential agricultural resources.

Urban development within Tehsil Ismail Zai is minimal and carefully controlled. Existing built-up areas cover 1,857.37 acres (4.96%), representing current settlements. Future development is guided through small but strategic allocations, including residential zones (16.93 acres) and mixed-use areas (10.72 acres), which promote compact and efficient land utilization. A Central Business District (10.24 acres) is proposed to serve as the primary commercial and administrative node within the tehsil.

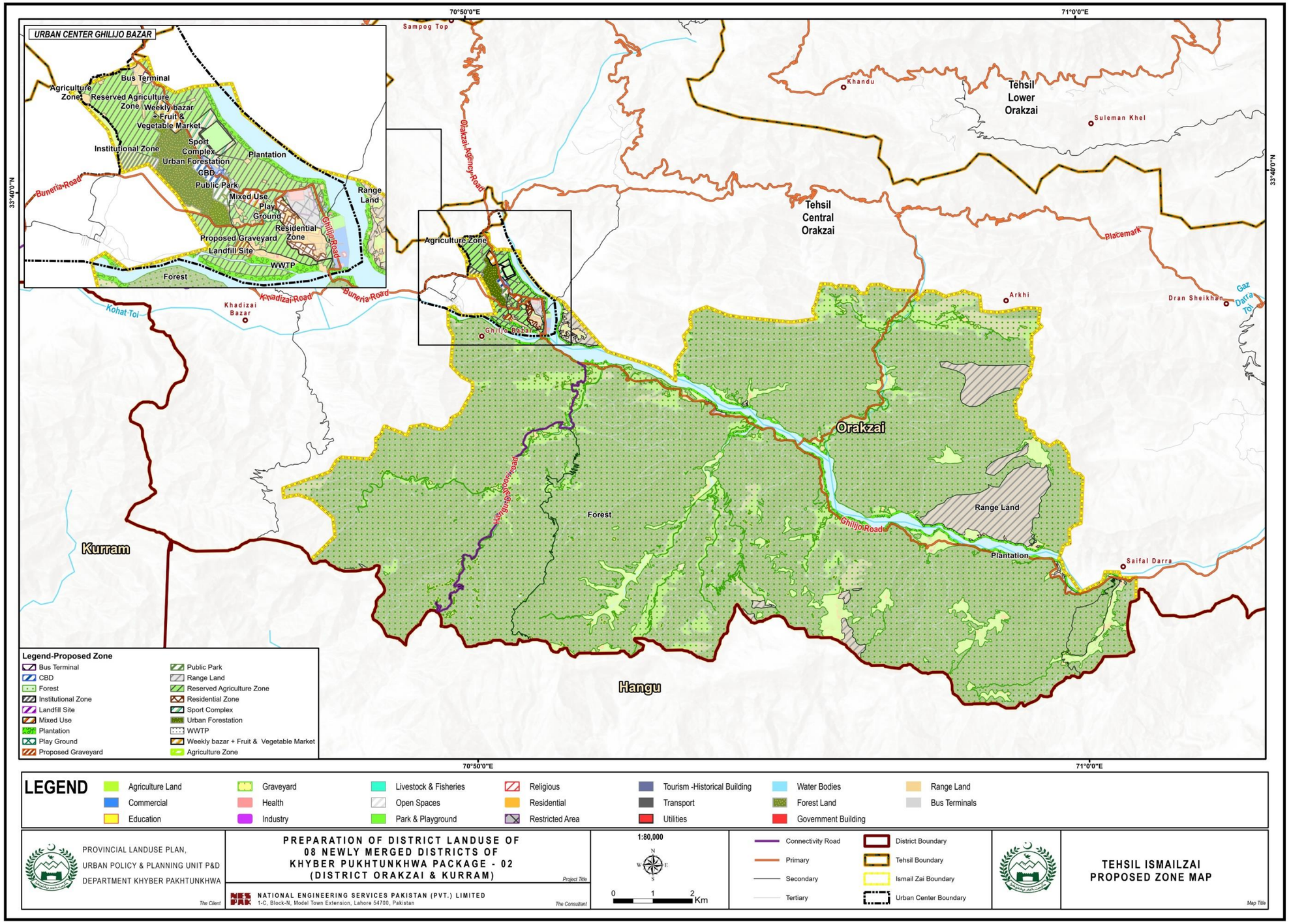
The plan incorporates essential public and institutional land uses to improve service delivery and community welfare. Institutional zones (16.10 acres) are designated alongside transport infrastructure such as a bus terminal (2.37 acres). Community facilities include public parks (9.68 acres), playgrounds (5.16 acres), sports complexes (21.58 acres), and graveyards (5.95 acres), which enhance livability and social well-being.

To support local economic activities, weekly bazaars combined with fruit and vegetable markets (12.47 acres) are proposed, facilitating small-scale commerce and agricultural trade. Environmental management infrastructure is also included, with landfill sites (0.88 acres) and wastewater treatment plants (0.88 acres) to ensure sustainable waste management and sanitation.

Overall, the proposed zoning plan for Tehsil Ismail Zai reflects a highly conservation-focused and environmentally sensitive planning approach. The dominance of forest and natural land uses underscores the priority given to ecological preservation, while limited and well-defined urban, commercial, and institutional zones ensure that development remains controlled and sustainable. This balanced framework supports environmental protection, modest economic activity, and improved service provision, while maintaining the natural character and ecological integrity of the tehsil.

Table 4-13 Tehsil Ismail Zai Proposed Zones Stats

Sr No.	Proposed Zone	Area Acre	Percentages
1	Agriculture Zone	0.06	0.0002%
2	Bus Terminal	2.37	0.0063%
3	CBD	10.24	0.0273%
4	Forest	31779.83	84.9045%
5	Institutional Zone	16.10	0.0430%
6	Landfill Site	0.88	0.0024%
7	Mixed Use	10.72	0.0286%
8	Plantation	376.30	1.0053%
9	Playground	5.16	0.0138%
10	Proposed Graveyard	5.95	0.0159%
11	Public Park	9.68	0.0259%
12	Range Land	1545.31	4.1285%
13	Reserved Agriculture Zone	1663.20	4.4435%
14	Residential Zone	16.93	0.0452%
15	Sport Complex	21.58	0.0576%
16	Urban Forestation	95.06	0.2540%
17	Weekly bazar + Fruit & Vegetable Market	12.47	0.0333%
18	WWTP	0.88	0.0023%
19	Existing Built up	1857.37	4.9622%
Total		**37430.08**	**100.0000%**



Map 4-10 Tehsil Ismail Zai Proposed Zones Map

4.6 Rural Development Framework

4.6.1 Introduction and Planning Rationale

This Rural Development Framework has been formulated to provide a structured, service-oriented, and population-responsive approach to rural development in Kurram Districts. The framework recognizes that rural areas are not static conservation spaces but living socio-economic systems where development must be carefully guided to support livelihoods, protect natural resources, and ensure equitable access to basic services.

In contrast to urban development models, rural development in the districts is predominantly shaped by agriculture, forestry, rangelands, tribal land tenure systems, and dispersed settlement patterns. Accordingly, this framework adopts a differentiated planning approach based on settlement population size, level of service provision, and functional role within the district hierarchy.

The key objectives are to:

- Guide rural growth toward settlements with existing or planned service capacity
- Safeguard agricultural land, forests, and rangelands from unplanned conversion
- Enable controlled, livelihood-linked rural housing
- Prevent ribbon development and speculative land subdivision
- Align rural development with infrastructure investment and service delivery capacity

4.6.2 Rural Settlement Hierarchy and Functional Classification

Rural settlements are categorized into a hierarchy to guide land-use intensity, infrastructure provision, and housing typologies.

4.6.2.1 Rural Growth Centers (RGCs)

Indicative Population Range: above 10,000

Functional Characteristics:

- Concentration of higher-order services such as secondary schools, colleges, BHUs/RHCs
- Organized bazaars, storage facilities, and transport linkages
- Administrative and service delivery functions for surrounding rural areas

Planning Role:
Rural Growth Centers shall act as focal points for future rural population absorption, economic diversification, and infrastructure investment, thereby reducing development pressure on urban areas.

Land-Use and Development Direction:

- Compact and clustered residential development patterns
- Mixed-use commercial spines along primary streets
- Small-scale agro-processing, storage, and workshops compatible with rural character

4.6.2.2 Rural Service Villages (RSVs)

Indicative Population Range: –2,000- 10,000

Functional Characteristics:

- Provision of basic social services such as primary/middle schools and dispensaries

- Local markets serving surrounding villages and hamlets

Planning Role:
Rural Service Villages shall function as intermediate service nodes, supporting agricultural and livestock-based economies of their hinterlands.

Land-Use and Development Direction:

- Low- to medium-density residential development
- Community facilities and local commercial activities
- Limited expansion subject to service capacity

4.6.2.3 Villages and Hamlets

Indicative Population Range: Below 2,000

Functional Characteristics:

- Limited formal services
- Dispersed and organic settlement form

Planning Role:
Villages and hamlets shall primarily support agriculture, forestry, and rangeland-based livelihoods, with development strictly regulated to maintain rural character.

Land-Use and Development Direction:

- Single-family residential dwellings only
- Prohibition of speculative subdivision and urban-style housing schemes
- Development restricted to household and livelihood-related needs.

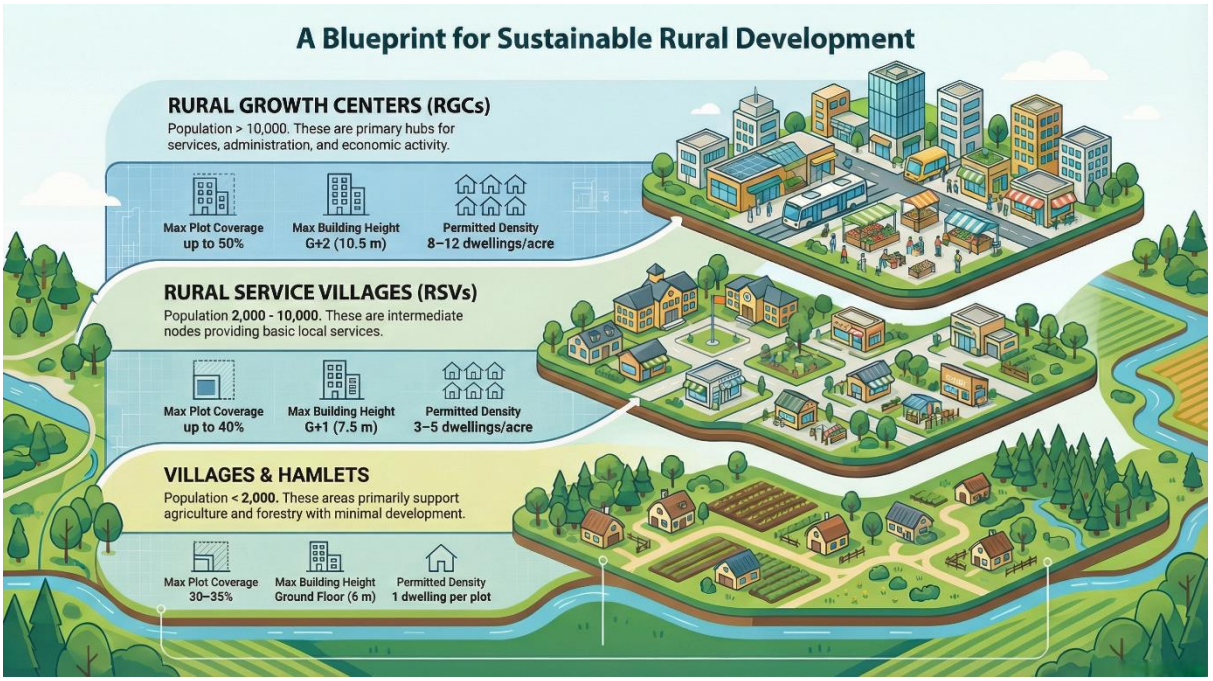


Figure 4-1: Suggested Settlement Hierarchy

4.6.3 Rural Land-Use Zoning Framework

4.6.3.1 Agriculture Zone (AZ)

Planning Intent:
To preserve agricultural productivity while enabling necessary rural habitation and agri-based economic activities.

Permitted Uses:

- Crop cultivation, orchards, and allied agricultural activities
- Single-family farm dwellings directly associated with landholdings
- Farm worker housing, storage facilities, barns, and small-scale agri-processing.

Regulatory Controls:

- Maximum of one residential dwelling per landholding
- Minimum plot sizes as prescribed under district regulations
- Prohibition of land subdivision for speculative residential development
- Mandatory linkage of residential use with agricultural activity

4.6.3.2 Forest Zone (FZ)

Planning Intent:
To conserve forest resources while accommodating traditional forest-dependent livelihoods.

Conditional Uses:

- Single caretaker or landowner dwelling
- Forest management and protection infrastructure

- Low-impact eco-tourism facilities subject to environmental clearance

Regulatory Controls:

- Very low site coverage and development footprint
- Absolute prohibition of commercial housing schemes
- Compliance with environmental protection requirements

4.6.3.3 Range Zone (RZ)

Planning Intent:
To protect grazing lands and sustain livestock-based livelihoods.

Permitted Uses:

- Livestock grazing and associated activities
- Single-family dwellings for herders or landowners
- Livestock shelters, water points, and ancillary structures

Regulatory Controls:

- Minimal development intensity
- Prohibition of land subdivision and urban conversion.

4.6.4 Rural Housing Policy

Rural housing development shall be governed by settlement hierarchy and service availability. In settlements with limited infrastructure, residential development shall be restricted to single-family dwellings to avoid overburdening services and to preserve rural character. Higher-density housing typologies shall only be permitted within designated Rural Growth Centers and Rural Service Villages, subject to infrastructure capacity.

4.6.5 Rural Development Design and Infrastructure Standards

4.6.5.1 Road and Street Network

- Primary rural access roads: ROW 18 m; carriageway 6–7.3 m
- Secondary rural roads: ROW 12 m
- Internal village streets: ROW 6–9 m
- Pedestrian paths and tracks: minimum width 1.5–2.0 m

Road alignments shall respect natural drainage, topography, and existing settlement morphology, particularly in hilly terrain.

4.6.5.2 Setbacks, Plot Coverage, and Built Form

Minimum Setbacks:

- Front: 3.0–4.5 m
- Side: 1.5–2.0 m (where applicable)
- Rear: 2.0–3.0 m

Maximum Plot Coverage:

- Villages & Hamlets: 30–35%

- Rural Service Villages: up to 40%
- Rural Growth Centers: up to 50%

4.6.5.3 Essential Rural Services

- Water supply: 45–70 liters per capita per day through protected or piped sources
- Sanitation: on-site systems with septic tanks or improved pits; clustered systems in growth centers
- Energy: grid extension supplemented by solar/off-grid solutions
- Solid waste: community collection points and controlled disposal/composting

4.6.5.4 Community Facilities and Open Spaces

- Villages & Hamlets: primary school, mosque/community space, basic water point
- Rural Service Villages: primary and middle schools, dispensary, market space, minimum 5% open space
- Rural Growth Centers: secondary education facilities, BHU/RHC, organized markets, minimum 10% public open space.

4.6.5.5 Development Control Regulations (DCR) – Rural Areas

Plot Sizes and Density:

- Villages & Hamlets: minimum 1 kanal; one dwelling per plot
- Rural Service Villages: minimum 0.75 kanal; 3–5 DU/acre
- Rural Growth Centers: minimum 10 marla; 8–12 DU/acre

Building Heights:

- Villages & Hamlets: Ground floor (5 m)
- Rural Service Villages: G+1 (7.5 m)
- Rural Growth Centers: G+2 (10.5 m)

Land-Use Restrictions:

- No subdivision below minimum standards
- No conversion of AZ, FZ, or RZ to urban residential use without plan revision
- Commercial housing schemes restricted to designated growth centers.

4.6.6 Commercial Regularization and Roadside Services Control in Rural Areas

4.6.6.1 Policy Rationale

Rural settlements in the district have experienced gradual emergence of commercial activities such as shops, workshops, fuel stations, storage facilities, and roadside tuckshops. While these activities are essential for livelihood diversification, mobility support, and local service provision, unregulated expansion can result in ribbon development, traffic hazards, environmental risks, and loss of agricultural land.

This section establishes an integrated framework to:

- Regularize existing commercial activities
- Prevent uncontrolled roadside commercialization
- Regulate petrol pump approvals and spacing
- Control tuckshop proliferation along rural corridors
- Align commercial growth with settlement hierarchy and infrastructure capacity
- Protect agricultural, forest, and range zones

4.6.6.2 Settlement-Based Commercial Permissions

Commercial uses shall be permitted based on settlement hierarchy.

A. Rural Growth Centers (RGCs)

Permitted Uses:

- Organized bazaars and market streets
- Retail shops and service establishments
- Small-scale agro-processing
- Warehousing (non-polluting)
- Fuel stations (subject to spacing and safety compliance)

Commercial development shall be concentrated within designated service cores and shall not extend beyond approved settlement boundaries.

B. Rural Service Villages (RSVs)

Permitted Uses:

- Small retail shops
- Local agricultural markets
- Repair workshops (low impact)
- Limited roadside services

Commercial uses shall be restricted to designated main streets or clusters. Strip commercialization along approach roads shall not be permitted.

C. Villages and Hamlets

Permitted Uses (Limited):

- Single small daily-needs shop
- Home-based enterprises
- Livelihood-linked micro-businesses

Standalone commercial plazas, fuel stations, and market strips shall not be permitted in villages and hamlets.

4.6.6.3 Regularization of Existing Commercial Uses

Existing commercial activities operating prior to adoption of this framework may be regularized subject to:

- No encroachment on public right-of-way
- Compliance with minimum road safety standards
- Provision of sanitation and waste management
- Structural safety compliance
- Environmental screening (where applicable)

Unauthorized commercial uses within Agriculture (AZ), Forest (FZ), or Range (RZ) Zones shall not be regularized unless directly linked to agricultural or livestock activity.

4.6.6.4 Petrol Pump (Fuel Station) Approval Standards

Fuel stations require strict regulation due to traffic, environmental, and safety implications.

A. Location Criteria

Fuel stations may be permitted:

- Within or on the periphery (300m) of Rural Growth Centers
- Along designated primary district roads (subject to spacing rules)

Fuel stations shall not be permitted:

- Within Forest or Range Zones
- In flood-prone or environmentally sensitive areas
- Within compact village cores
- On road curves, blind spots, or unsafe gradients

B. Minimum Spacing Requirements

To prevent clustering and traffic congestion:

- Primary Roads: Minimum 3 km between petrol pumps
- Secondary Roads: Minimum 5 km between petrol pumps
- Within Rural Growth Centers: Minimum 1 km between pumps

Spacing shall be measured center-to-center along the road alignment.

C. Plot and Design Standards

- Minimum plot size: 1 kanal
- Minimum frontage:
    - 30 meters on primary roads
    - 24 meters on secondary roads
- Minimum setback from ROW: 12–15 meters
- Minimum distance from:
    - Residential structures: 30 meters
    - Schools, mosques, health facilities: 50 meters

- Water bodies or wells: 60 meters

Dedicated entry and exit points, internal circulation, deceleration lanes (where required), oil traps, drainage systems, and fire safety compliance shall be mandatory.

4.6.6.5 Roadside Tuck-shop and Small Commercial Control

To prevent ribbon development along rural corridors, small tuck-shops shall be regulated as follows:

A. Location Permissions

Tuck-shops may be permitted:

- Within settlement boundaries
- At designated transport nodes
- Along long rural corridors subject to spacing controls

They shall not be permitted within Agriculture, Forest, or Range Zones outside settlement limits.

B. Minimum Spacing Standards

- Primary Roads: Minimum 1 kilometer between tuck-shops
- Secondary Roads: Minimum 1.5 kilometer between tuck-shops
- Outside settlement boundary: Maximum one tuck-shop per 2 km stretch

Spacing shall be measured along the road alignment.

C. Plot and Building Standards

- Maximum plot size (outside settlements): 5 marla
- Maximum coverage: 40%
- Height limit: Single storey (maximum 4.5 meters)
- Minimum front setback: 6 meters from ROW
- No encroachment on road shoulder or drainage

Consecutive roadside commercial plots shall not be approved to avoid strip commercialization.

4.6.6.6 Corridor-Based Commercial Management

Along major rural access corridors:

- Commercial uses shall be clustered rather than dispersed
- Infrastructure (parking, waste disposal, lighting) shall be planned collectively
- Agricultural frontage shall be protected from speculative subdivision

No approval shall be granted that leads to linear, urban-style commercial ribbon development.

4.6.6.7 Environmental and Infrastructure Compliance

All commercial and roadside service uses shall comply with:

- Safe water supply and sanitation provisions
- Solid waste management systems
- Drainage and stormwater management

- Fire safety regulations
- Environmental screening where required

Polluting industries, heavy mechanical workshops, fuel depots (bulk), and hazardous storage facilities shall not be permitted in rural settlements.

Policy Outcome

This integrated commercial regulation framework ensures that:

- Rural economic activity is supported and formalized
- Road safety and mobility are protected
- Environmental risks are minimized
- Agricultural and protected lands are preserved
- Ribbon commercialization is prevented
- Commercial growth aligns with settlement hierarchy and service capacity

Enforcement Clause

Failure to comply with these Development Control Regulations shall result in:

- Suspension of approval
- Monetary penalties
- Sealing of premises
- Demolition of unauthorized structures
- Blacklisting from future approvals

4.6.7 Phased Wise Service Provision and Implementation Strategy

- **Phase I (Basic Services):** safe water, access tracks, primary schools, sanitation
- **Phase II (Intermediate Services):** piped water, dispensaries, improved streets, markets
- **Phase III (Advanced Services):** secondary education, upgraded health facilities, drainage, public open spaces

Implementation shall be coordinated through district authorities, line departments, and community institutions, with periodic review every five years.

4.6.8 Layout Framework for Rural Development (Indicative Planning Structure)

The rural development framework shall be spatially implemented through a hierarchical layout structure, ensuring that population growth, services, and infrastructure are logically aligned.

4.6.8.1 District-Level Structure

At the district scale, the layout framework shall:

- Identify and designate Rural Growth Centers and Rural Service Villages
- Protect continuous tracts of agricultural land, forests, and rangelands
- Define primary rural access corridors connecting settlements to markets and urban centers

4.6.8.2 Settlement-Level Layout (Growth Centers and Service Villages)

At the settlement scale, Rural Growth Centers and Rural Service Villages shall be planned as compact, efficient, and service-oriented settlements. The objective is to ensure that residential development is directly supported by infrastructure and public services, while preventing unplanned outward expansion into agricultural and environmentally sensitive areas.

Key Layout Principles:

- A clearly defined settlement boundary shall be established to control sprawl and ribbon development along access roads.
- A central service core shall be designated, accommodating key facilities such as bazaars, schools, health units, mosques, local administration, and community spaces.
- Residential areas shall be organized in compact clusters around the service core to ensure walkable access to daily services and to reduce infrastructure costs.
- Higher residential densities shall be located closer to the service core, with densities gradually decreasing toward the settlement edge.
- Expansion of the settlement shall be incremental and contiguous to existing built-up areas, subject to service capacity and infrastructure availability.

Street and Circulation Structure:

- A hierarchical road network shall be followed, comprising primary access roads, secondary internal streets, and pedestrian pathways.
- Streets within the service core shall prioritize pedestrian movement and local access, with traffic-calming measures where appropriate.
- All new development shall maintain adequate right-of-way reservations for future service upgrades.

Open Spaces and Community Facilities:

- Public open spaces and playgrounds shall be distributed within walking distance of residential clusters.
- Community facilities shall be centrally located to maximize accessibility for the surrounding population.

This settlement-level layout approach ensures efficient service delivery, strengthens rural service functions, and supports sustainable population growth in accordance with service availability and planning capacity.

4.6.8.2.1 Population Thresholds and Service Triggers

To ensure that development intensity remains aligned with service capacity, the following indicative population thresholds and service triggers shall guide settlement expansion:

- **Up to 2,000 population:** Basic services only (primary school, water points, access roads); residential development restricted to low-density clustered housing.
- **2,000–10,000 population:** Intermediate services permitted (dispensary/BHU, piped water, local market); moderate residential densification allowed within settlement boundary.

- **Above 10,000 population:** Higher-order services required (secondary education, upgraded health facilities, drainage systems); higher-density residential and mixed-use development permitted within designated areas.

Expansion beyond existing settlement boundaries shall only be allowed once the minimum service requirements for the relevant population threshold are met.

4.6.8.2.2 Residential Density and Housing Typology

Residential density within Growth Centers and Service Villages shall be regulated to reflect proximity to services:

- **Core Area (within walking distance of service core):** Compact housing, small plots, and mixed residential-commercial use where appropriate.
- **Intermediate Area:** Low- to medium-density residential plots suitable for extended family housing.
- **Peripheral Area:** Low-density housing transitioning toward agricultural or open land, with no further outward expansion without plan review.

Apartment-style or high-rise residential development shall not be permitted in rural settlements.

4.6.8.2.3 Infrastructure Coordination and Phasing

All residential expansion shall be synchronized with infrastructure provision:

- Roads, water supply, sanitation, and drainage shall be provided prior to or concurrently with new development.
- Incremental upgrading of infrastructure shall be prioritized over outward spatial expansion.
- Temporary service deficits shall not justify unplanned settlement growth.

4.6.8.2.4 Environmental and Agricultural Safeguards

- Settlement expansion shall avoid prime agricultural land, flood-prone areas, steep slopes, and environmentally sensitive zones.
- A minimum buffer shall be maintained between settlement boundaries and agricultural, forest, or range zones.
- Natural drainage channels and vegetation shall be preserved within and around settlements.

4.6.8.2.5 Implementation and Control Measures

- Settlement boundaries and service cores shall be delineated on planning maps.
- All new development proposals shall be evaluated against population thresholds and service availability.
- Any deviation from the approved layout framework shall require formal planning approval and justification.

4.6.8.3 Village and Hamlet Layout

For villages and hamlets with limited services:

- Organic settlement patterns shall be respected
- Development shall occur as infill or incremental expansion adjacent to existing built-up areas
- Individual residential plots shall remain large enough to support household-level livelihood activities.

4.6.9 Conceptual Rural Development Layout

The rural development framework follows a nodal settlement model in which Rural Growth Centers function as primary service and employment hubs, supported by Rural Service Villages acting as secondary service nodes. Smaller villages and hamlets remain dispersed within agriculture, forest, and range zones. Infrastructure and services radiate outward from primary and secondary nodes, enabling efficient service delivery, controlled land consumption, and long-term sustainable rural development.

The conceptual rural development layout follows a nodal model:

- **Primary Node:** Rural Growth Center acting as the main service and employment hub
- **Secondary Nodes:** Rural Service Villages supporting surrounding villages
- **Support Areas:** Villages and hamlets embedded within agriculture, forest, and range zones

Infrastructure and services radiate outward from primary and secondary nodes, while low-density residential development remains dispersed and livelihood-oriented. This structure ensures efficient service delivery, controlled land consumption, and long-term sustainability.

4.6.10 Rural Livelihood Diversification and Local Economic Development

Rural development shall not be limited to primary agriculture alone. The framework promotes diversification of rural livelihoods to improve income resilience, reduce out-migration, and strengthen local economies.

Policy Directions:

- Promotion of cottage and home-based industries such as handicrafts, food processing, carpentry, and tailoring
- Support for agri-value chains including storage, grading, packaging, and local markets
- Allowance of small-scale, non-polluting enterprises within Rural Growth Centers and Rural Service Villages
- Integration of women-led and youth-led economic activities within settlement layouts

Livelihood-related development shall remain compatible with rural character and environmental capacity.

4.6.11 Gender, Social Inclusion, and Vulnerable Groups

The rural development framework recognizes the need for inclusive and equitable access to services and spaces.

Key Considerations:

- Safe and convenient access to water points, schools, health facilities, and markets
- Provision of community spaces usable by women, children, elderly, and persons with disabilities
- Walkable settlement layouts reducing travel burden for daily needs
- Integration of social facilities within settlement cores to enhance safety and accessibility

4.6.12 Disaster Risk Reduction and Climate Resilience

Given the exposure of rural areas to floods, landslides, droughts, and climate variability, resilience measures are integral to rural planning.

Planning Measures:

- Prohibition of settlement expansion within flood plains, unstable slopes, and erosion-prone areas
- Maintenance of buffers along watercourses and natural drainage channels
- Promotion of drought-resilient water supply systems and rainwater harvesting where feasible
- Preservation and enhancement of tree cover and natural vegetation around settlements.

4.6.13 Rural Mobility, Accessibility, and Connectivity

Efficient and inclusive rural mobility is essential for service access and economic activity.

Framework Provisions:

- Priority to all-weather access roads connecting settlements to service centers and markets
- Consideration of walking distances in settlement layout design
- Recognition and protection of traditional movement paths, including livestock routes
- Integration of public transport stops within Growth Centers and Service Villages

4.6.14 Governance, Community Participation, and Ex Tribal Context

Effective rural development requires alignment with local governance structures and customary practices.

Implementation Principles:

- Engagement of community representatives, jirgas, and local leadership in planning and implementation
- Respect for communal and customary land tenure systems
- Preference for incremental upgrading and regularization of existing settlements rather than forced restructuring
- Capacity-building of local institutions for long-term management

4.6.15 Flexibility and Context-Sensitive Application

Recognizing the diversity of terrain, settlement forms, and socio-cultural conditions, the framework shall be applied with contextual flexibility.

- Standards may be adapted to hilly terrain and dispersed settlements where justified
- Existing village cores may be accommodated through pragmatic adjustments to setbacks and layouts
- Flexibility shall not compromise environmental protection or long-term sustainability

4.6.16 Monitoring, Review, and Performance Indicators

The effectiveness of the Rural Development Framework shall be periodically assessed using measurable indicators.

Indicative Indicators:

- Population growth trends by settlement category
- Access to basic and intermediate services
- Rate of agricultural and environmental land conversion

- Infrastructure coverage and service quality

A formal review of the framework shall be undertaken every five years to reflect changing population dynamics, service levels, and development priorities.

4.6.17 Integration with District and Sectoral Planning

The Rural Development Framework shall be integrated with district development plans, sectoral investment programs, and infrastructure strategies.

- Alignment with education, health, water, and transport sector plans
- Use of the framework to guide public investment prioritization
- Coordination among planning, line departments, and local governments

This integrated approach ensures coherence between land-use planning, service delivery, and long-term rural development objectives.

4.7 Conclusion and Policy Recommendations

The proposed Land Use Planning and Zoning Framework for District Orakzai represents a strategic and data-driven approach to guiding the district's future spatial development in a sustainable, inclusive, and environmentally responsible manner. It serves as a blueprint for balancing urban expansion, agricultural productivity, industrial growth, and environmental conservation, ensuring that development initiatives align with both local aspirations and regional policy objectives such as those outlined in the Khyber Pakhtunkhwa Urban Policy 2030.

Through the delineation of distinct zoning categories including Residential, Commercial, Industrial, Institutional, Recreational, Agricultural, Forest, and Rangeland Zones, the framework establishes a clear spatial structure that supports orderly development, efficient resource allocation, and sustainable land management. Each zone has been identified and planned based on its functional suitability, locational context, and long-term development potential, providing a robust foundation for both urban governance and rural land management.

4.7.1 Summary of Key Findings

The assessment revealed that District Orakzai's land composition is characterized by a diverse mix of urbanizing settlements, agricultural plains, forested hills, and extensive rangelands, each playing a unique role in the district's socio-economic and ecological system:

- Urban and Peri-Urban Areas: Rapid population growth and emerging commercial activities necessitate the adoption of compact and sustainable urban forms. The zoning plan promotes high-density development within designated urban boundaries, ensuring efficient use of land and infrastructure.
- Agricultural Land: Approximately 44,243 acres of highly productive agricultural land have been safeguarded to maintain the district's food security and rural economy, with strong emphasis on sustainable irrigation, soil conservation, and climate-resilient farming practices.
- Industrial Zones: Industrial development is planned in strategic locations with access to transportation networks and non-agricultural land, promoting economic diversification while minimizing environmental conflicts.
- Forest and Rangeland Areas: Together covering a substantial portion of Orakzai's landmass, these zones are vital for biodiversity conservation, carbon sequestration, and soil stabilization. The proposed framework supports sustainable forest management, community-based conservation, and regulated grazing systems to prevent degradation and maintain ecological balance.

- Recreational and Green Infrastructure: Parks, open spaces, and proposed urban forestation zones enhance livability, climate resilience, and public health, integrating nature into the built environment and improving overall urban quality of life.

4.7.2 Policy Recommendations

To implement the proposed zoning plan and ensure its long-term effectiveness, the following policy directions are recommended:

1. **Institutional Strengthening and Governance**

    - Establish a District Land Use Planning and Management Authority (DLUPMA) for Orakzai to oversee implementation, monitoring, and periodic review of the zoning plan. or fully operationalized the established Land use and Building Control Authority (LUBCA)

2. **Sustainable Land and Resource Management**

    - Enforce policies that discourage the conversion of prime agricultural land for non-agricultural purposes.
    - Introduce integrated watershed and soil conservation programs to address erosion, desertification, and water scarcity, particularly in the rangeland and forest zones.
    - Promote water-efficient irrigation systems and encourage the adoption of solar-powered technologies to reduce dependency on groundwater extraction.

3. **Climate Resilience and Environmental Protection**

    - Implement reforestation and afforestation programs in degraded forest areas and along riparian corridors to enhance vegetation cover.
    - Strengthen rangeland management through rotational grazing, fodder cultivation, and water harvesting systems.
    - Integrate climate-adaptive design principles into all future development to reduce vulnerability to droughts, floods, and temperature extremes.

4. **Infrastructure and Economic Development**

    - Prioritize infrastructure investments including transport, energy, and communication networks within designated urban and industrial zones to stimulate economic growth.
    - Encourage public-private partnerships (PPPs) to attract investment in housing, tourism, and agro-industrial ventures compatible with the zoning framework.
    - Promote local employment and skills development programs, particularly in sustainable construction, agriculture, and forest management sectors.

5. **Community Participation and Awareness**

    - Foster community engagement in land use decision-making, especially among farmers, pastoralists, and forest-dependent communities.
    - Develop awareness programs on the importance of land conservation, sustainable agriculture, and environmental stewardship.
    - Support community-based monitoring systems for forest and rangeland management to ensure long-term ownership and accountability.

4.7.3 Conclusion

The Land Use Planning and Zoning Framework for District Orakzai provides a holistic and forward-looking foundation for guiding development up to the planning horizon year 2045. By integrating spatial planning with environmental management, the framework ensures that growth remains balanced, resources are utilized responsibly, and future generations inherit a resilient and sustainable landscape.

Ultimately, the proposed plan seeks to transform Orakzai into a model district for integrated rural–urban development, where economic opportunity, environmental protection, and community well-being coexist in harmony. Through consistent policy enforcement, stakeholder collaboration, and adaptive governance, District Orakzai can achieve sustainable growth that honors its cultural heritage, ecological richness, and developmental potential.

4.8 Land Use Regulations and Guidelines

Land use regulations constitute the legal and procedural backbone of spatial governance, enabling the orderly transformation of land while safeguarding public interest, environmental assets, and urban form. As part of the zoning framework, these regulations establish the functional character of each land parcel by defining what activities are allowable, conditionally approvable, or strictly restricted within designated zones.

The following Land Use Zoning Regulations have been formulated to guide the spatial development of Orakzai District in accordance with sustainable urban planning principles, environmental protection standards, and socio-economic needs. These zoning categories delineate the allowable land uses, conditional activities, and prohibited developments to ensure orderly growth, public safety, and the protection of natural resources.

Central to this framework are three key categories:

- **Permitted Uses:** refer to those land use activities that are inherently aligned with the primary intent and planning objectives of a specific zone. These uses are allowed by-right and do not require discretionary approval, provided they comply with applicable building codes, design guidelines, floor area ratios (FAR), setbacks, and height restrictions. Permitted uses facilitate predictable development outcomes and ensure efficient processing of building permits and planning approvals.
- **Permissible Uses:** represent a secondary tier of land use activities that may be allowed within a zone subject to certain conditions. These uses are not automatically permitted but may be approved through a special review process often involving impact assessment, stakeholder consultation, and compliance with supplementary criteria. The intent is to provide flexibility while maintaining compatibility with surrounding uses and minimizing potential land use conflicts.
- **Prohibited Uses:** encompass activities that are fundamentally incompatible with the intended function of a zone due to their adverse environmental impacts, socio-spatial externalities, or infrastructure demands. These uses are categorically disallowed to preserve the integrity of zoning objectives, protect public health and safety, and maintain functional coherence in urban and rural areas.

These regulatory distinctions are essential to preserving urban form, promoting functional integration, managing growth, and facilitating context-sensitive development. They also empower local planning authorities to enforce zoning compliance, monitor land use change, and guide investment in alignment with strategic spatial frameworks.

The zoning regulations apply uniformly across the district and are tailored to the land use character and development intensity of each zone. The regulatory structure covers the following major land use categories:

- Residential Zones
- Commercial Zone (CBD)
- Industrial Zones
- Agricultural Zones
- Mining Zones
- Forest Zones
- Institutional Zones (including Education, Health, and Governmental uses)

- Recreation Zone

Each of these zones is governed by a specific matrix of permitted, permissible, and prohibited uses, as detailed in the following subsections. This structured approach ensures the development of an inclusive, sustainable, and resilient urban-rural fabric while balancing socio-economic development with environmental stewardships.

Each zone defines a distinct functional character residential, commercial, industrial, institutional, agricultural, recreational, forest, mining, and mixed-use designed to accommodate the district's current and projected land use requirements.

All land development activities within these zones shall be subject to the approval of the Land use and Building Control Authority (LUBCA) and must comply with the provisions of the Khyber Pakhtunkhwa Local Government (Planning) Rules, Environmental Protection Act, and other relevant regulations.

The purpose of this matrix is to:

- Provide clear guidance on land use compatibility.
- Prevent environmental degradation and land use conflicts.
- Promote efficient infrastructure provision and balanced growth.
- Support the vision of an environmentally sustainable and economically vibrant Orakzai District.

4.8.1 Residential Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Detached/semi-detached dwellings • place of worship or prayer • Social/cultural institutions • Parks and playgrounds • Residential Apartment • Graveyard or place of burial horticultural nursery, • Small health units/dispensaries • Neighborhood grocery or corner shop • Rainwater harvesting structures • Home-based small-scale cottage industries (non-polluting). • Urban farm, • Old age home or orphanage, • Urban forest,	• Commercial offices and service, • Shops of local character, • Raising of poultry for non-commercial purposes, • Private community center or club • Day-care center or Pre-schools, • primary school; • secondary school; • Rehabilitation centers, • Small scale Taxi/rickshaw stand. • Guest houses • Offices of professionals with adequate parking facilities, • Local shopping areas/retail shops, • Clinics/dispensaries • Private schools (primary/secondary.	• Local government shall not allow person to use land or building commercial area for any purpose which is neither permitted nor permissible.

4.8.3 Commercial Zone (CBD)

Permitted Uses	Permissible Uses	Prohibited Uses
• Commercial buildings, • Markets, shopping mall departmental stores and Outlets, • Shops except dealing in hazardous dangerous substances • Taxi/rickshaw stand. • Public Squares and Parks • Memorial and monument, • Hotel or motel, • Hostel • Car showroom, • Police station, post office and fire station, • Restaurant, • Social welfare institutions such as community center, art gallery and museum, • Parking plaza or Parking site.	• Pedestrian friendly streetscape, • Mixed- use buildings,(As per KP Urban Policy 2023) • Seasonal commercial fare site, • Fuel Stations, • Coal, wood or Timber yard. • Marriage or banquet hall, concert hall • petrol pump or gas or LPG or LNG station; • auto workshop; • indoor sport facility • place of worship or prayer,	• Local government shall not allow person to use land or building commercial area for any purpose which is neither permitted nor permissible.

4.8.5 Industrial Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Small and Medium Scale Industries and associated activities and facilities • vertical green industry; • construction equipment, building material store; • Industrial park or estate • Police station, fire station and post office; • Bank or automated teller machine (ATM); • Industrial research institute; • Treatment or recycling plant • Vocational Training Institute • Renewable energy manufacturing (solar panels, wind components).	• Showrooms (only for industrial products, not retail) • Mixed- used buildings(industrial + service use only) • Residence for workers • Fuel stations and Oil depot; • Restaurant; • Power plant • Grid Station • Place of Worship • commercial, health and educational facility for workers or employees • Auto workshop, service garage and service station • Petro chemicals, petroleum and gas products • Cannabis Processing Industry • Weighing stations • Shooting Range	• Local government shall not allow person to use land or property in an industrial area for any purpose which is neither permitted nor permissible.

Note: Industries in this zone shall adopt green practices including renewable energy integration, rainwater harvesting, effluent treatment, and tree belts as per EPA and district planning standards.

4.8.6 Agriculture Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Crop, • Orchard, • Pastureland • livestock such as dairy or poultry farm • Forest, • Nursery or a green house, horticulture, • Tube well, • Existing rural settlement or village, • Place of worship or prayer. • Agro-based industry: limited to small or cottage-scale (e.g., flour, oil pressing, fruit processing) • Storage activities of agricultural goods which are non-hazardous in nature. • Water harvesting ponds and irrigation structures • Farm-to-market storage sheds	• Milk Chilling and Pasteurization • Animal husbandry clinic, veterinary dispensary or hospital. • Agricultural machinery workshop • Basic health unit • clinic or hospital. • Zoological garden, • Farmhouse (max 2 kanal, owner-linked) • Detached/semi-detached dwellings. • Slaughterhouses, • Dairy production, • Botanical garden, • recreational club or resort or country club. • Bird sanctuary, • Zoo or wildlife park, • Grain market • Cattle farm • Poultry Farm, • Cattle market • Fruit and vegetable market, • Agriculture, Livestock research institute • Park, monument, playground, gymnasium or sports complex • public or private recreational or theme park; • Vegetable, fruit and grain market • water filtration plant; • wastewater treatment plant; • Power plant • Petrol pump or gas station or LPG or LNG storage and filling station. • Base trans-receiver station • Or communication tower. • shooting range • swimming pool	Other than permitted and permissible

	• library • Public slaughterhouse	

Note: Conversion of fertile agricultural land to non-agricultural use shall be subject to prior environmental clearance and approval by the District Planning & Development Committee (DPDC) or Land Use and Building Control Authority (LUBCA) Priority shall be given to preserving prime agricultural land for food security.

4.8.7 Mining Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Extraction of minerals (e.g., coal, sand, gravel, stone), quarrying, and other resource mining activities. • Temporary storage and crushing units • Rehabilitation Areas • weighbridges, safety offices, and security check-posts	• Housing or colony for workers (including schools and corner shops, health facility) • Processing plants for mined materials, • storage facilities for mined goods, Industrial parks related to mining activities (Processing plants, Storage facilities • Workshops and manufacturing units, Logistics infrastructure), Transportation infrastructure. • Utilities for mining operations (water treatment plants, power plants for mining operations), • Vocational training centers for workers in the mining sector.	• Residential developments, • Commercial buildings, • Agricultural uses (crop farming, livestock farming), • Any land use that interferes with mining operations or is incompatible with mining activities. • Any non-essential developments such as recreational areas, large-scale residential, or commercial zones within mining areas

4.8.9 Forest Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Forestry activities such as timber extraction (sustainable logging), reforestation, agroforestry, controlled ecotourism (e.g., hiking, camping), conservation efforts. • Wildlife conservation and habitat restoration, national parks, nature reserves.	• Forestry research institutes, sustainable wood processing industries (e.g., paper mills), eco-tourism facilities (lodges, visitor centers), and community-based forest management activities. • Educational and training centers focused on environmental conservation and sustainable forestry practices	• Urban development (residential, commercial, industrial), large-scale agriculture (e.g., crop farming), mining activities, infrastructure projects (e.g., roads, buildings), land clearing for non-forest related uses. • Any activities that lead to deforestation, illegal logging, or degradation of forest ecosystems. • hunting, poaching, and wildlife trafficking • waste disposal, solid waste dumps, or quarrying

Note: Any tree felling, land clearance, or construction activity without prior approval from the Forest Department shall be strictly prohibited

4.8.10 Institutional Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Large Scale education zone • General education universities • IT and Media institutes • City Level libraries, book banks, data and information centers • Large Scale Health Institutions; Hospitals, • Scientific research institutes • Clinics • Clinical Laboratory, • BHUs and RHCs • Maternity Care Centers • Government or semi- government offices (District Secretariat, Town Hall etc. • Social welfare institution such as community center, art gallery, museum and auditorium • Local and zonal municipal office • Police station, fire station or post office • Shelter home	• Staff residences (teaching and non-teaching, health workers, employees) • Separate hostels for Boys and Girls • Auditoriums, seminar halls, workshop spaces • Athletic club, gymnasium, Sports facilities, fitness center or indoor sport facility • Banks or Automated Teller • Machine (ATM) • Departmental Store • Taxi or bus stand. • Hotel or Motel • Guest house	• Other than permitted and permissible

• Pannahgahh • Convention Centre • Religious Seminaries (Madaris) • NGO/INGO offices		

4.8.11 Mixed Land Use Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Detached/semi-detached homes • Residential apartments • Social institutions (schools, places of worship) • Retail shops, cafes, local businesses, offices for professionals (doctors, lawyers) • Schools, • Clinics, • Community centers, • Public parks, • Transportation hubs (bus stations and public transport terminals) • Small workshops, • Artisan businesses, • Local food production, local manufacturing units • Libraries, post offices • Restaurants, Cafés, and Small Eateries • small offices, co-working spaces, and financial institutions (banks, ATMs).	• Additional housing developments, Housing Schemes, housing societies and residential apartments • Hotels, motels, restaurants, specialized retail outlets. • Day-care centers, health centers, cultural centers. • Cottage industries, home-based businesses, small- scale production units. • Public sports complexes, recreation centers.	• Large-scale housing projects incompatible with zoning. • Hazardous goods stores, large malls, or heavy industry shops. • Large hospitals, forensic labs, military facilities. • Large factories producing hazardous materials, heavy industrial operations. • Sewage plants, waste disposal sites, power plants. • Wholesale Markets • Truck Terminals • Fuel Depots •

4.8.12 Recreation Zone

Permitted Uses	Permissible (Conditional) Uses	Prohibited Uses
• Public parks, playgrounds, green spaces • Sports facilities (fields, courts, pools) • Community/recreation centers • Nature preserves • Accessory uses (parking, restrooms) • Educational facilities (nature centers) • Walking and cycling trails • Children's activity zones and cultural performance areas	• Commercial amenities (e.g., cafés) • Event venues (festivals, concerts) • Campgrounds/RV parks • Private recreational facilities (marinas) • Small-scale lodging (eco-lodges) • Temporary uses (farmers' markets)	• Industrial activities (factories) • Heavy commercial (malls) • Residential housing (high density) • High-impact infrastructure (highways) • Polluting uses (landfills) • Intensive agriculture (livestock farming) • Waste disposal facilities • Transport depots/terminals • fuel stations, parking depots, • Scale Food Courts • Quarrying or Sand Extraction • long-term camping • Other than permitted and permissible

4.9 Implementation and Regulatory Framework

4.9.1 Institutional Responsibility

The implementation of the zoning regulations shall be the responsibility of the Land use and Building Control Authority (LUBCA), which will serve as the principal coordinating body for overseeing, enforcing, and periodically reviewing land use and zoning activities within District. The LUBCA shall work in close coordination with the Tehsil Municipal Administrations (TMAs), the Environmental Protection Agency (EPA), and other relevant line departments to ensure that zoning provisions are implemented in a transparent, efficient, and accountable manner.

Each agency shall perform a defined role:

- LUBCA; policy oversight, zoning enforcement, and inter-departmental coordination.
- TMAs; Implementation at the tehsil level, including building control and land use monitoring.
- EPA; Environmental clearance, impact assessment, and compliance monitoring.
- Line Departments; Technical support in infrastructure, housing, agriculture, industry, and public utilities.

4.9.2 Approval and Monitoring

All development proposals that fall under permissible (conditional) land uses shall undergo a formal review and written approval process administered by LUBCA before the commencement of construction or activity. This process shall include technical evaluation, environmental assessment, and verification of conformity with zoning regulations and design guidelines.

Regular compliance monitoring shall be conducted by the relevant authorities to ensure that developments adhere to approved plans, environmental safeguards, and safety standards. Violations or deviations shall be subject to corrective actions and penalties as stipulated in the enforcement provisions.

4.9.3 Environmental and Safety Compliance

All industrial, mining, or major infrastructure activities within the district shall be subject to environmental clearance in accordance with the Khyber Pakhtunkhwa Environmental Protection Agency (EPA) Regulations. Environmental Impact Assessments (EIA) and Initial Environmental Examinations (IEE) shall be mandatory for all projects with potential environmental or social impacts.

Activities that pose a risk to public health, water sources, natural ecosystems, or cultural heritage shall not be permitted. The EPA, in coordination with the LUBCA, shall have the authority to suspend or revoke approvals for non-compliance with environmental and safety standards.

4.9.4 Zoning Amendments

Future zoning amendments or revisions may be considered in response to population growth, economic transitions, infrastructure expansion, or environmental considerations. Any such amendments shall follow a structured review and approval process, including:

- Technical assessment by the LUBCA and relevant departments.
- Stakeholder consultation, ensuring representation from local communities, private sector entities, and civil society.
- Formal endorsement through the LUBCA and notification by the competent district authority.

This process ensures that zoning regulations remain dynamic, adaptable, and aligned with evolving development priorities and sustainability objectives.

4.9.5 Enforcement and Penalties

Strict enforcement mechanisms shall be instituted to preserve the integrity of zoning boundaries and uphold planning standards. Unauthorized land use changes, encroachments, or developments inconsistent with the approved zoning regulations shall be subject to:

- Fines and penalties as prescribed by the LUBCA.
- Cessation orders or demolition of unauthorized structures.
- Land restoration requirements to rehabilitate affected areas.

The DPDC, in coordination with the LUBCA & TMAs and relevant enforcement agencies, shall ensure that violations are addressed promptly and transparently.

4.9.6 Policy Statement

The District Land Use Zoning Regulations seek to establish a coherent and enforceable framework that balances development with conservation. The overarching policy objective is to ensure efficient land utilization, sustainable livelihoods, and environmental stewardship that safeguard the interests of both present and future generations.

This regulatory framework reinforces the district's commitment to planned development, equitable resource distribution, and ecological resilience, thereby supporting the realization of Orakzai's long-term vision for sustainable spatial growth and community well-being

5 LEGAL & INSTITUTIONAL FRAMEWORK

5.1 Legal Framework for Implementation of District Land Use Plans

Under the Khyber Pakhtunkhwa Land-Use and Building Control Act, 2021, the implementation of District Land-Use Plans involves a structured process. Initially, the Planning Control Authority or designated unit formulates the plan, which is then reviewed and approved by the Provincial Land-Use and Building Control Council. Once approved, the plan is officially notified, and public consultations may be conducted to raise awareness. The plan is integrated with broader urban and infrastructure plans to ensure alignment with development goals and service provision. Landowners and developers must ensure their activities comply with the plan, with the Planning Control Authority monitoring compliance and enforcing regulations through inspections and notices. Applications for land-use and development permissions must align with the plan. The plan is subject to periodic reviews and updates, with significant changes leading to amendments. The Planning Control Authority monitors implementation, prepares regular reports, and resolves disputes through the Appellate Tribunal, ensuring effective and organized land development across Khyber Pakhtunkhwa.

5.1.1 Constitution and Functions of the Council

The Khyber Pakhtunkhwa Land-Use and Building Control Act, 2021 establishes the Provincial Land-Use and Building Control Council, a key body responsible for overseeing land-use and building regulations. The Council is chaired by the Chief Minister of Khyber Pakhtunkhwa, with the Minister for Local Government, Elections, and Rural Development serving as the Vice Chairperson. The Council's membership includes various provincial ministers such as those for Agriculture, Industries, and Environment as well as senior officials from the Planning and Development Department, the Board of Revenue, and other government departments. Additionally, the Council features five experts, with at least three from the private sector, who are nominated by the Chairperson. The Director General of the Authority acts as the Member-cum-Secretary. While co-opted members with specific expertise may be invited for discussions, they do not possess voting rights. Members are expected to attend all meetings and may receive honoraria, particularly those from the private sector. Terms for members from clause (q) are three years, renewable, and vacant seats must be filled within one month.

The Council’s functions are multifaceted. It is responsible for approving policies and guidelines related to the Authority’s operations, reviewing and endorsing urban policies, physical planning standards, and land- use regulations proposed by the Authority. The Council oversees the creation and modification of strategic and master plans, including district land-use plans, and approves the Authority’s annual budgets. Additionally, the Council manages financial provisions for private sector expert members and oversees the preparation and implementation of various plans, providing directives as needed.

Meetings of the Council are chaired by the Chief Minister or, in their absence, by the Vice Chairperson. The Council is required to meet at least bi-annually, though additional meetings may be convened at the Chairperson’s discretion. A quorum for meetings is two-thirds of the total members, and the Council determines its own procedural rules.

5.1.2 Provincial Land-Use and Building Control Authority

The Act also establishes the Provincial Land-Use and Building Control Authority as a corporate entity with perpetual succession, capable of managing property, entering into agreements, and engaging in legal actions. The Council serves as the Board of Directors for the Authority, which is headquartered in Peshawar with the option to open sub-offices across the province. The

Authority's actions are authenticated by the Director General, who is supported by the Urban Planning Policy Unit of the Planning and Development Department.

The Director General leads the Directorate General, overseeing the Authority's operational aspects. Responsibilities include proposing and recommending planning standards, land-use guidance, and regulatory amendments to the Council, and supervising the development and implementation of master plans, strategic development plans, and district land-use plans. The Director General conducts research, publishes reports, and advises the Council on land conservation, classification, and development, and supervises the District Land-Use Planning and Management Committees. The Director General may be appointed from a panel of recommended candidates or through direct recruitment. This role involves administrative and financial management of the Authority, preparation of meeting agendas, implementation of Council decisions, progress monitoring, and compliance management, including recommending inquiries into non-performance.

This comprehensive framework under the Khyber Pakhtunkhwa Land-Use and Building Control Act, 2021, aims to ensure organized development and regulatory compliance across the province, fostering effective land-use planning and building control.

5.1.3 District Local Enforcement Unit

The planning regulation outlines the establishment of a Local Planning and Enforcement Unit in each district to ensure effective land-use management. This Unit comprises a Chief Planning Control Officer, Planning Control Officers, Inspectors, and additional staff appointed by the government in consultation with the relevant authority. The Chief Planning Control Officer is responsible for the administration and operational functions of the Unit and reports directly to the District Land-Use Planning and Management Committee. Moreover, the Chief Officer is required to maintain coordination with local governance bodies, including the Chairperson of the Tehsil Council, City Mayor, Tehsil Municipal Officer, Director of the Urban Area Development Authority, as well as Deputy and Assistant Commissioners. This inter-agency coordination ensures transparency and accountability, particularly in identifying and reporting deviations from approved land-use and master plans.

The Unit's primary responsibilities include supporting the District Land-Use Planning and Management Committee in conducting surveys and preparing district land-use and master plans. It is also tasked with ensuring the implementation of relevant legislative provisions within its jurisdiction. Furthermore, the regulation empowers the government to appoint Planning Control Officers and Inspectors as required, and to authorize other agencies or designated officials to perform these roles during the enforcement period of the Act. Overall, this chapter emphasizes a structured, collaborative, and compliance-driven approach to land-use governance at the district level.

5.1.4 District Land-Use Planning and Management Committee

The District Land-Use Planning and Management Committees are constituted as institutional mechanisms to oversee and guide land-use governance at the district level in accordance with statutory provisions. Each committee is chaired by the Deputy Commissioner and comprises key departmental heads and representatives from local councils, with the Additional Deputy Commissioner (Finance and Planning) serving as both a member and the Secretary. The committees are mandated to convene on a monthly basis or as required, with a two-thirds quorum necessary for proceedings. Their core functions include the facilitation and supervision of land-use surveys, zoning activities, strategic and master planning, and coordination with local government bodies. They are also responsible for reviewing no-objection certificates (NOCs), development permissions, and recommending land-use plans to the relevant Authority for

approval. Additionally, the committees are empowered to take enforcement action against unauthorized developments and violations of approved land-use plans. The inclusion of co-opted members with technical expertise further strengthens the committee's capacity for informed decision-making. These provisions collectively promote a structured, accountable, and efficient approach to district-level land-use planning and management.

5.1.5 Planning Control Permissions

Under the Khyber Pakhtunkhwa Land-Use and Building Control Act, 2021, certain permissions are required for land and building developments. These include both land-use and development permissions. Land-use permission is necessary for any land or building unless specifically exempted by the Act, while development permission is required for any land development or building construction. It is important to note that land- use permissions granted before the commencement of this Act will still be subject to its provisions.

5.1.6 Land Use Permission

To obtain land-use or master planning permissions, applications must be submitted to the Planning Control Officers. These applications need to be in the prescribed format and include all necessary documents, along with any additional documentation that the Planning Control Officer may request. Only the landowner or their authorized representative is eligible to apply for land-use permission.

When a land or building use does not comply with the district land-use plan, the owner must submit a land- use conversion plan within three months of the notification of the plan. If the owner fails to submit a plan, the Planning Control Officer will issue a notice requiring submission within 30 days. Should the plan still not be provided, the Planning Control Officer will create and issue a conversion plan on behalf of the owner. Owners must align their land or building use with the issued conversion plan.

5.1.7 Development Permissions

The Act defines three types of development permissions: land development permissions, road remodeling permissions, and building permissions. Applications for these permissions must be accompanied by the prescribed fee.

Applications for development permissions should be submitted to the Planning Control Officer, following the prescribed format and including all necessary documents. Additional documentation may be requested by the Planning Control Officer. Land development and building permissions can only be requested by the property owner or their authorized representative, whereas road remodeling permissions can be requested by relevant authorities or entities.

Certain exemptions apply to building permissions. Specifically, no building permission is required for constructions based on standard designs notified by the Authority. Similarly, repairs, rehabilitation, or renovation of historic buildings, provided they have the approval of the relevant authority, are exempt from building permission requirements.

Owners of buildings that do not comply with the district land-use plan must submit a building conversion plan within three months of the notification of the plan. If no plan is submitted, the Planning Control Officer will issue a notice requiring submission within 30 days. Should the plan still be lacking after this notice, the Planning Control Officer will create and issue a conversion plan. Compliance with the issued conversion plan is mandatory for all building owners.

This framework provides clear procedures for obtaining and managing planning and development permissions, ensuring adherence to land-use and building regulations, while also allowing for necessary modifications and exemptions.

5.1.8 Certificates and Renewal of Building Stock

Under the Khyber Pakhtunkhwa Land-Use and Building Control Act, 2021, a compliance certificate is mandatory for anyone who has obtained development permission. This certificate must be submitted within the time specified in the development permission and must confirm that the development has been executed in accordance with the granted permissions and applicable regulations. The compliance certificate should adhere to the form and include the documents specified by the Authority or any additional documents requested by the Planning Control Officer. If the Planning Control Officer determines that the development aligns with the permissions and regulations, they will issue the compliance certificate.

Buildings may be subject to renewal regulations, and owners are required to renew their buildings in accordance with these regulations.

5.1.9 Improvement of Urban Design

Improvement proposals are necessary if an area's urban design is deemed poor or if directed by the Government. These proposals must include a land use change plan (if required), a redevelopment plan, a building stock renewal program (if necessary), cost estimates for the redevelopment and renewal programs, any required changes in development and ownership, and steps to ensure a smooth transition to the planned development. Land use change plans will follow the procedures outlined in Section 18 of the Act.

When land use changes occur, an infrastructure change proposal must be formulated within 60 days. This proposal will include directives for utilities and agencies to plan for the municipal services required to support the new land use. The Unit has the authority to prepare and execute schemes, direct government agencies, standardize building plans, acquire land, enter into public-private partnerships, reallocate land and building rights with Government approval, and support the establishment of Real Estate Investment Trusts (REITs).

A betterment fee may be charged to cover the costs of improvement or infrastructure proposals, with prior Government approval. This fee is based on the ownership of physical assets and may be recovered as arrears of land revenue. It can cover all or part of the costs associated with improvements.

If the full cost of improvements is not covered by the betterment fee, a development charge may be imposed on the owners of physical assets who have benefited from the development. This charge is payable upon the sale or lease of the asset exceeding 11 months. It correlates with the development costs and may be recovered as arrears of land revenue, subject to Government approval.

5.1.10 Enforcement and Penalties

Planning Control Officers are responsible for assessing and evaluating planning permissions, while Planning Control Inspectors handle unauthorized land use and development and prepare contravention reports.

Authorized officers have the power to seal buildings or structures for violations of the Act, rules, or regulations. They may also attach areas or open spaces for such violations.

Penalties for offenses are specified in the First Schedule of the Act. These offenses are cognizable and non-bailable. No court can take cognizance of these offenses except on a complaint by an authorized officer or the District Land-Use Planning and Management Committee. The Code of Criminal Procedure, 1898 applies to offenses under this Act.

The Government will establish an Appellate Tribunal to hear appeals against decisions or orders issued by the Authority or its officers. The Tribunal will consist of a chairperson and two expert members. Appeals must be filed within 15 days of receiving the decision. The Tribunal's decisions are final, and its members will serve a three-year term. Directors and officers of corporate bodies are responsible for offenses under this Act unless they can prove otherwise.

5.1.11 Inspection

The Government may establish an external Land Use Inspectorate to monitor enforcement of the Act. This Inspectorate will include a Chief Inspector and Deputy Chief Inspectors and will be funded by the Government.

The Chief Inspector and Deputy Chief Inspectors have the authority to inspect records, enter premises, and obtain court records related to the enforcement of the Act.

Inspections will follow an annual schedule prepared in consultation with the Authority. Unannounced inspections may only occur on the Department's directions. Draft findings from inspections will be shared with enforcement officials for feedback, and final reports will be provided to the relevant authorities.

5.1.12 Inclusion of Technical Experts in District Planning framework

In order to ensure a robust and effective decision-making in district land-use planning, the framework requires the active participation of technical experts, a provision made possible through the co-option of members in the District Land-Use Planning and Management Committee, in collaboration with the newly established Local Planning and Enforcement Unit. Some strong alternatives include:

- Inclusion of local enforcement unit in District Land-Use Planning
- Engagement of Urban Planners, GIS Experts for District-Level Planning
- Integration of specialized workforce for effective Land-Use Planning
- Integration of Sectoral Expertise in District Committees
- Appointment of Technical Consultants for Planning Oversight
- Expert Advisory Mechanism for District Planning Committees
- Involving Technical Experts in District Land-Use Planning.

5.2 Institutional Gaps and Implementation Strategy

Despite the presence of a legislative and administrative framework for land use planning at the provincial and district levels, effective implementation remains hindered by several institutional shortcomings. Key challenges include limited technical and human resource capacity, poor inter-agency coordination, weak monitoring and enforcement mechanisms, and minimal stakeholder engagement. Local planning units often operate without qualified professionals such as urban planners and GIS experts, leading to delays in plan preparation, poor compliance, and ineffective development control. Fragmented mandates, cumbersome regulatory processes, and lack of data-sharing protocols further exacerbate inefficiencies and duplication of efforts.

5.2.1 Institutional Gap Analysis and Actionable Mechanisms

To address these issues, a set of targeted, actionable mechanisms has been developed to strengthen institutional performance and bridge the gap between planning and implementation. These include establishing formal coordination bodies, implementing training programs, introducing GIS-based monitoring tools, reforming regulatory procedures, and creating participatory platforms for community engagement. The following table outlines the key

institutional gaps and corresponding strategies designed to enhance accountability, coordination, and responsiveness in the planning system.

Identified Gap	Detailed Description	Proposed Mechanism / Action Plan	Responsible Institutions
Fragmented Inter- Agency Coordination	Agencies at provincial, district, and tehsil levels often operate in silos with unclear communication and reporting lines. This leads to duplication of work and conflicting decisions in planning and enforcement.	• Establish formal coordination committees at each level. • Conduct quarterly inter- departmental coordination meetings. • Develop shared digital dashboards for real-time data sharing.	District Planning Committees
Inadequate Institutional Capacity	District and tehsil-level units often lack adequately trained urban planners, GIS experts, data analysts, and enforcement officers, limiting the quality and timeliness of plan implementation.	• Launch mandatory training & certification programs for planning staff. • Hire technical staff through P&D-led recruitment. • Allocate dedicated funds for technical equipment and planning software.	Planning Control Authority, P&D Department
Weak Monitoring and Enforcement System	Lack of real-time monitoring tools and irregular site inspections lead to unauthorized developments going unchecked.	• Integrate GIS-based monitoring systems. • Schedule routine and surprise inspections. • Publish quarterly compliance and enforcement reports. • Establish citizen complaint response mechanisms.	Inspectorate Wing, District Enforcement Units, Planning Control Officers
Obsolete Land Use Data and Delayed Updates	Land use plans are often based on outdated or incomplete data, and there is no structured timeline for their periodic review.	• Make five-year plan revision mandatory by regulation. • Institutionalize data collection using satellite imagery and public surveys. • Create a rolling update mechanism at the district level.	DG of Authority, District Committees, Urban Planning Policy Unit
Limited Community Engagement and Public Awareness	Citizens remain unaware of land-use regulations, their responsibilities, or the grievance re	• Launch public education campaigns (radio, TV, social media, town halls). • Establish digital	District Committees, LG Department, Communication & Outreach Unit

	dressal mechanisms available to them.	portals for plan access and feedback. • Form citizen advisory groups for plan reviews.	

5.2.2 Strengthened District Institutional Framework and Human Resource Structure (Proposed for District Kurram)

While the Act provides the statutory basis for land-use governance, effective implementation at the district level requires institutional strengthening, particularly in District Kurram where technical capacity and coordination mechanisms require formal consolidation.

Accordingly, the following enhanced institutional structure is proposed.

5.2.2.1 Establishment of District Technical Planning Sub-Committee

A District Technical Planning Sub-Committee shall be constituted under the District Land-Use Planning and Management Committee.

A. Composition:

- Senior Urban Planner – Convener
- GIS Specialist
- Environmental Planner
- Transport/Infrastructure Planner
- Revenue Survey Officer
- Legal Officer

B. Functions:

1. Technical vetting of development proposals prior to Committee approval.
2. GIS-based spatial analysis and zoning verification.
3. Review of land-use conversion applications.
4. Preparation of five-year plan revision documentation.
5. Maintenance of district land-use spatial database.

No major land-use conversion shall be placed before the Committee without prior technical review.

5.2.2.2 Strengthening of Local Planning and Enforcement Unit

The Local Planning and Enforcement Unit shall be strengthened through structured human resource deployment as follows:

A. Core Technical Positions

Position	Minimum Qualification	Function
Chief Planning Control Officer	BS/MS Urban & Regional Planning (PCATP Registered)	Overall supervision
Urban Planners (02)	BS/MS Planning (PCATP Registered)	Zoning & proposal review
GIS Specialist (01)	GIS/Geomatics	Spatial monitoring
Environmental Planner (01)	Environmental Science	Impact review
Data Analyst (01)	Statistics/Planning	Monitoring & evaluation
Legal Officer (01)	LLB	Enforcement & prosecution

B. Enforcement Staff

Position	Responsibility
Planning Control Officers (02–03)	Permission processing
Planning Inspectors (04–06)	Field inspections
Surveyor (02)	Boundary verification
Clerical Staff	Record management

5.2.2.3 Digital Monitoring and Data Systems

To address monitoring gaps identified earlier, the following systems shall be introduced:

1. District GIS Laboratory
2. Digital Building Permission Portal
3. Mobile-based Inspection Reporting System
4. Quarterly Compliance Dashboard
5. Public Complaint and Tracking Portal

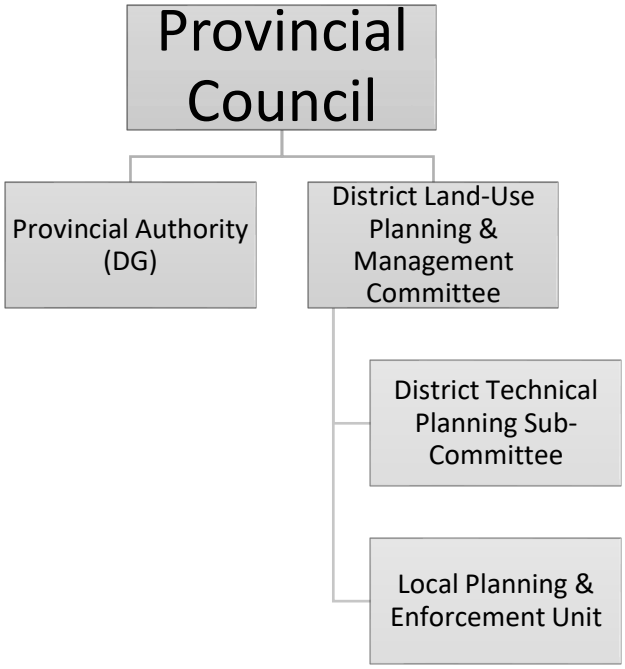
5.2.2.4 Institutional Coordination Mechanism

To overcome inter-agency fragmentation:

1. Quarterly District Coordination Meetings shall be mandatory.
2. Shared digital dashboards shall be maintained.
3. Joint inspection protocols shall be established.
4. Annual institutional performance review shall be conducted.

5.2.2.5 Organizational Hierarchy

The operational hierarchy shall function as follows:


Provincial Council
Provincial Authority (DG)
District Land-Use Planning & Management Committee
District Technical Planning Sub-Committee
Local Planning & Enforcement Unit