

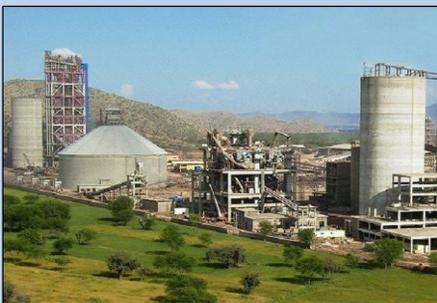
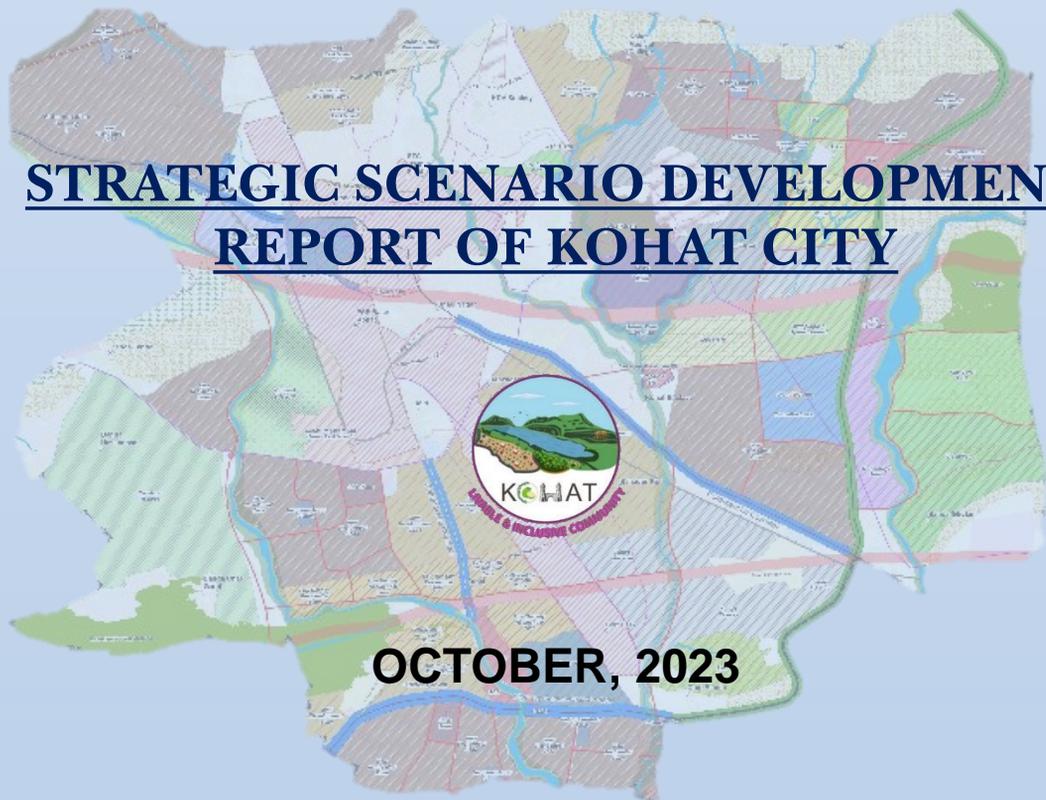


**URBAN POLICY UNIT**  
Planning and Development Department  
GOVERNMENT OF KHYBERPAKHTUNKHWA



# **CONSULTANCY SERVICES FOR THE MASTER PLAN OF URBAN CENTER OF KHYBER PAKHTUNKHWA DIVISIONAL AND SELECTED DISTRICT HEAD QUARTER CITIES**

*Package 2: Kohat, Bannu and DI Khan*



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## 1. VISION STATEMENT FOR KOHAT CITY

Recognizing that the main purpose of Developing a City Master Plan for Next 20 Years is to provide a vision for the future of the community, this section sets out the vision for Kohat City based upon the adopted principles of Sustainability.

### 1.1. City Vision Statement

Because of absence of any master plan, development control mechanism and lack of basic social amenities & Physical Infrastructure in the City of Kohat, people are more focused and desirous of having basics of a good City Life. Both Citizens and departments are more concerned about current miseries of the city instead of focusing on Future Vision & Sustainable Growth. However, as evident from comprehensive consultations and based on realization of Quality Urban Living, Following Vision may be adopted for Kohat City:



**“To provide a safe, clean, affordable and Inclusive Urban Community while continuously striving to improve the Quality of Life for the Citizens”**

The above statement emphasizes a proactive local government that values safety and affordability while recognizing the need to continually seek opportunities for enhancing the quality of urban life of the Entire City.

#### **Overarching Principle- Safe, Clean & Affordable City**

The above principle may be achieved through applying environmental, economic, and social sustainability. Energy requirements of a City are also very important aspect of affordability & sustainability. Following strategic elements are to be ensured and to make the above vision realized which also related to “Urban Quality Of Life” Values:-

**Table 1-1: Principles of Urban and Civic Sense**

<b>Education</b>	Highly educated citizenry, Urban Living
<b>Health &amp; Safety</b>	Safe, Secure & Healthy Living
<b>Prosperity</b>	Economic opportunities and prosperity
<b>Diversity</b>	Vibrant, all segments of population be properly served
<b>Stewardship</b>	Intelligent & Sustainable management of City’s environment, nature, economics, health, property, information, cultural resources etc.
<b>Pursuit Of Happiness</b>	Enhanced environmental, natural, recreational & cultural Opportunities
<b>Heritage</b>	Preservation of historic, architectural & cultural resources
<b>Shelter</b>	Neighborhood preservation, affordable housing
<b>Efficiency</b>	Convenience, accessibility & mobility, Walkable Community
<b>Landuse</b>	Diverse Mixed Use & Compact land use
<b>Civic Involvement</b>	Engaged public in planning & managing the City
<b>Resilient</b>	Resilient Communities to withstand natural disasters
<b>Cityscape</b>	Beautiful Urban Landscape

## 2. EXISTING LANDUSE TYPOLOGY OF PROJECT AREA

### 2.1. Brief Analysis of Kohat

Kohat Division is comprising of five Districts including Kohat, Karak, Hangu, Kurram and Orakzai with a total area of 12,280.55 Sq. Km having a population of 30, 92,877. District Peshawar lies on the North of Kohat Division, District Bannu on the South and District Attock on the East and on the West Afghanistan. Kohat District is the divisional headquarter of Kohat Division with the population of 992,427 as recorded in the census of 2017 which was previously 562,644 in 1998. The average annual growth rate was 3.03% which is higher as compared to the average annual growth of KP Province and overall Pakistan. Kohat District has further three tehsils; Lachi, Gumbat and Kohat. Population of Kohat Tehsil was 461,842 in 1998 as compared to 264,440 in 1981. According to the census report of 2017, its population increased to 848,997 which is showing a significant increase in tehsil population. Following table is showing population distribution for Kohat Tehsil among rural and urban, recorded by the past six census.

**Table 2-1: Population of Kohat by Rural Urban Distribution**

Population Of Kohat Tehsil By Rural-Urban Distribution						
Years	1951	1961	1972	1981	1998	2017
Rural	71996	79516	143913	186836	335215	620442
Urban	40534	49854	65202	77604	126627	228555
Total	112530	129370	209115	264440	461842	848997
Kohat M.C.	30467	36016	48096	55832	95863	191,836

**Table 2-2 Population of Kohat Cantonment**

Population Of Kohat Cantonment						
Years	1951	1961	1972	1981	1998	2017
Kohat Cantt.	10067	13838	17106	21772	30764	36935

### 2.2. Project Area Population

Total project area population is calculated as 388,512 person including the population of 16 neighborhood councils and approximate 13 village councils falls under project area. Following are the population of NCs/VCs falling in project area:-

**Table 2-3: Project Area Population**

Sr no	Neighborhood Council	Population	Sr no	Village Council	Population
1	Haji Bahadar	8244	1	Mian Garhi	4576
2	Pir Abdulah Shah	7912	2	Muhammad Zai	5392
3	Behzadi Chikar Kot	6711	3	Naway Kalay	13699
4	Garhi Mawaz Khan	11459	4	Nusrat Khel	6718
5	Garhi Banorian	11235	5	Kaghzai	1636
6	Garhi Behraam Khan	30029	6	Shahpur	10317
7	Jungle Khel	11643	7	Bahadarkot	27436
8	Pir Khel	13092	8	Sheikhain	10003
9	Gulshan Abad	13293	9	Togh Bala	13214
10	Char Garh	15238	10	Togh Payan	14952
11	KDA	21052	11	Jarma-I	15481
12	Garhi Risal Dar	25643	12	Tor Chapri	8728
13	College Town	15011	13	Babri Banda	4810



14	Mir Ahmad Khel	18293	Total	136962
15	Tappi	21914	<b>PROJECT AREA POPULATION = 388,512</b>	
16	Mirozai	20781		
<b>Total</b>		<b>251,550</b>		

Source: Office of Assistant Director Local Govt and Rural Development Department Kohat

### 2.3. Land Cover Analysis

The surface of the Earth includes a variety of natural and artificial geographical features such as ecosystems, landforms, human settlements, and engineered constructions. Land use and land cover (LULC) analysis is a general term used to depict Earth surface cover, whether it is natural or manmade. In case of Kohat city the landcover analysis has been performed in seven major land cover classes. The built-up percentage is 23.57% and cultivated land is 29.51. However, the land available for development is 33% of total project area. Following table shows the percentages and areas of different classes:-

**Table 2-4: Land Cover Analysis of Kohat City**

<b>Kohat Land Cover Stats (Excluding Cantt. Area)</b>				
Sr. No.	Land Cover Class	Area(Sq km)	Area(Acres)	Percentage
1	Built-up	38.48	9508.10	23.57
2	Cultivated Land	48.18	11906.20	29.51
3	Forest	2.81	693.82	1.72
4	Graveyard	1.12	276.79	0.69
5	Open Land	55.47	13706.68	33.97
6	Orchard	8.30	2050.36	5.08
7	Water Body	8.93	2206.42	5.47
<b>Grand Total</b>		<b>163.28</b>	<b>40348.37</b>	<b>100</b>

### 2.4. Population Density

Population density is the concentration of individuals within a species in a specific geographic locale. Population density data can be used to quantify demographic information and to assess relationships with ecosystems, human health, and infrastructure. To distribute the project area into density zones, different ranges and classes has been fixed based on the prevailing trend of Kohat city:-

- ✚ Low Density 0-30 person per acre
- ✚ Medium Density 31-60 person per acre
- ✚ High Density above 60 person per acre

As per density classes, total four neighborhood councils are high density, two neighborhood councils and cantonment falls in medium density and all other remaining neighborhood councils and village councils falls in low density.

### 2.5. Landuse Typology

The Landuse survey was carried out for the entire Project area, spread over 177 square kilometers. The information obtained through Landuse surveys was fed into GIS. The analysis of survey information reveals that around 29.1% of the total surveyed area is under agriculture/orchards and about 36.7% is built-up. The overall Landuse pattern of Kohat is diffused and the city has been expanding haphazardly. Development continues mostly along the major roads. The City is expanding in all directions, but the major growth is towards north and north-West. In other directions, spatial growth is less intensive, sporadic and along the main roads. Such leap-frog developments cause unnecessary urban sprawl, increasing the cost of infrastructure, distances, travel time, traffic and pollution. The areas under Kohat



City, Cantonment and nearest archeological site in terms of absolute numbers (acres) as well as percentages.

**Table 2-5: Landuse Typology of Kohat**

Sr.	Landuse	Area in Sq Km	Percentage
1	Kohat City	165	93
2	Kohat Cantonment	12	7
<b>Total Project Area</b>		177	100
3	Kohat Zoo & Wildlife Park	0.16	<b>Outside Designated Project Area</b>
4	Ghamkol Sharif Darbar	0.10	

The area under commercial uses is about 450.76 acres, which is about 3.02% of the built-up area. The industrial area currently is about 360.95 acres. However, even the present percentage is within the observed range of Landuse proportions in large cities. The areas of built-up, cultivated land, hilly terrain and open land in terms of absolute numbers (acres) as well as percentages (Table below).

**Table 2-6: Landuse area percentages**

Sr No	Landuse	Area in Sq Km	Percentage
1	Built-up	60.46	34.1
2	Cultivated Land	48	27.08
3	Hilly Terrain	10.9	6.15
4	Open Land	45.7	25.78
<b>Grand Total (A)</b>		<b>165.23</b>	<b>93.13</b>
5	Kohat Cantonment	12	6.77
<b>Grand Total (B)</b>		<b>12</b>	<b>6.77</b>
<b>Grand Total (A+B)</b>		<b>177.23</b>	<b>100</b>

The land use map prepared on the basis of a comprehensive land use and buildings survey. For this purpose, an observation sheet was developed for each and every parcel of land (polygon on GIS map). This survey identified the detailed:

- ✚ Land use of Kohat city
- ✚ Landuse of Kohat Cantonment
- ✚ Height of buildings

Core City center occupied with commercial areas, administrative buildings, bus stands, historic settlements and open & recreation areas. It is reported that city has been growing in unplanned manner instead of following any physical development plan or any planning policy resulting in haphazard and uncoordinated development in different sectors. This scattered growing trend resulted in inefficient provision and accessibility of services like water, electricity, roads, sewerage, drainage, etc. No municipal committee or town committee has been given/assigned functions to control and guide developments in the town.



Table 2-7: Area Distribution under existing landuse

Built-up Area Landuse Distribution- Kohat City				
No	Landuse	Area In Acres	Area in Sq Km	Percentage
1	Residential	6287.46	25.44	42.09
2	Commercial	450.76	1.82	3.02
3	Public Buildings	980.06	3.97	6.57
4	Green/Open spaces (including Recreational places, Orchards & Forest Area)	2903.43	11.75	19.43
5	Industry	360.95	1.46	2.42
6	Graveyard	289.24	1.17	1.94
7	Roads (including Transport Terminals & Railway Line)	1446.28	5.85	9.68
8	Public Utility Buildings	46.67	0.19	0.31
9	Water Body	1861.92	7.53	12.45
10	Restricted Area	313.65	1.27	2.10
<b>Grand Total</b>		<b>14940.42</b>	<b>60.46</b>	<b>100.00</b>

### Residential Areas

The residential buildings covered 6287.5 acre i.e., 42.09% of total area including planned and unplanned old residential areas. The total number of residential units/housing units in the city, based on an average per-household size of 7.5 persons, is approximately 35677 and urban residential density is 4.06 units/Acre. This residential percentage includes narrow street pattern of old slum areas where street width mostly ranges between 5 to 15 feet. The Residential areas mainly comprises old unplanned housing areas in the north & south west of Kohat Cantonment. These areas are characterized by narrow and irregular street patterns, small and irregular plot sizes, high density, and lack of open spaces. Abadis like Jungle Khel, areas on south of main Kohat bazar, settlements along Pindi Road included in this. KDA Housing scheme is the only major and public sector housing project in the north east of existing city which covers about 15-20% of the total residential footprint of the city. Few other small housing schemes like Kohat Enclave, Jerma Housing and Kohat Model Town etc has been developed along major arteries like Peshawar Road, Bannu Road & Pindi Road which are still to be colonized. Lots of unapproved land subdivisions featured with no proper access, no public infrastructure are coming up and trapped within agricultural areas / guava orchards of the city. Few large village settlements such as Sheikhan Village, Togh Bala etc also lies within proposed City Boundary.

### Commercial Areas, Roads, Health and Other Uses

The commercial area occupies 3.02 percent of land. Most of the commercial activities/uses are along Primary roads, such as, the centrally located intersection of Bannu Road and Rawalpindi Road is the main commercial hub of the city. In the absence of any planned housing & commercial developments in the past, commercial activities spreads out everywhere in the city including along major arteries, old city areas, streets and only few designed commercial plazas exist in the city. The areas adjacent to the old Laari Adda and Main Kohat Bazar in its south are the most congested linear commercial bazars penetrated inside small and narrow streets. New Planned fruit & vegetable markets in the south of Kohat Air Base, commercial zones of KDA Scheme and other commercial plazas have also been developed in the recent past.

### Educational & Health Facilities

Educational institutions spread over 418.81 acres of land and health uses occupy only 38.95 acres of total land. Among Educational institutes, lots of private schools, mostly primary & middle level as well as





academies located in various parts of the city. However public sector schools, colleges and universities are very few in number. Among notable higher educational institute includes the Kohat University of Science & Technology, KMU Medical Institute, Kohat Medical College, Kohat Cadet College, Garrison Cadet College, Govt. Polytechnic Institute, Nishtar Special Education Centre, KMU Institute of Dental Sciences. Health Facilities accounts for only about 0.25 % of the total Built up area of the City. Small private clinics can be found everywhere however specialized and general public sector health facilities also exists. Among few notable health facilities include DHQ Hospital, Al Shifa Trust Eye Hospital, Liaqat Memorial Hospital, Kohat Institute of Cardiology.

### Industrial Area

The industrial uses occupy a total of 2.42 percent area of the total built up area. Kohat district has a vast industrial potential in various manufacturing sectors in addition to the mines and mineral explorations particularly coal and gas reserves. In the city limits of Kohat, major industrial establishments includes Kohat Cement Factory located on Pindi Road, Janana Textile Mills and Kohat Textile mills both located in close proximity of PAF Base. A Small Industrial Estate (SIE) built way back in early 1980's also located on Dhoda Road while an OGDCL Gas processing field is also operational in the outskirts along Kohat Bypass Road.

### Parks, Playgrounds & Recreational Uses

The area under use of parks, play grounds and recreational facilities accounts for approximately 19 % of the total built up area. But it primarily includes Ecological Conservation Park adjacent to KUST Campus in the west and trapped Guava orchards inside various low density residential expansions in the urban periphery. Parks & Playgrounds only accounts for 4.66 % of the total built up which includes Kohat Sports Complex. Old residential parts of the City seriously lacks in green spaces or play fields. Only KDA Housing Scheme is relatively well served as far as neighborhood parks, play grounds and indoor sports are concerned. Two wildlife parks namely Togh mangara Safari Park located east of Peshawar Road and Kohat Wildlife Park located north of the city near Hangu Chowk are also providing some recreational opportunities for the residents of the Kohat City. Dense forest, tourist point and a wildlife sanctuary also exist alongside the Tanda Lake which provides good leisure time activities for outdoor recreations. Fishing points and boating facilities also available for Tanda Lake visitors.

### Other Public Buildings & Graveyards

The graveyards occupy about 1.94 percent respectively of the area. The public buildings, religious buildings, post office and police station occupy very insignificant portion (6.57 percent) of the area in Kohat City.

### Agricultural Areas

The land use analysis indicates that a major portion of the project area in Kohat City (around 29.10% i.e., 11874.2 Acres) is composed of agricultural land area which comprises of mostly Guava Orchards, open green areas, plantation and the agricultural area. Manmade drains and river water are the main sources of irrigation. Agricultural products and their by-products in the area include vegetables, fruits, dry fruits and fodder.



### Vacant Land

Vacant land has been found as the major land use (32.7%) categorized into 03 types i.e., vacant land difficult for development (10.03%), Vacant and suitable development land (19.38%) and vacant land not suitable for development (3.29%).

### Forests

Forests cover 1.70 percent of the total land in Kohat city. Since, winter is the dominant season in Kohat and due to regular power shortages and limited energy resources, therefore, wood and timber are the main sources of energy. Therefore, being an essential source of fuel, conservation of forests in the city is essential for many reasons for instance to avoid deforestation, to protect ecological system, to stop soil erosion etc.

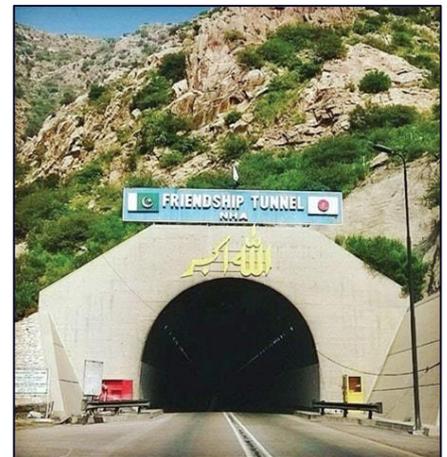
The spatial analysis of the town shows that there is unplanned development and expansion of the built-up area in the city. The land uses have been developed in a mixed form where even incompatible uses have been placed together. Thus industries creating all type of pollutions, have been developed near the residential areas and the residents are suffering from a number of diseases because of high noise and air pollution levels in the area. The town has suffered from the absence of any town planning and as a result, the whole town is growing haphazardly in the form of a huge slum. There is no development control or building control being applied in Kohat City. If nothing is done in connection with future planning of the town, the situation will grow from bad to worse.

## **3. DRIVERS OF URBAN GROWTH FOR KOHAT CITY**

### **3.1. Major Road Projects**

#### Kohat Tunnel

The Kohat Tunnel is a 1.9-kilometre-long highway tunnel under the Khigana Mountains between Kohat District of Khyber Pakhtunkhwa and Frontier Region Kohat in the Federally Administered Tribal Areas of Pakistan. The tunnel carries northbound and southbound traffic along N-55 National Highway (Indus Highway) under the Kohat Pass. Construction on the tunnel began in 1999, and opened to traffic in June 2003. As part of the developing Indus Highway system, the tunnel serves as a shorter, alternate route to the Kohat Pass, situated between the cities of Peshawar and Kohat. The new route decreases the time required to travel through the Kotal Pass by about 20 minutes. The main advantage of the tunnel is that long bodied vehicles can now use the Indus Highway whereas previously the hairpin bends on the Kotal Pass made it impossible for such vehicles to travel. It also helps alleviate traffic congestion, improve traffic safety, regional connectivity, and promote economic development.



**Figure 3-1: Kohat Tunnel**

#### N-80 National Highway

N-80 is one of Pakistan National Highway running from Capital city of Islamabad to the city of Kohat in Khyber Pakhtunkhwa Province via Fateh Jang and Jand. Its total length is 146 km divided into

121 km section in Punjab Province and remaining 49 km in Khyber Pakhtunkhwa Province. It is maintained and operated by Pakistan's National Highway Authority.

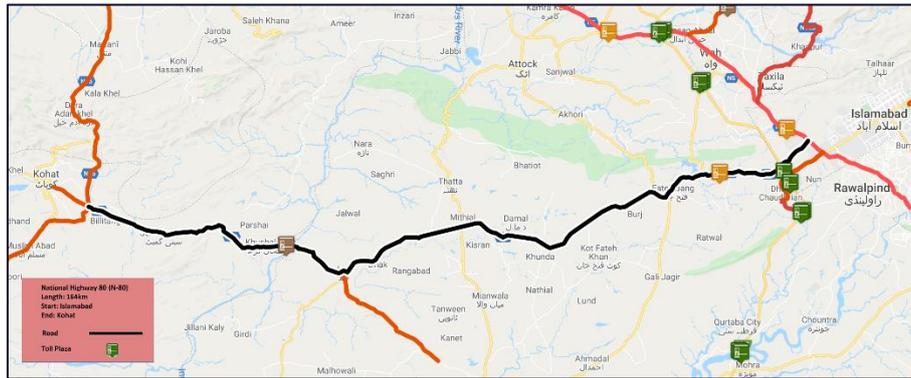


Figure 3-2: National Highway 80 (Islamabad-Kohat)

### Kohat Bypass Road

Kohat Bypass Road was developed in parallel to Kohat Tunnel during 2001-2002 to provide direct link of Indus Highway and Kohat Tunnel with Hangu Road. This Road also established direct access to KDA Scheme bypassing the whole city.

### 3.2. Major Industrial Projects

#### Kohat Cement Factory

State Cement Corporation of Pakistan (SCCP) established a 1000 TPD Romanian cement line at Kohat in 1984. The Government of Pakistan in open bidding in 1992 privatized the Company. The new management headed by Aizaz Sheikh (CEO) undertook an extensive BMR program in 1995 funded by proceeds of a public offering and a commercial debt. The capacity of the Plant was enhanced to 1,800 TPD by engaging KHD, a renowned German Company. KCCL has been in expansion mode since then and timely converted to coal firing, established a white cement plant of 450 TPD production capacity, set up a new grey cement line of 6,700 TPD capacity and also established a standby power plant of 22.4 MW capacity. It is located in the eastern side of the Kohat City on the Road leading to Rawalpindi.

#### Kohat Industrial Estate (SIE) Kohat

The industries department developed Kohat Industrial Estate in 1984 on Dhoda Road Kohat having approximately 156 Industrial Plots of varying sizes. However, it has been observed that Industries Department has failed to make fully operational despite the passage of 36 years since the plots were allotted in 1984.

Majority of the allotted plots were lying unused despite the fact they were required to become operational within two years of allotment, but the department was not cancelling such plots. They said that most of the owners had only raised nominal structures decades ago in a bid to hoodwink the department, and to later sell the plots at exorbitant rates.

The sources said an arms factory had obtained 12 plots in 1984, but these were still lying unused in violation of the law. They said construction work should be started on the plot after six months of allotment, and it should be made operational within two years. They added that it was also against the law that 12 plots were allotted to single firm or party.

### 3.3. MAJOR RESIDENTIAL PROJECTS

#### KDA Housing Scheme

Kohat Development Authority (KDA) Kohat was established in the year 1979. The KDA comprises two Phases i.e. Phase-I, Phase-II and Phase-II Extension. The Phase-I and Phase-II are fully developed. KDA has acquired and developed 1066 acres of land in its 1st two phases comprising 7600 residential plot of various categories. It has major impact on planned expansion of the Kohat City as there was no planned housing schemes of such scale in Kohat. Further to this, Total of 175 acres land has already been acquired for phase II Extension.

#### Jerma Housing Scheme Kohat

The project site is located in District Kohat near Kohat University main Indus highway. The scheme was developed and approved by Provincial Housing Authority. Total area of scheme is 300 kanal where 329 plots of different categories are created. (218 five Marla and 111 ten Marla) 37 kanal land is reserved for apartments which will accommodate approximately 216 flats.

#### Kohat Enclave Housing Scheme

Kohat enclave is premium residential and Commercial Township, situated at attractive location of main Rawalpindi Road Kohat. The project spans over an area of 25 acres and aims to provide its residents eco-friendly and modern-day standard of living amenities. Provided the facilities of school, park, Jamia Masjid, Facility of Clinic, Proper waste management system, Underground infrastructure including Gas, electricity and sewerage, Community center which will have Gym, indoor sports facilities, Commercial area for business and Gated Communities.

### 3.4. Major Social Sector Projects

#### Cadet College Kohat

In recognition of military services by the people of the area, Mr. Fateh Khan Bandial, the then Deputy Commissioner, Kohat, requested Malik Amir Muhammad Khan, Governor West Pakistan that a Cadet College should be established at Kohat. Late Malik Amir Muhammad Khan agreed. Consequently, Mr. Fateh Khan Bandial acquired 144 acres of land for the college. Malik Amir Mohammad Khan, Governor, West Pakistan, laid Foundation Stone of Cadet College Kohat (CCK) on 19 April 1964. The campus acquired 144 acres of land. First Entry of 58 cadets started in April 1965 with one House.



**Figure 3-3: Cadet College Kohat**

#### KMU-Institute Of Medical And Dental Sciences KIMS, Kohat

The KMU Institute of Medical and Dental Sciences KIMS, in Kohat, Khyber Pakhtunkhwa, was established in April 2006 as a public sector medical college. The Pakistan Medical and Dental Council has approved it as a public sector medical institution. In MBBS, 100 students are enrolled based on their performance in the ETEA test, and in BDS, 50 students are enrolled. KMU is affiliated with Khyber Medical University in Peshawar and is located at Phase 2 of KDA Scheme Kohat.

### Kohat University of Science & Technology (KUST) Kohat

Established in 2001, KUST is located near Village Jerma, main Indus Highway on Bannu Road, about 9km from Kohat City towards East. The University campus is surrounded by a regional facility of Agricultural Research System, Cadet College Kohat, Army Public College, Govt. Commerce College Kohat, F.G College for Women Kohat etc. In other words, the university campus/city is like an academic town producing education right from the nursery to the highest level in almost all-important disciplines. Kohat University of Science and Technology (KUST) is one of the most important seat of higher learning in the south region of Khyber Pakhtunkhwa (KPK) province. Since its inception, KUST is making tremendous contribution to the education system of Kohat and surrounding districts.



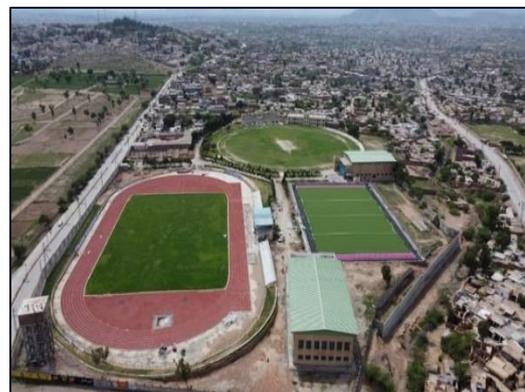
**Figure 3-4: Kohat University of Science and Technology**

### DHQ Hospital Kohat

DHQ Teaching Hospital KDA Kohat was inaugurated in 2000 as Divisional Headquarter Hospital by the Governor of Khyber Pakhtunkhwa Mr. Syed Iftikhar Hussain Shah, with limited staff and equipment's mostly shifted from Liaquat Memorial/ Women & Children Hospital Kohat. DHQ Teaching Hospital KDA Kohat is located on a Plateau at the foot of Kohat pass hills about 05 km North East of the old city of Kohat spread over an area of 242 kanal, having total beds strength of 449, of which 380 beds are functional presently, entertaining about 1500 patients pouring-in from District Kohat and adjoining districts of Karak, Hangu, newly merged Orakzai and Kurram districts, in OPDs and Accident & Emergency Department, on daily basis. The Hospital was declared a Teaching Institute for medical faculty of KIMS in the year 2005. Initially, it was a Category-B hospital and in the year 2012, the hospital was elevated to the status of Category-A. The required infrastructure was completed in August 2017.

### Kohat Sports Complex

A beautiful Multipurpose Sports Complex including exclusive fields for cricket, Hockey & Football has been developed in the recent past on a land of around 20 acres. Kohat sports complex provides the facilities of cricket stadium, football stadium, swimming pool, gymnasium and hockey ground. The up-gradation project under the supervision of Directorate Sports has been completed which includes new swimming pool, indoor gymnasium hall, hostel, four walls, street lights, hockey turf, Athletic Tartan Track and internal roads. The up-gradation



**Figure 3-5: Kohat Sports Complex**



completed in 2022 also included women's gymnasium, which has facilities of all indoor Games specifically for the female.

**Development of Shahbaz Gul Sabzi Mandi on Hangu Bypass Road**

In 2004, it is evident from the Google Image, Shahbaz Gul Sabzi (vegetable) Mandi did not exist while the area was completely under Guava orchards. In 2013 the commercial area developed and it experienced haphazard growth invading the orchards and the surrounding areas also developed. Sabzi mandi was developed near Hangu Bypass Road in 2022. TMA had built a new vegetable market in 2008 five kilometers from the city Centre. TMA-run market was incomplete and far away from the city.

**Establishment of KUST Campus on Bannu Road / Indus Highway Link**

In 2001 at Bannu Road, KUST Campus was inaugurated by the then Governor, Lt. Gen. Syed Iftikhar Hussain Shah. Over these years, KUST has progressed remarkably well, both in terms of human resources and physical infra-structure. However, there were relatively few department constructions at the time. With time, other departments were established in 2009. However, the university continued to grow in 2022, expanding alongside the Bannu Road and the N55 road.

**3.5. Growth Trend of Kohat City 2004-2021**

Total growth ratio of Kohat is 0.17 sqkm per year. In 2004, urban area of Kohat is 32.08 sqkm and in 2017, the urban area is 55.87 sqkm. The area in the north-east are 7.94 sq km, the north-west are 14.54 sq km, the south-west are 11.29 sq km, and the south-east are 22.11 sq km in 2021. The area is mainly built in the south-east direction. In 2004, the growth is along south-east direction which is same as 2021. Growth is along Kohat Fateh Jang Road N80 and N55. Kohat Hangu Road N80. Govt. Post Graduate College, Kohat and Cadet College Kohat. In 2004, area is developed along Kohat Hangu Road N80.

**Urban Sprawl**

GIS Techniques are used to monitor the dynamic phenomenon of urbanization with the help of satellite images. The high-resolution imagery of Google Earth was analyzed for the year 2004, 2012, 2017 & 2021 to precisely monitor the urban changes. The estimated area under these years is as follows:

**Table 3-1: Estimated Urban Area for Year 2004 & 2021**

No	Years	Area In Sq.KM	Area in Acres
1	Urban Area (2004)	32.08	7927
2	Urban Area (2021)	55.87	13805

**Spatial Urban Growth Trend**

In the last 17 years (2004-2021), the growth rate of North-East region has observed these years was 11.9%, with total expansion of 701 acres. The North-West region was also significant growth, with a rate of 16.6% and with total expansion of 975 acres. The growth rate of South-West region was 20.7%, resulting in an expansion of 1,217 acres. The South-East region had highest growth rate of 50.8%, with total expansion of 2,985 acres. The total expansion of area across all regions is approximately 5,878 acres.



Table 3-2: Growth Trend from 2004 to 2021

No.	Quad Name	Year 2004	Year 2021	Growth (sq. km per year)
1	North-East (NE)	5.10	7.94	0.17
2	North-West (NW)	10.59	14.54	0.23
3	South-West (SW)	6.36	11.29	0.29
4	South-East (SE)	10.02	22.11	0.71
<b>Grand Total</b>		<b>32.08</b>	<b>55.87</b>	<b>1.40</b>

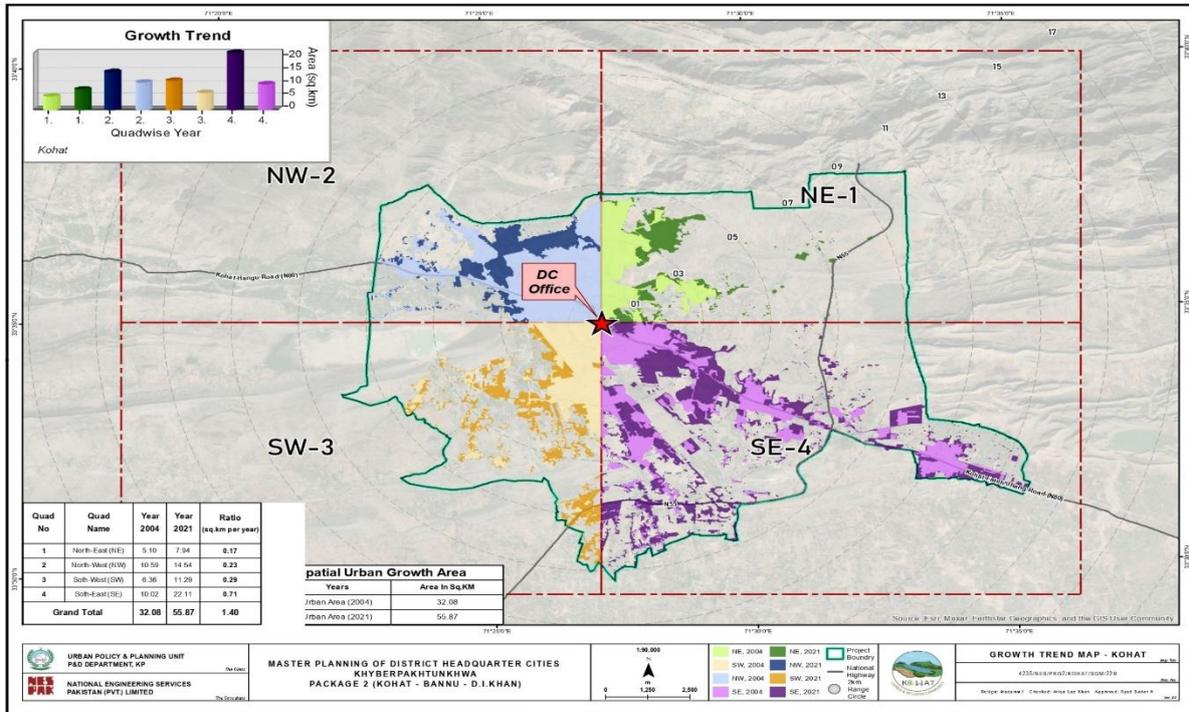


Figure 3-6: Growth Trend Map of Kohat

### 3.6. Spatial Growth and its Drivers

The growth towards North-East direction over last 17 years (2004-2021) was 11.9%, with a total expansion of 701 acres of land area. The North-West direction experienced significantly high growth, because of major development projects on the land area. With expansion of 975 acres which is 16.6% of total land area. District Headquarter (DHQ) Hospital Kohat, inaugurated in 2000 about 5 km towards North-East of the old city of Kohat, having total beds strength of 449, out of which 380 beds are currently functional. In the year 2005, DHQ Hospital was declared a Teaching Institute for the medical faculty of Institute of Medical and Dental Sciences (KIMS). Moreover, Khyber Medical University Institute of Medical and Dental Sciences (KIMS), located in the most developed area of Kotal Township of Kohat Development Authority in 2006. In addition, Kohat Development Authority (KDA) Housing Scheme was established in the year 1979 to combat homelessness in terms of facilitating people with construction of homes towards north direction. KDA has acquired and developed 1066 acres of land which comprising of 7600 residential plots of various categories. It has major impact on planned expansion of the Kohat City as there was no planned housing schemes of such scale in Kohat. The Kohat sport complex has been developed in KDA housing scheme in the recent past years. The up-gradation of the complex is completed in 2022. Above all discussed drivers of urban growth mainly contributed to major development and growth activities in Kohat City.

The growth towards South-West direction was 20.7%, resulting in expansion of 1,217 acres. Kohat Enclave is premium residential and Commercial Township situated at attractive location, developed in 2016 at main Rawalpindi Road Kohat. To provide residents eco-friendly and better quality amenities at prime landmark for the community. Kohat Enclave is brilliantly planned for future development and project will contribute the development of city towards the south. Additionally, Kohat University of Science & Technology (KUST) Campus was established in the year 2001, located on Bannu Road and Indus Highway Link. University campus is dynamic academic community which producing education facilities to the highest level in all-important disciplines. It is one of the most important significant educational institute in the south region to attract more population, with attracting a larger population and fostering greater community participation and enrollment in education. All the above development project will contribute towards the growth and development of Kohat city in south west region.

The above mentioned development projects significantly contribute to the growth of Kohat city in the south-west region.

The South-East region had highest growth of 50.8%, with total expansion of 2,985 acres. Jerma Housing Scheme Kohat, is located in District Kohat near Kohat University main Indus highway. The scheme was developed 329 plots of different categories and area is also reserved for apartments which will accommodate approximately 216 flats. Scheme will major impact on planned expansion of the Kohat City towards south region as there was no planned housing scheme developed here. The overall area growth across all directions is about 5,878 acres. These urban drivers play a crucial role in the developmental activities of Kohat city.

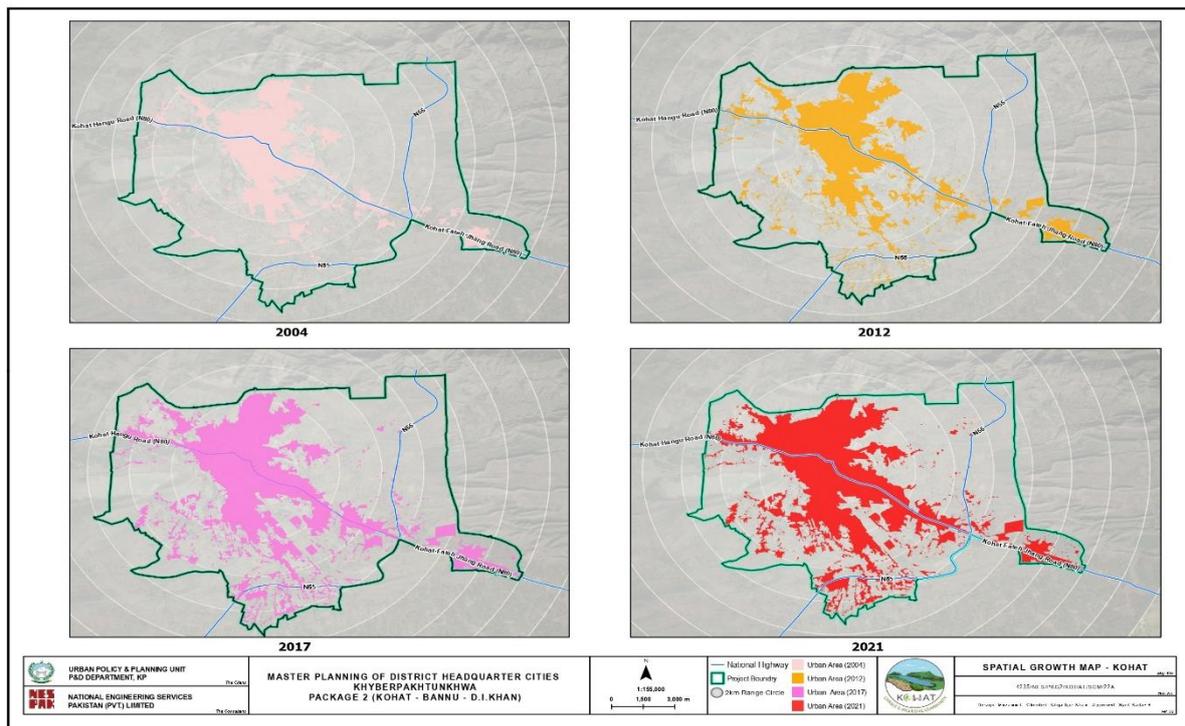


Figure 3-7: Spatial Growth Map of Kohat

#### 4. POPULATION PROJECTION

A population projection is an estimation of the number of people expected to be alive at a future date that is made based on assumptions of population structure, fertility, mortality and migration. It is an essential

to assess the need for new jobs, schools, doctors and nurses, planning urban housing, foods, clothing and requirements of energy and resources. It is also needed for policy discourse i.e. helps to the policy-makers to understand the existing problems and finally supports to develop the suitable solutions. Widely used population projection methods are described below:

#### 4.1. Mathematical Method

The mathematical method is the earliest one to be used for population projection. "The resistance or the sum of the obstacles opposed to the unlimited growth of population increases in proportion to the square of the velocity with which the population tends to increase." It means that the growth of population declines in proportion to the increase in density of population. However, demographers use simple arithmetic and geometric formulas and graphs for population projection.

#### 4.2. Arithmetic Method

In the arithmetic projection method, it is assumed that the annual change (increase or decrease) in population remains the same throughout the projection period and the crude birth and death rates are taken. The formula for such linear interpolation is

$$p_p = p_t + \frac{n(p_1 - p_2)}{N}$$

Where,  $P_p$  = Population projection in the future;

$P_1$  = Present population as per the recent census;

$P_2$  = Size of population in the previous census;

$n$  = Number of years between the projection year and the previous census; and

$N$  = Total number of years between the recent and previous consensus.

#### 4.3. Geometric Increase/Progression Method

Geometric mean increase is used to find out the future increment in population. In this method the percentage increase in population from decade to decade is assumed to remain constant. This method is adopted for young and developing towns, where the rate of growth of population is proportional to the population at present (i.e.,  $dP/dt \propto P$ ). Therefore, it is assumed that the percentage increase in population is constant. It is similar to compound interest calculations. The population predicted by this method is the highest of all. The population at the end of nth decade 'Pn' can be estimated as:

$$P_n = p \left( 1 + \frac{1 + IG}{100} \right)^n$$

Where, IG = geometric mean (%)

P = Present population

N = no. of decades



Table 4-1 Population Projection of Neighborhood Councils

Sr.	Names of NC	Population (2017)	Area in Acre	AAGR (1998-2017)	Projected Population 2017-22	Projected Population 2023-27	Projected Population 2027-32	Projected Population 2032-37	Projected Population 2037-2042
1	Haji Bahadar	8244	340	3.71	9891	11804	14088	16813	20065
2	Pir Abdulah Shah	7912	248	3.71	9493	11274	13229	15337	17565
3	Behzadi Chikar Kot	6711	227	3.71	8052	8462	8894	9348	9825
4	Garhi Mawaz Khan	11459	160	3.71	13748	16408	19487	22867	26509
5	Garhi Banorian	11235	136	3.71	13480	16087	19199	22913	27345
6	Garhi Behraam Khan	30029	1988	3.71	36028	39778	43918	48489	53536
7	Jungle Khel	11643	2146	3.71	13969	16792	20040	23744	27929
8	Pir Khel	13092	2848	3.71	15708	18746	22372	26700	31864
9	Gulshan Abad	13293	2602	3.71	15949	17609	19441	21465	23699
10	Char Garh	15238	157	3.71	18282	20685	23232	25903	28599
11	KDA	21052	1101	3.71	25258	30144	35974	42933	51238
12	Garhi Risal Dar	25643	758	3.71	30766	35666	40848	46215	51654
13	College Town	15011	131	3.71	18010	19884	21954	24239	26762
14	Mir Ahmad Khel	18293	676	3.71	21948	26332	31275	36876	43166
15	Tappi	21914	1022	3.71	26292	31227	37088	43730	51189
16	Mirozai	20781	2067	3.71	24933	29914	36046	43248	51888
	<b>Total</b>	<b>251550</b>	<b>16607</b>	-	<b>301807</b>	<b>350812</b>	<b>407085</b>	<b>470820</b>	<b>542833</b>



Table 4-2 Population Projection of Village Councils

Sr.	Names of VC	Population (2017)	Area in Acre	AAGR (1998-2017)	Projected Population 2017-22	Projected Population 2023-27	Projected Population 2027-32	Projected Population 2032-37	Projected Population 2037-2042
1	Mian Garhi	4576	4018	3.15	5344	6240	7287	8509	9936
2	Muhammad Zai	5392	1716	3.15	6296	7353	8586	10026	11708
3	Naway Kalay	13699	2174	3.15	15997	18680	21814	25473	29745
4	Kaghzai	1636	1069	3.15	1910	2231	2605	3042	3552
5	Shahpur	10317	3942	3.15	12048	14068	16428	19184	22402
6	Bahadarkot	27436	3202	3.15	32038	37412	43688	51016	59573
7	Sheikhain	10003	15802	3.15	11681	13640	15928	18600	21720
8	Togh Bala	13214	4523	3.15	15431	18019	21041	24571	28692
9	Togh Payan	14952	1823	3.15	17460	20389	23809	27803	32466
10	Jarma-I	15481	2846	3.15	18078	21110	24651	28786	33615
11	Tor Chapri	8728	1804	3.15	10192	11902	13898	16229	18952
12	Babri Banda	4810	4444	3.15	5617	6559	7659	8944	10444
<b>Total</b>		<b>130244</b>	<b>47363</b>	<b>37.8</b>	<b>152092</b>	<b>177603</b>	<b>207394</b>	<b>242183</b>	<b>282805</b>

Constant population growth rate is based on past population growth patterns. Population growth rate is relatively stable over certain period. However, due to increased urban and civic amenities, the population has increased over time. Constant population growth rate is influenced by various factors, including current spatial expansion trends, past trends, economic conditions, social changes, policy interventions, and environmental factors. Furthermore, migration to developed cities is also one of the dominant influences on urban growth. Thus, for the neighbourhood councils, the average population growth rate remained constant at 3.71 from 1998 to 2017, while the average growth rate for the village councils remained constant at 3.15.



### 5. URBAN GROWTH MODELS

Cities are not simply random collections of buildings and people. They exhibit functional structure: they are spatially organized to perform their functions as places of commerce, production, education, and much more. One of the most important forces determining where certain buildings or activities are located within a city deals with the price of land. This tends to be the highest in the downtown area and declines as one moves outward from the center. The United States is the only country in the world in which the majority of the people live in the suburbs. Even though house prices may be higher in the suburbs, the land value is lower (a downtown apartment complex will produce much more revenue per year than a few suburban homes occupying the same amount of space). In every other country the majority resides in either rural or urban areas. Three major urban growth models are:



Figure 5-1: Urban Growth Models

### 5.1. Concentric Zone Model

The first model is called the concentric zone model, which states that cities have the ability to develop in five concentric rings. The inner zone of the cities tends to be the CBD, followed by a second ring that tends to be the zone of transition between the first and third rings. In this transition zone, the land tends to be used by industry or low quality housing. The third ring is called the zone of independent workers and tends to be occupied by working-class households. The fourth ring is called the zone of better residences and is dominated by middle-class families. Finally, ring five is called the commuter's zone, where most people living there have to commute to work every day.

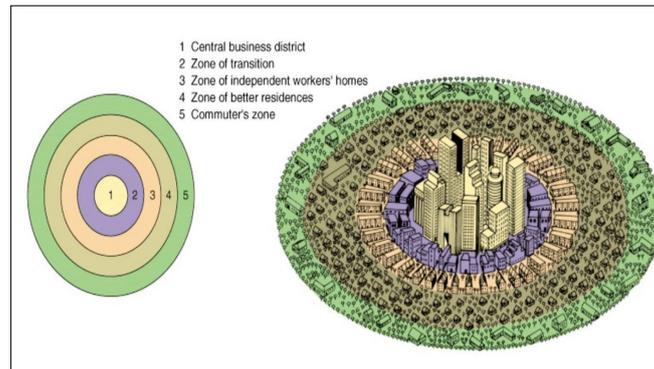


Figure 5-2: Concentric Zone Model

### 5.2. Sector Model

The second model for city development and growth is called the sector model. This model states that cities tend to grow in sectors rather than concentric rings. The idea behind this model is that “like groups” tend to grow in clusters and expand as a cluster. The center of this model is still the CBD. The next sector is called the transportation and industry sector. The third sector is called the low-class residential sector, where lower income households tend to group. The fourth sector is called the middle-class sector and the fifth is the high-class sector.

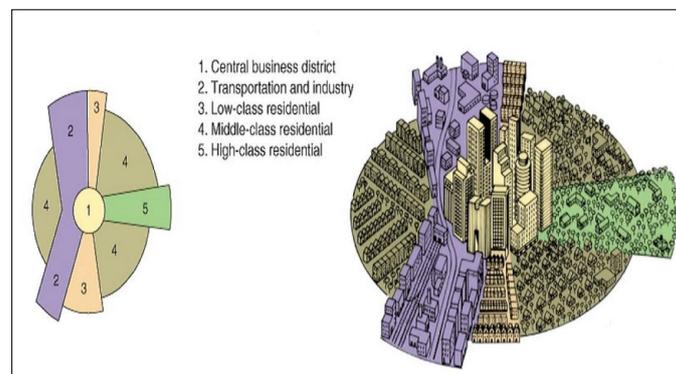


Figure 5-3: Sector Growth Model

### 5.3. Multi-Nuclei Model

The third and final urban design is called the multiple nuclei model. In this model, the city is more complex and has more than one CBD. A node could exist for the downtown region, another where a university is situated, and maybe another where an international airport may be. Some clustering does exist in this

model because some sectors tend to stay away from other sectors. For example, industry does not tend to develop next to high-income housing.

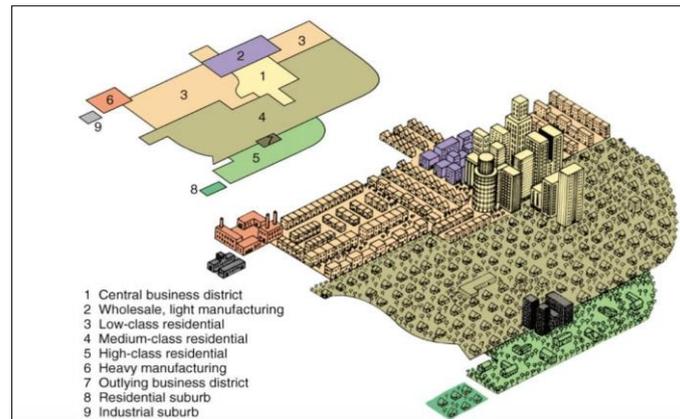


Figure 5-4: Multiple Nuclei Model

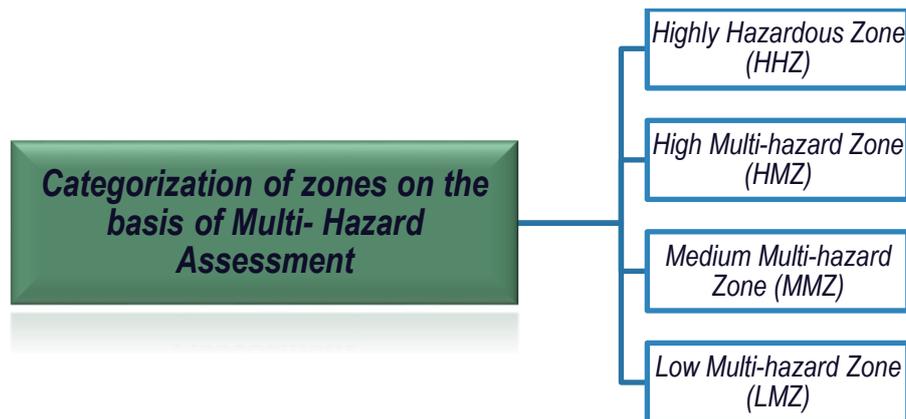
#### 5.4. Applicability of multiple nuclei growth model on Kohat

As far as the applicability is concerned, the multiple nuclei growth model is highly applicable and feasible for Kohat city. The linear as well as urban expansion in patches along small and medium industries shows that the city has the strength to be developed in a sustainable manner along with the fringes and civic communities. Furthermore, the proposal of low class residential zones along the fault lines and water bodies would develop a new direction of city's growth towards South and East. The provision of New CBD in South depicts that the city would not have only one center to grow rather it would grow in multiple points and through multiple commercial avenues. The proposed new residential zone on the land under KDA jurisdiction will serve the purpose of residential suburb. This will not only increase the density of existing urban areas but will also serve the purpose of urban and civic sense among the residents who are not near to CBD.

### 6. MULTI-HAZARD ZONING

The strategic scenario of the Kohat City master plan involves the Multi-Hazard Vulnerability and Risk Assessment (MVHRA) based on the concept of Total Hazard. Total Hazard is the gross accumulative impact of all types and intensities of the envisage geohazards to which the certain piece of land is exposed over a given timeframe of recurrence. It involves the gross effect of all types of direct and indirect Natural Hazards that may be associated with an earthquake to which the area under study may be subjected within a defined period of time.

Multi-Hazard maps are primarily used for Urban Master Planning, Safer Landuse management and town planning. It is an efficient tool to mitigate the geohazards or otherwise minimize the impacts of these on urban population. These maps can be used for future planning regarding selection of sites for urban development and location/ relocation of critical public lifeline facilities and utilities which should be directed towards areas of relatively lower hazard. Based on the result of Multi-Hazard assessment, the project area has been categorized into following zones.



**Figure 6-1: Categorization of zones on the basis of Multi- Hazard Assessment**

The detail of these zones are describing as under;

### **6.1. Highly Hazardous Zone (HHZ)**

This seismic zone constitutes an active geologic fault and any seismic activity associated to this fault may result in lateral, vertical and horizontal ground ruptures. As per BCP, SP-2007, sub-clause 3.2, No construction should be carried out within the HHZ and the landuse should be restricted to open areas as it is not suitable for build-up structures. This zone also includes areas prone to massive slope failures, huge rock falls and high flood hazard zone which are difficult to manage by engineering solutions.

Generally, avoid any new construction in the Highly Hazardous Zone (HHZ) and for any unavoidable construction such as roads, buildings, electrical lines, water/gas pipelines, the requisite of safe design should be adherent with special risk evaluation studies as this zone constitutes surface rupture zone of active geologic faults, capable of generating a hazardous earthquake. Permissible Landuse should be preferably restricted to open spaces, recreational area, parking lots, forest, graveyards, crossing of utilities and transportation facilities etc.

Any structure / facility constructed in this zone should not involve permanent human occupancy or part time large occupancy, such as students /teacher's hostel, places of worship, hotels/restaurants, cultural and community gatherings and other residential buildings. Any unavoidable construction in this zone should be single story scattered and disseminated using light weight prefabricated construction materials. Avoid the construction of multistory or high rising lifeline structures within the Highly Hazardous Zone. Any unavoidable new construction should be restricted to single Storey buildings and located at a safe distance from adjoining upper and lower hill slopes as per sub-clause 3.4 Fig.3.1 of BCP, SP-2007.

This zone is not suitable for essential and critical infrastructure like health, education, governance, disaster and emergency response facilities and detachments with high importance factor. This zone is also not suitable for storage of ammunitions, toxic, inflammable and radioactive materials. Indigenous and innovative construction technologies such as using wood / steel framed, prefab, light weight and flexible structures should be encouraged an account of their seismic performance and energy efficiency.

Necessary emergency exists and safe escapes should be suitably located and must be of sufficient capacity to ensure the prompt and safe exit of all the occupants from the buildings along with the safe areas allocated for the public assembly during the Earthquake/disaster within the building. Site Specific detailed geologic and geotechnical investigations are mandatory for the determination of engineering characteristics of rocks/soils as foundation materials. Nearest known seismic source distances should be



considered zero as this zone situates within a highly active seism tectonic source that may result in a hazardous Earthquake.

### **6.2. High Multi-Hazard Zone (HMZ)**

Very high seismic ground shaking and other indirect earthquake induced localized geo hazards such as rock falls, slope failure, mud/ debris flows, and snow/debris avalanches this zone also includes areas prone to moderate flood hazard and bank collapse. Suitable only for restricted urban Landuse planning and development with relatively very low population density. Any structure / facility constructed in this zone should not involve permanent human occupancy such as hotels, students / teachers hostel and other residential buildings. Any construction in this zone should be scattered and disseminated; avoid dense housing and construction.

Critical infrastructure such as education, health, governance and storage of hazardous and toxic/inflammable and radioactive materials including ammunition is forbidden in the high seismic hazard zone.

Avoid the construction of high rising lifeline structures within the High Hazardous Zone. Any new construction should be restricted to single storey buildings. Innovative construction technologies such as prefab, light weight should be employed for construction an account of their seismic performance. Masonry structure must be adequately design, procured and constructed by adopting confined reinforced concrete masonry structures and RCC and masonry infilled concrete frames (MICF). Necessary emergency exists and escapes should be suitably located and must be of sufficient capacity to ensure the prompt and safe exit of all the occupants within the building during a hazardous seismic event. During a major earthquake (magnitude  $\geq 7$ ) the probability of surface rupturing is high to moderate. Nearest known seismic source distance varies from 300m – 1000m.

### **6.3. Moderate Multi-Hazard Zone (MMZ)**

High seismic ground shaking and other indirect earthquake induced localized geohazards. Prone to minor rock falls, slope failure, mud/ debris flows, and low flood hazard. Suitable for all types of landuse and new construction involving educational, residential, office buildings, public service & infrastructural facilities as per generalized structural design provisions mentioned in Building Code of Pakistan, Seismic Provisions - 2007 in conjunction with the recommendation of site specific Seismic Design Parameters. Site specific geologic and geotechnical investigations are mandatory for the evaluation of engineering characteristics of rocks and soils.

Necessary emergency approaches, exits and other crisis management facilities be suitably located for prompt earthquake relief and disaster mitigation. For areas comprising hill slopes, necessary slope protection measures should be adopted based on detailed engineering studies. During a major earthquake, magnitude  $\geq 7$ , the probability of surface rupturing is moderate to low. Nearest known seismic source distance varies from 1000m – 3000m. Innovative construction technologies such as light weight constructions like light gauge (cold formed) Galvanized sheet technology (LGST) and structural concrete insulated panels (SCIP)

### **6.4. Low Multi- Hazard Zone (LMZ)**

Seismic ground shaking envisaged during a strong earthquake with very low risk of earthquake induced indirect and localized geohazards. Not prone to rock falls, slope failure, mud/ debris flows, and flood hazard.



Suitable for all types of Land use and new construction involving educational, residential, office buildings, public service & infrastructural facilities, involving permanent human occupancy such as hotels, student's /teachers hostels and other residential buildings, high rising buildings as per generalized structural design provisions mentioned in Building Code of Pakistan, Seismic Provisions – 2007 Probability of surface rupturing is low. Nearest known seismic source distance varies from 3000m – 6000m.

## 7. SAFER URBAN LANDUSE SUITABILITY BASED ON CONSTRUCTION SUITABILITY

### 7.1. Construction Suitability Recommendations for Geohazard Zones

Multi-Hazard zonation map covering the envisaged spectra of all the potential regional and localized geohazards shall be carried out to assess the risks involved in the perspective of the enhanced built-up exposure and the anticipated recurrence of the geohazards during the service life of the development. For carrying out the Multi-Geohazard zonation mapping of the project area, all the thematic map layers shall be overlaid with their gravity ratings to prepare the Multi Hazard Zonation Map based on the concept of Total Hazard. As these studies now serve as an indispensable tool for Master Planning / Urban Landuse Management of any City being based on the concept of Total Hazard, it looks appropriate that the construction Suitability Zoning Map of City which furnishes the fundamental guidelines for Landuse Planning should better be anchored to the Seismic and Structural Design Provisions.

Based on the results Multihazard vulnerability assessment, the project area shall be divided into four zones of construction suitability which are.



Figure 7-1: Construction Suitability Recommendations for Geohazard Zones

### 7.2. High Construction Suitability (HCS) Zone

Suitable for all types of urban landuse planning and development without any population density limitations involving vertical growth of the urban population compliant as per the design provisions of Building Code of Pakistan (BCP), SP 2007 and any other Codal practices and Building Byelaws as notified and indemnified by the Federal, Provincial and City Governments. Site specific geologic and geotechnical investigations and necessary engineering solutions for prevention and mitigation of localized geohazards (if any) are mandatory.

### 7.3. Moderate Construction Suitability (MCS) Zone

Suitable for urban landuse planning and development with relatively moderate population density, as per design provisions of Building Code of Pakistan (BCP), SP 2007 and any other codal practices and



Building Byelaws as notified and indemnified by the Federal, Provincial and City Governments. Some limitations apply for the safe urban landuse and design optimization of proposed (and existing) development due to high seismic ground shaking Site specific geologic, geotechnical investigations and necessary engineering solutions for prevention and mitigation of localized geohazards (if any) are mandatory.

#### **7.4. Low Construction Suitability (LCS) Zone**

Suitable only for restricted urban landuse planning and development with relatively very low population density as per design provisions of Building Codes of Pakistan (BCP), SP 2007 and any other codal practices and Building Byelaws and as notified and indemnified by the Federal, Provincial and City Governments. Not recommended for high rising buildings, towns, high occupancy community buildings, governance buildings, critical infrastructure, ammunition and toxic storage, unless disaster resilience is ensured by specialized engineering studies and solutions.

#### **7.5. Not Suitable for Development (NSD)**

Not available for construction accept very restricted urban Landuse such as open/green areas, grazing land, parks etc. Prone to seismic surface rupturing and other limiting indirect and localized geo-hazards requiring very specialized studies and engineering solutions for any proposed development. Specialized and specific studies and investigations are mandatory to ensure disaster resilience by High-Tech engineering solutions for any unavoidable infrastructural development such as transportation corridors (including bridges), water supply and electric lines, communication towers and other high rising structures etc.

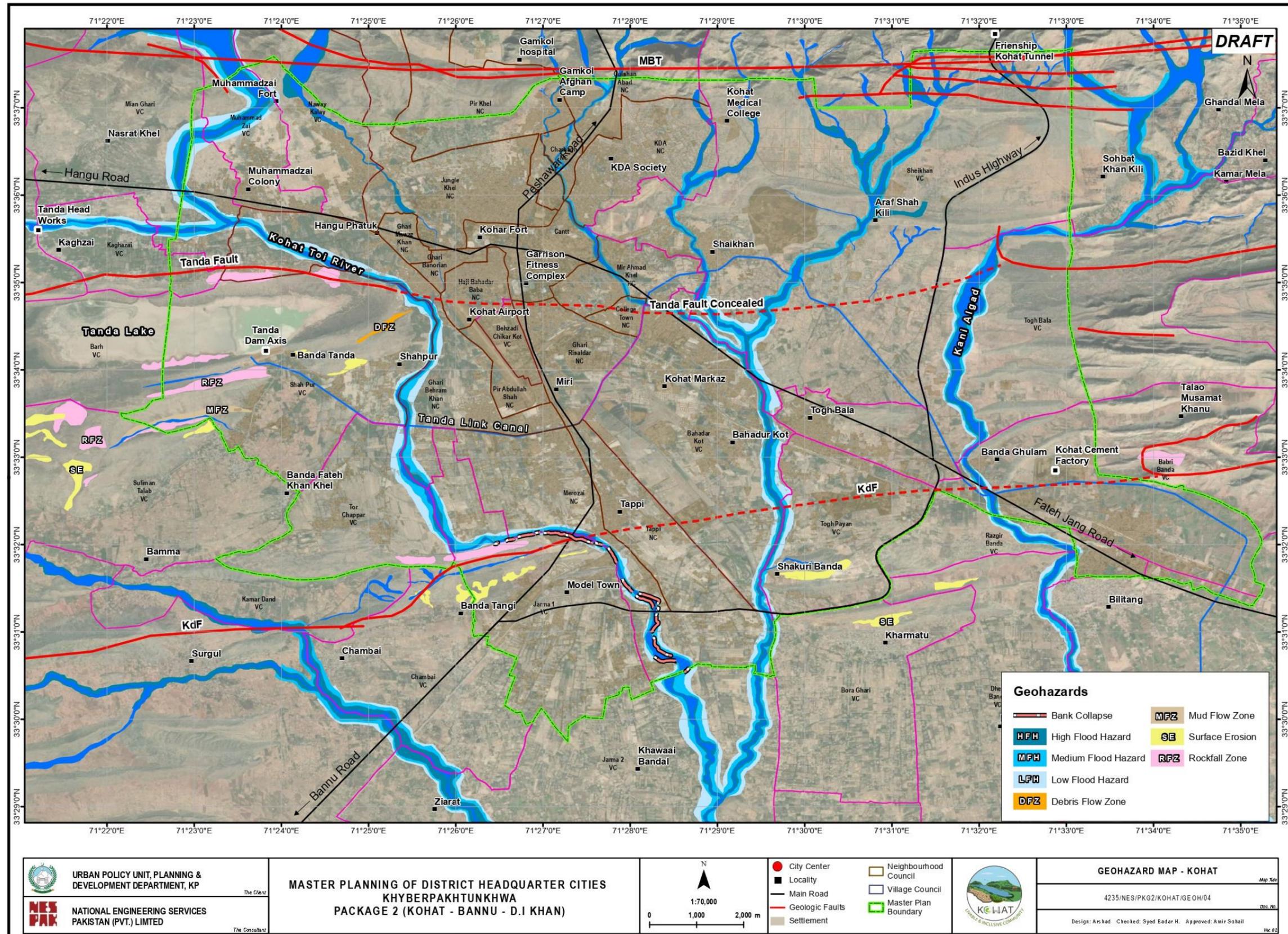


Figure 7-2: Geohazard Map of Kohat City

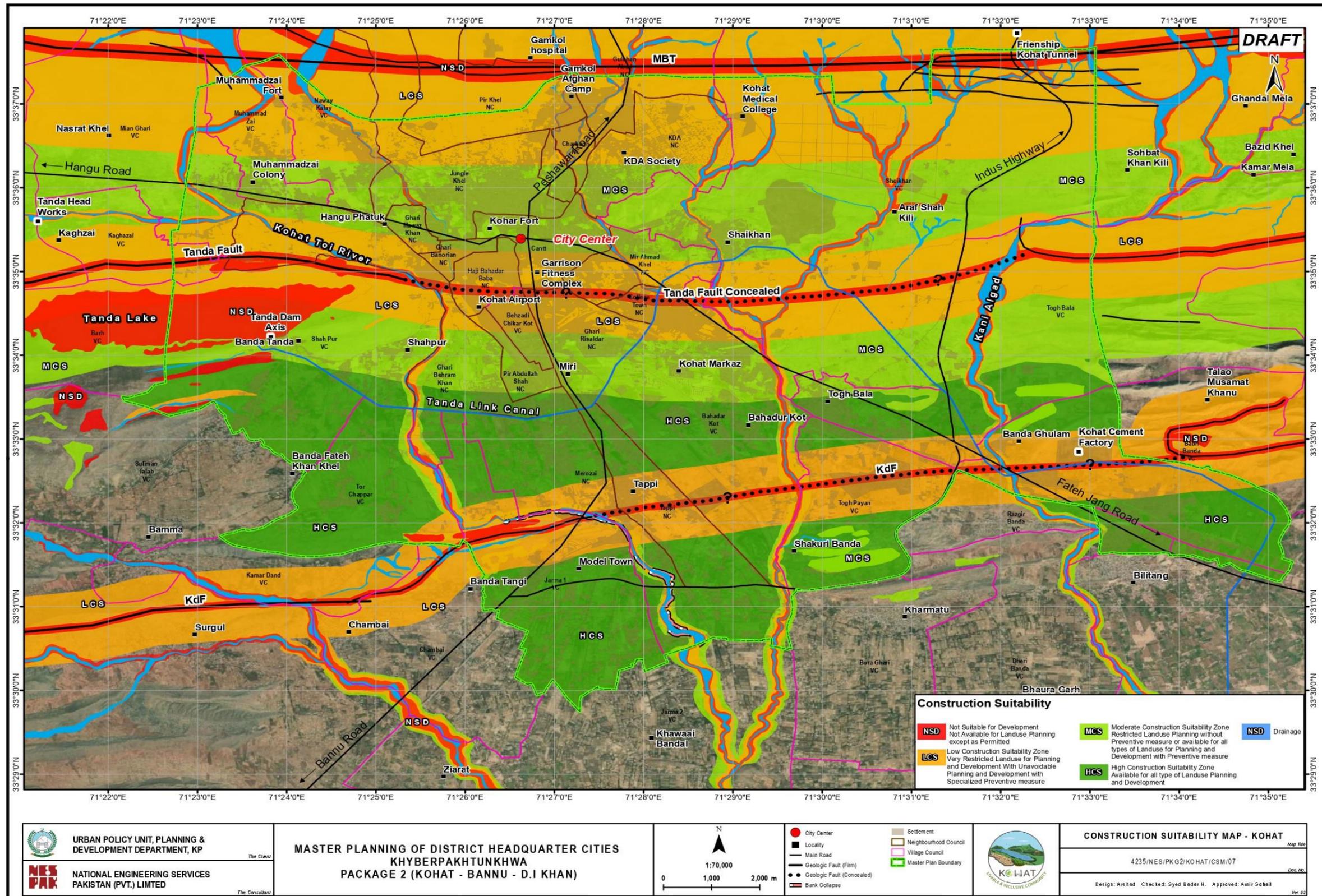


Figure 7-3: Construction Suitability Map of Kohat City



## 8. SUSTAINABLE DEVELOPMENT GOALS, 2030

The Sustainable Development Goals are collection of seventeen interlinked objectives designed to serve as a shared blueprint for peace and prosperity for people and the planet, now and in future. Pakistan affirmed its commitment to the 2030 Agenda for Sustainable Development by adopting the Sustainable Development Goals (SDGs) as its own national development agenda through National Assembly Resolution in 2016. Since then, the country has made considerable progress by mainstreaming these goals in national policies and strategies and developing an institutional framework for SDGs implementation in Pakistan.

Two sustainable development goals are integrated for the master planning project in KP cities. Goal 6, purpose is to ensure the sustainable management of water and sanitation and Goal 11, purpose is to ensure sustainable cities and communities for all. SDG 6 and SDG 11 are closely interconnected as they address key aspects of urban development, infrastructure and public health. Both goals have direct impact on both well-beings, public health and sustainability of the community. Integrating these goals in master planning project can ensure sustainable development, considering both water and sanitation aspects as well as the overall livability and resilience of cities

### 8.1. SDG 6: CLEAN WATER AND SANITATION



**Ensure availability and sustainable management of water and sanitation for all**

Goal 6 aims to ensure availability and sustainable management of water and sanitation for all. Water and sanitation are critical to the health of people and the planet. Improvements in drinking water, sanitation and hygiene are essential for progress in other areas of development too, such as nutrition, education, health and gender equality. By selecting this goal, prioritize addressing issues such as water scarcity, inadequate sanitation facilities, water pollution, and water-related diseases. Achieving SDG 6 can have a significant impact on public health, education, gender equality, and overall sustainable development. This goal also emphasizes the importance of protecting and restoring water-related ecosystems, ensuring sustainable use of water resources, and enhancing international cooperation to address water-related challenges.

SDG 6 emphasizes the need for efficient water management, including access to clean water, wastewater treatment, and addressing water scarcity issues. By incorporating SDG 6 would play vital role in Kohat master planning, to develop strategies and infrastructure solutions that prioritize sustainable water supply, promote water conservation and manage wastewater effectively.

### Goal Targets

Achieve universal and equitable access to safe and affordable drinking water for all

Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation

Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials

Substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially

Implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

Protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

Expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes

Support and strengthen the participation of local communities in improving water and sanitation management

Expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes

Expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes

### 8.2. SDG 11: Sustainable Cities and Communities



**Make cities and human settlements inclusive, safe, resilient and sustainable.**

SDG 11 focuses on creating sustainable cities and communities by addressing issues like urban sprawl, inadequate housing and transportation challenges. Making cities sustainable means creating career & business opportunities, safe and affordable housing, building resilient societies and economies. It involves investment in public transport, creating green public spaces, improving urban planning in participatory and inclusive ways. The rapid growth of cities, as a result of rising population and increasing migration to mega-cities, especially in the developing countries and slums are becoming a more significant feature of urban life.

By incorporating SDG 11, master planning project would focus on designing sustainable infrastructure, promoting compact & well-connected communities, encouraging mixed land-use planning and integrating green spaces and public amenities.



**Goals Targets**

- Ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums
- Provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety and expanding public transport
- Enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management
- Strengthen efforts to protect and safeguard the world's cultural and natural heritage
- Significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters
- Reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and waste management
- Provide universal access to safe, inclusive and accessible, green and public spaces
- Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning
- Substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters
- Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials





## 9. MULTI-CRITERIA ANALYSIS

Suitability of Landuse based on multi-criteria analysis, which categorized into qualitative and quantitative analysis.

### 9.1. Qualitative Multi-Criteria Analysis

Qualitative Multi-Criteria Analysis which includes;

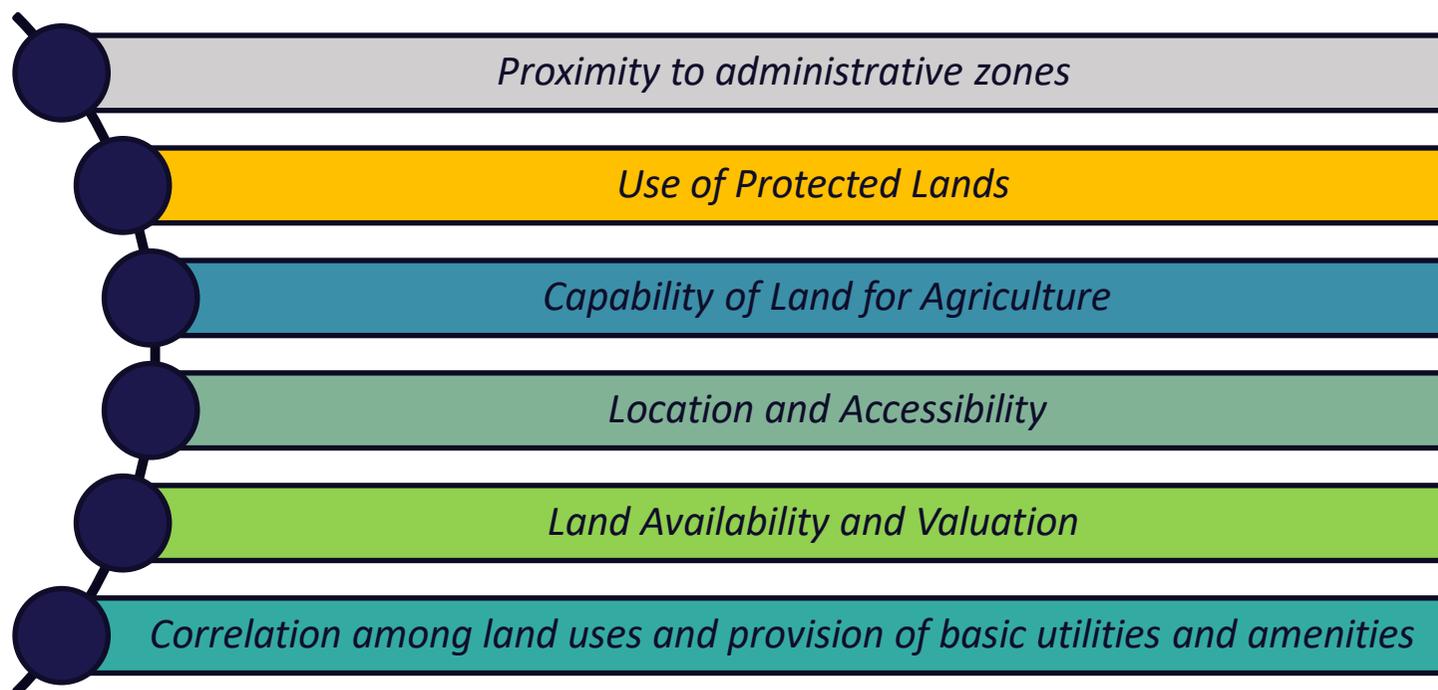




Table 9-1: Qualitative Multi Criteria Analysis

Sr.	Landuse	Criteria Categories & Description			
1	Residential	<p><b>Low Income Housing &amp; Apartments</b></p> <ul style="list-style-type: none"> <li>• Access to public transport</li> <li>• Accessible to Employment center</li> <li>• Availability of Parks/Open spaces, Landscape</li> <li>• Availability of affordable basic utilities/services and Public sector social amenities</li> <li>• Security and safety</li> <li>• Better quality of life</li> <li>• Highly dense areas</li> <li>• Proximity to industrial area</li> <li>• Proximity to existing low income residential areas</li> <li>• Affordable land prices</li> <li>• Supply of subsidized state land</li> </ul>	<p><b>Middle Income</b></p> <ul style="list-style-type: none"> <li>• Affordable access to quality housing</li> <li>• Neighborhood scale</li> <li>• Low/medium density detached housing</li> <li>• Sense of Community</li> <li>• Availability of basic utilities and services</li> <li>• Affordable land prices</li> <li>• Access to public transport and quality roads</li> <li>• Access to social amenities</li> <li>• Less environmental issues</li> </ul>	<p><b>High Income</b></p> <ul style="list-style-type: none"> <li>• Efficient size and design</li> <li>• Low density areas</li> <li>• Sense of community</li> <li>• Livable /calm societies</li> <li>• Safe and secure neighborhoods</li> <li>• Green &amp; clean environment</li> <li>• Good quality road infrastructure</li> <li>• Uninterrupted supply of basic utilities and services</li> <li>• Access to quality social amenities</li> <li>• High land prices</li> <li>• Connectivity to existing high income areas</li> </ul>	
2	Commercial	<p><b>PROPOSED CBD</b></p> <ul style="list-style-type: none"> <li>• Availability of large land parcel(s)</li> <li>• Adjacent to open / green spaces</li> <li>• Multi-nuclei city centers</li> <li>• Access from major Roads</li> <li>• High Land Prices</li> <li>• Proximity to new development zone</li> </ul>	<p><b>Special Development Zones</b></p> <ul style="list-style-type: none"> <li>• Existing trend of mixed use</li> <li>• Availability of land parcel(s)</li> <li>• Availability of parking spaces</li> <li>• Accessible from public transport</li> <li>• Access from major roads</li> <li>• Central locations with reference to new development</li> </ul>	<p><b>Neighborhood Centers</b></p> <ul style="list-style-type: none"> <li>• Centralized with respect to neighborhood</li> <li>• Providing primary level services of daily use</li> <li>• Preferably pedestrian friendly</li> <li>• Adequate parking space</li> <li>• Walkability to catchment population</li> </ul>	<p><b>Business and Trade Zone</b></p> <ul style="list-style-type: none"> <li>• Proximity to inert city highway</li> <li>• Availability of land parcel</li> <li>• Proximity to other city level zones</li> <li>• Availability of parking spaces</li> <li>• Accessible to public transport</li> </ul>





Sr.	Landuse	Criteria Categories & Description		
3	Industrial	<p><b><u>Economic/Technology Zone</u></b></p> <ul style="list-style-type: none"> <li>• Accessible from major roads</li> <li>• Adjacent to transport terminal(s)</li> <li>• Nearby existing economic activities</li> <li>• nearby city peripheral areas</li> <li>• Buffer of residential areas</li> <li>• Close to city level recreational activities</li> <li>• Close proximity to high utility lines</li> <li>• Proximity to the existing ecological corridors</li> </ul>	<p><b><u>Industrial Zone</u></b></p> <ul style="list-style-type: none"> <li>•Nearby existing industries</li> <li>•Favorable wind direction</li> <li>•Accessible from major roads</li> <li>•Away from city center</li> <li>•Nearby transport terminal(s)</li> <li>•Close proximity to target labor</li> </ul>	<p><b><u>Logistics Hub</u></b></p> <ul style="list-style-type: none"> <li>• Multiple transport options – major inter-modal facilities and road highway interchanges.</li> <li>• Connections to other divisional logistics hubs</li> <li>• Access to a large consumer market</li> <li>• Domestic economy engaged in trade of goods and services</li> </ul>
4	Sports and Recreational	<p><b><u>City level Facilities</u></b></p> <ul style="list-style-type: none"> <li>• Availability of large land parcel(s)</li> <li>• Approachable from major roads</li> <li>• Either available at center or at outskirts of town</li> <li>• Adequate parking spaces</li> <li>• Around existing water resource</li> </ul>		<p><b><u>Neighborhood Level</u></b></p> <ul style="list-style-type: none"> <li>• Within each neighborhood</li> <li>• Pedestrian friendly approach</li> <li>• Accessible for catchment population</li> <li>• Suitable to all income groups</li> </ul>
5	Public Buildings	<p><b><u>Education</u></b></p> <p><b><u>Schools</u></b></p> <ul style="list-style-type: none"> <li>• Preferably on walking distance for Low income groups</li> <li>• Nearby residential development</li> <li>• Adjacent to open / green spaces</li> <li>• Suitable for all income groups</li> <li>• Away from noisy business areas</li> <li>• Away from intercity highways</li> </ul> <p><b><u>Colleges</u></b></p> <ul style="list-style-type: none"> <li>• Nearby mixed use facilities</li> </ul>	<p><b><u>Health</u></b></p> <ul style="list-style-type: none"> <li>• Preferably on walking distance for low income group especially</li> <li>• Nearby residential development</li> <li>• Adjacent to green spaces</li> <li>• Nearby mixed use facilities</li> <li>• Adequate parking space</li> <li>• Approachable from major roads</li> </ul>	<p><b><u>Religious</u></b></p> <ul style="list-style-type: none"> <li>• Preferably on walking distance for low income group especially</li> <li>• Nearby residential development</li> <li>• Adjacent to green spaces</li> <li>• Nearby mixed use facilities</li> <li>• Adequate parking space</li> <li>• Availability of land parcel(s)</li> </ul>





Sr.	Landuse	Criteria Categories & Description	
		<ul style="list-style-type: none"> <li>• Approachable via secondary roads</li> <li>• Adjacent to open / green spaces</li> <li>• Adequate parking space</li> <li>• Adjacent to playgrounds</li> </ul> <p><b>Universities</b></p> <ul style="list-style-type: none"> <li>• Approachable from intercity &amp; primary roads</li> <li>• Nearby periphery areas</li> <li>• Availability of large land parcels</li> </ul>	<ul style="list-style-type: none"> <li>• Accessible through public transport</li> <li>• Availability of land parcel(s)</li> </ul>
6	<b>Administration/ Civic Zone</b>	<p><b>Administrative Buildings</b></p> <ul style="list-style-type: none"> <li>• At city Multiple centers</li> <li>• Ideally to be located in city center near CBD</li> <li>• Accessible from major roads</li> <li>• Availability of land parcel(s)</li> <li>• Adjacent to existing civic services</li> </ul>	
7	<b>Transportation Road Network</b>	<p><b>Transportation Corridors</b></p> <ul style="list-style-type: none"> <li>• Avoid traffic congestion</li> <li>• Main connectivity</li> <li>• Occurrence of prime activities</li> <li>• Presence of important land uses</li> </ul>	<p><b>Transport Terminal</b></p> <ul style="list-style-type: none"> <li>• On outskirts of town</li> <li>• Near industries / economic zones</li> <li>• Adjacent to provincial roads</li> <li>• Vacant land parcel(s)</li> <li>• At crossing of major roads</li> <li>• Nearby significant landmarks</li> </ul>
8	<b>City level Graveyards</b>	<ul style="list-style-type: none"> <li>• On outskirts of town</li> <li>• Low land prices</li> <li>• Accessible from major roads</li> </ul>	



## **9.2. Quantitative Multi-Criteria Analysis**

The quantitative multi-criteria analysis involves various parameters related to land uses. Quantitative analysis generates a suitability map using Geographic Information Systems (GIS), which helps identify suitable locations and allocate different zones.

## **9.3. Methodology**

Land-use suitability assessment is an important step in land use planning for urban development. GIS has been considered one of the most suitable methods for land suitability analysis process. The method focuses mainly on the identification of the evaluation criteria and on the determination of the preference structure such as weightage criteria. In GIS process, each parameter is assigned a weightage which indicates its values and its importance to evaluate of criteria. Geographic Information Systems (GIS) used to determine the most suitable areas for various land uses.

For the assessment of Land Suitability in case of Kohat, which involve six landuses categories including residential, commercial, industrial, civic, sport & recreation zones and agriculture zones. Propose a GIS-based land suitability map that takes into account with different parameters and assign weightages, to identify both the opportunities and constraints present in each zone. The evaluation process considers multiple parameters as suitability criteria. Weightage criteria are used to assess both constraints and opportunities within each landuse. A weighted scale ranging from 0 to 5 used to evaluate constraints, while scale from 6 to 10 used for opportunities. These weightage criteria help in identifying the suitability of land uses within each zone. By weightage criteria, identify and prioritize the areas that determine the highest suitability for each specific land-use category.

Based on the suitability results, three categories are used to identify landuse suitability. Which classified as:

1. Not Suitable
2. Moderately Suitable
3. Highly Suitable

### 9.4. Framework for Landuse Suitability Analysis based on GIS

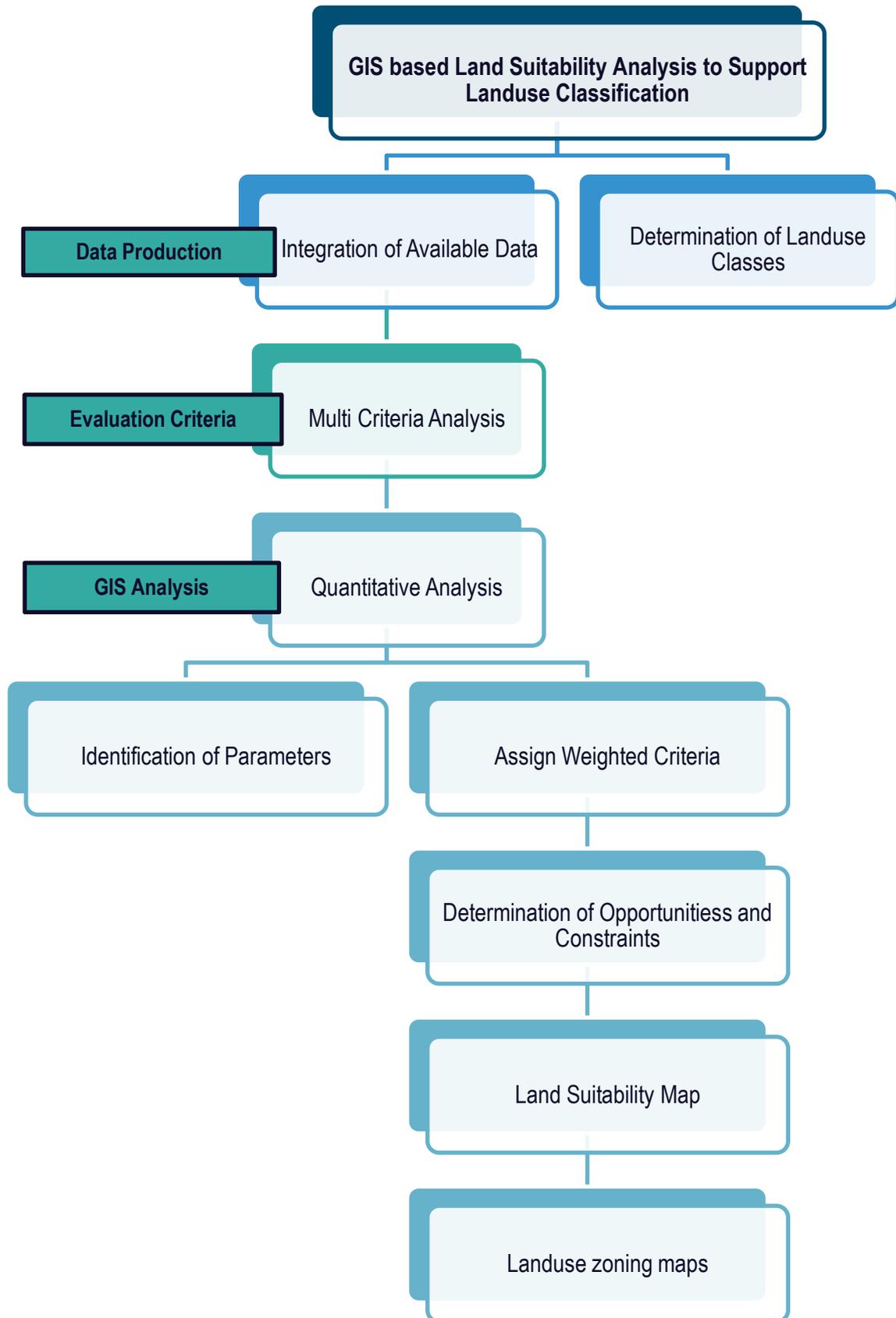


Figure 9-1: Framework for Landuse Suitability Analysis based on GIS



Table 9-2 Quantitative Multi-Criteria Analysis

Sr.	Parameter	Opportunities	Constraints	Weighting Criteria
<b>RESIDENTIAL ZONES</b>				
1	Highly Hazardous Zone (HHZ)		Constraints	0
2	High Multi-hazard Zone (HMZ)		Constraints	02
3	Medium Multi-hazard Zone (MMZ)	Opportunities		06
4	Low Multi-hazard Zone (LMZ)	Opportunities		08
5	Land parcels suitable for agriculture use including cultivation, orchards & forests.		Constraints	0-2
6	Land parcels near landfill/dumping sites & STP (200m)		Constraints	0
7	Land parcels near protected areas including high tension (HT) Lines, firing range etc.		Constraints	0-2
8	Land available near obnoxious industries		Constraints	0
9	Vacant land parcels within Built-up Areas	Opportunities		07
10	Large land parcels (open/barren land) other than Built-up Areas	Opportunities		10
11	Land parcels accessible to transportation network	Opportunities		08
12	Land availability proximal to community facilities	Opportunities		07
13	Land availability proximal to employment opportunities	Opportunities		08
14	Availability of land parcels over Slope less than 20%	Opportunities		10
15	Availability of land parcels over Slope from 20-30%		Constraints	05
16	Availability of land parcels over Slope above 30%		Constraints	0
<b>COMMERCIAL ZONES</b>				
1	Highly Hazardous Zone (HHZ)		Constraints	0
2	High Multi-hazard Zone (HMZ)		Constraints	02
3	Medium Multi-hazard Zone (MMZ)	Opportunities		06
4	Low Multi-hazard Zone (LMZ)	Opportunities		08
5	Land parcels suitable for agriculture use including cultivation, orchards & forests.		Constraints	0
6	Land parcels near landfill/dumping sites & STP (200m)		Constraints	0
7	Land parcels near protected areas including high tension (HT) Lines		Constraints	0-2
8	Land available near obnoxious industries		Constraints	0-2
9	Vacant land parcels within Built-up Areas	Opportunities		08
10	Large land parcels other than Built-up Areas	Opportunities		08
11	Land parcels accessible to transport corridors/network	Opportunities		10
12	Lands proximal to existing physical infrastructure services	Opportunities		08
13	Existing trend of mixed Landuse along primary roads of city	Opportunities		10
14	Availability of suitable land parcel on central location with reference to new development	Opportunities		09
15	Availability of land parcels over Slope less than 20%	Opportunities		08
16	Availability of land parcels over Slope from 20-30%		Constraints	04
17	Availability of land parcels over Slope above 30%		Constraints	0





Sr.	Parameter	Opportunities	Constraints	Weighting Criteria
<b>INDUSTRIAL ZONES</b>				
1	Highly Hazardous Zone (HHZ)		Constraints	0
2	High Multi-hazard Zone (HMZ)		Constraints	02
3	Medium Multi-hazard Zone (MMZ)	Opportunities		06
4	Low Multi-hazard Zone (LMZ)	Opportunities		08
5	Land parcels suitable for agriculture use including cultivation, orchards & forests.		Constraints	0
6	Land parcels near landfill/dumping sites & STP		Constraints	0-2
7	Land parcels near protected areas including high tension (HT) Lines		Constraints	0-2
8	Land parcels along major highways	Opportunities		10
9	Lands proximal to existing main trunk utility lines	Opportunities		07
10	Land parcel availability proximal to exiting industries	Opportunities		06
11	Availability of large land parcels	Opportunities		08
12	Availability of land parcels over Slope less than 20%	Opportunities		08
13	Availability of land parcels over Slope from 20-30%		Constraints	04
14	Availability of land parcels over Slope above 30%		Constraints	0
<b>CIVIC ZONES (ADMINISTRARTION/PUBLIC BUILDING/COMMUNITY FACILITIES) (Administration, Education, Health &amp; Religious)</b>				
1	Highly Hazardous Zone (HHZ)		Constraints	0
2	High Multi-hazard Zone (HMZ)		Constraints	02
3	Medium Multi-hazard Zone (MMZ)	Opportunities		06
4	Low Multi-hazard Zone (LMZ)	Opportunities		08
5	Land parcels suitable for agriculture use including cultivation, orchards & forests.		Constraints	0
6	Land parcels near landfill/dumping sites & STP		Constraints	0
7	Land parcels near protected areas including high tension (HT) Lines		Constraints	0-2
8	Land available near obnoxious industries		Constraints	0-2
9	Vacant land parcels within Built-up Areas	Opportunities		08
10	Large land parcels other than Built-up Areas	Opportunities		08
11	Land parcels accessible to public transport corridors	Opportunities		10
12	Lands proximal to existing physical infrastructure services	Opportunities		08
13	Availability of suitable land parcel on central location with reference to new development	Opportunities		09
14	Availability of land parcels over Slope less than 20%	Opportunities		08
15	Availability of land parcels over Slope from 20-30%		Constraints	04
16	Availability of land parcels over Slope above 30%		Constraints	0
<b>SPORTS &amp; RECREATIONAL ZONE</b>				
1	Highly Hazardous Zone (HHZ)		Constraints	02
2	High Multi-hazard Zone (HMZ)		Constraints	04
3	Medium Multi-hazard Zone (MMZ)	Opportunities		08
4	Low Multi-hazard Zone (LMZ)	Opportunities		10
5	Land parcels suitable for agriculture use including cultivation, orchards & forests.		Constraints	03-04





Sr.	Parameter	Opportunities	Constraints	Weighting Criteria
6	Land parcels near landfill/dumping sites & STP		Constraints	0
7	Land parcels near protected areas including high tension (HT) Lines		Constraints	04
8	Land available near obnoxious industries		Constraints	0
9	Vacant land parcels within Built-up Areas	Opportunities		09
10	Large land parcels other than Built-up Areas	Opportunities		08
11	Lands proximal to existing water bodies (lakes, canals & water channels)	Opportunities		10
12	Availability of suitable land parcel on central location with reference to new development	Opportunities		07
13	Availability of land parcels over Slope less than 20%	Opportunities		05-08
14	Availability of land parcels over Slope from 20-30%	Opportunities		05-08
15	Availability of land parcels over Slope above 30%	Opportunities		05-08
<b>AGRICULTURE ZONES</b> <i>(Cultivation, Orchards, Urban Farms, Forest)</i>				
1	Land parcels suitable for cultivation outside Established Built-up Area	Opportunities		08
2	Land parcels along/near water irrigation system	Opportunities		08
3	Land proximal to transport services	Opportunities		07
4	Lands proximal to farm markets	Opportunities		07
5	Lands proximal to existing agricultural activities	Opportunities		08
6	Availability of land parcels over Slope less than 20%	Opportunities		07-10
7	Availability of land parcels over Slope from 20-30%	Opportunities		07-10
8	Availability of land parcels over Slope above 30%	Opportunities		07-10
9	Land available near obnoxious industries		Constraints	0-2
10	Land available near landfill/dumping sites & STP		Constraints	0-2

## 10. GIS BASED LAND SUITABILITY ANALYSIS

### 10.1. Residential Zone

Suitability map is generated through GIS based quantitative multi-criteria prepared to identify the potential of land for suitability of different Landuses, which considers various parameters and their weightage to determine the best locations and allocation for different residential zones. Three categories have been used to identify and designate residential zones which are as follows:-

1. Not Suitable
2. Moderately Suitable
3. Highly Suitable

Restricted areas have already been identified and merged in the maps with the not suitable for construction/development activity of specific Landuse. The other areas which are suitable for residential zones regardless of scale of zone have been shown/presented with Green and Yellow color tones. The overall suitability map indicates that most of the area is under highly suitable area which is towards northern side, while areas with medium suitability can properly utilized for residential purposes.

Constraints for residential development include Highly Hazardous zones, highly multi-hazard zones, agricultural land, areas near dumping sites, proximity to obnoxious industries, land parcels with slopes of





20% or more, and proximity to fault lines, water channels, and hilly areas. On the other hand, parameters that contribute to medium suitability includes medium-multi hazard zones, low-multi hazard zones, large land parcels within built-up areas, land parcels easily accessible to transportation networks, proximity to employment opportunities, and land parcels with slopes less than 20%.

The land suitability map have been generated taking into account the various parameters and assigned weightage to determine the most suitable locations for residential zones.



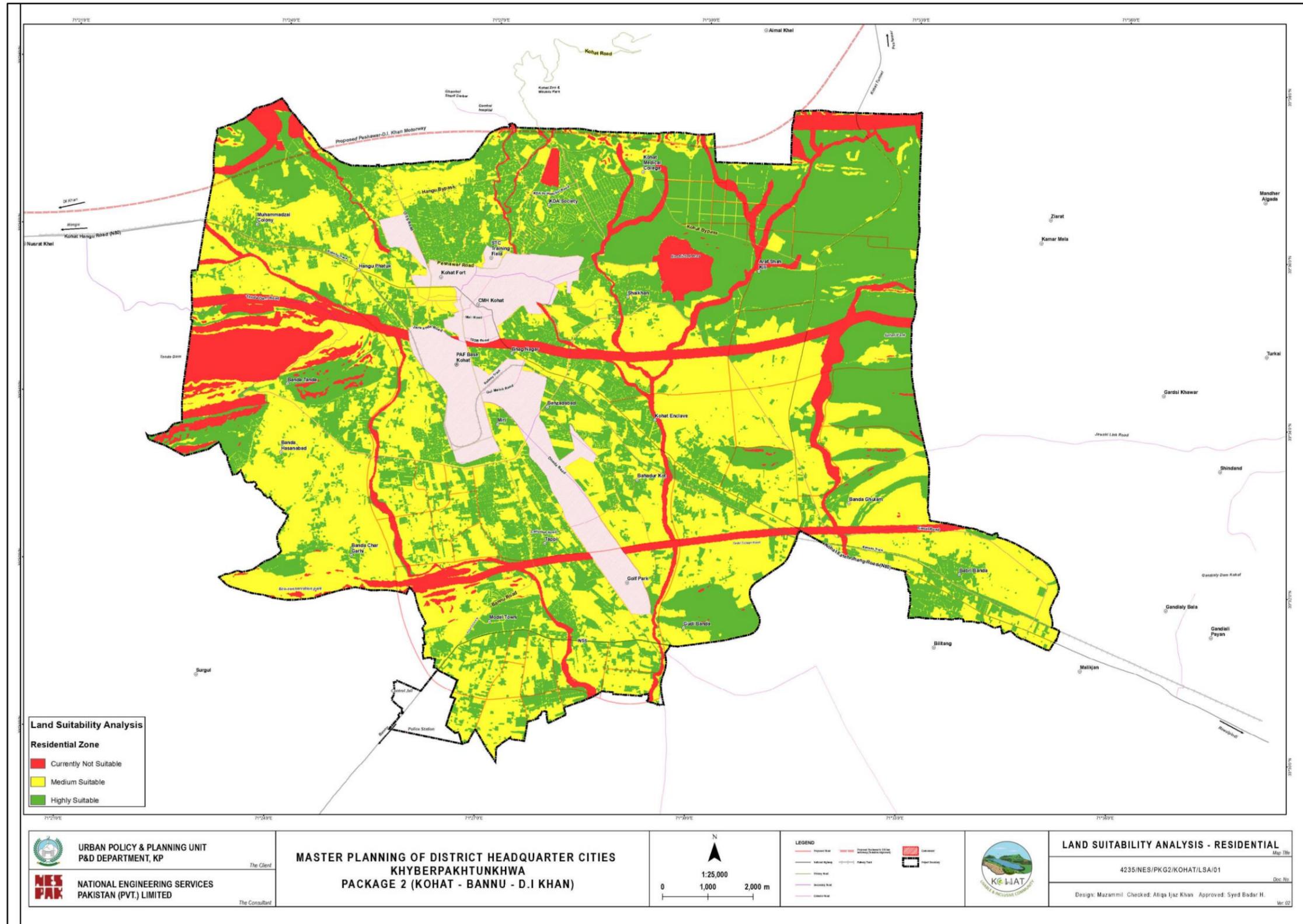


Figure 10-1 Residential Suitability Analysis Map



## 10.2. Commercial Zone

Suitability map is generated through GIS based quantitative multi-criteria, to identify the potential of land for suitability of different Landuses, which considers various parameters and their weightage to determine the best locations and allocation for different commercial zones. Three categories have been used to identify and designate for commercial zones which are as follows:-

1. Not Suitable
2. Moderately Suitable
3. Most Suitable

Restricted areas have already been identified and merged in the maps with the not suitable for construction/development of commercial activities. The other areas which are suitable for commercial zones regardless of scale of zone have been shown/presented with Green and Yellow color tones. The overall suitability map indicates that most of the area is under not suitable area, while areas with medium suitability can properly be utilized for commercial purposes.

Areas constraints for commercial development include Highly Hazardous zones, highly multi-hazard zones, land suitable for agricultural land, areas near landfill site/dumping sites & STP (200m), near protected areas including high tension (HT) Lines, proximity to obnoxious industries, land parcels with slopes over 20% or above. On the other hand, parameters that contribute to medium and high suitability includes medium-multi hazard zones, low-multi hazard zones, vacant land parcels within built-up areas, large land parcels other than built up area, land parcels easily accessible to transport corridor/networks, proximal to existing physical constraints, Existing trend of mixed Landuse along primary roads of city, Availability of suitable land parcel on central location with reference to new development, and land parcels with slope less than 20%.

The land suitability map have been generated by taking into account the various parameters and assigned weightage to determine the potential and constraint areas for commercial activities.

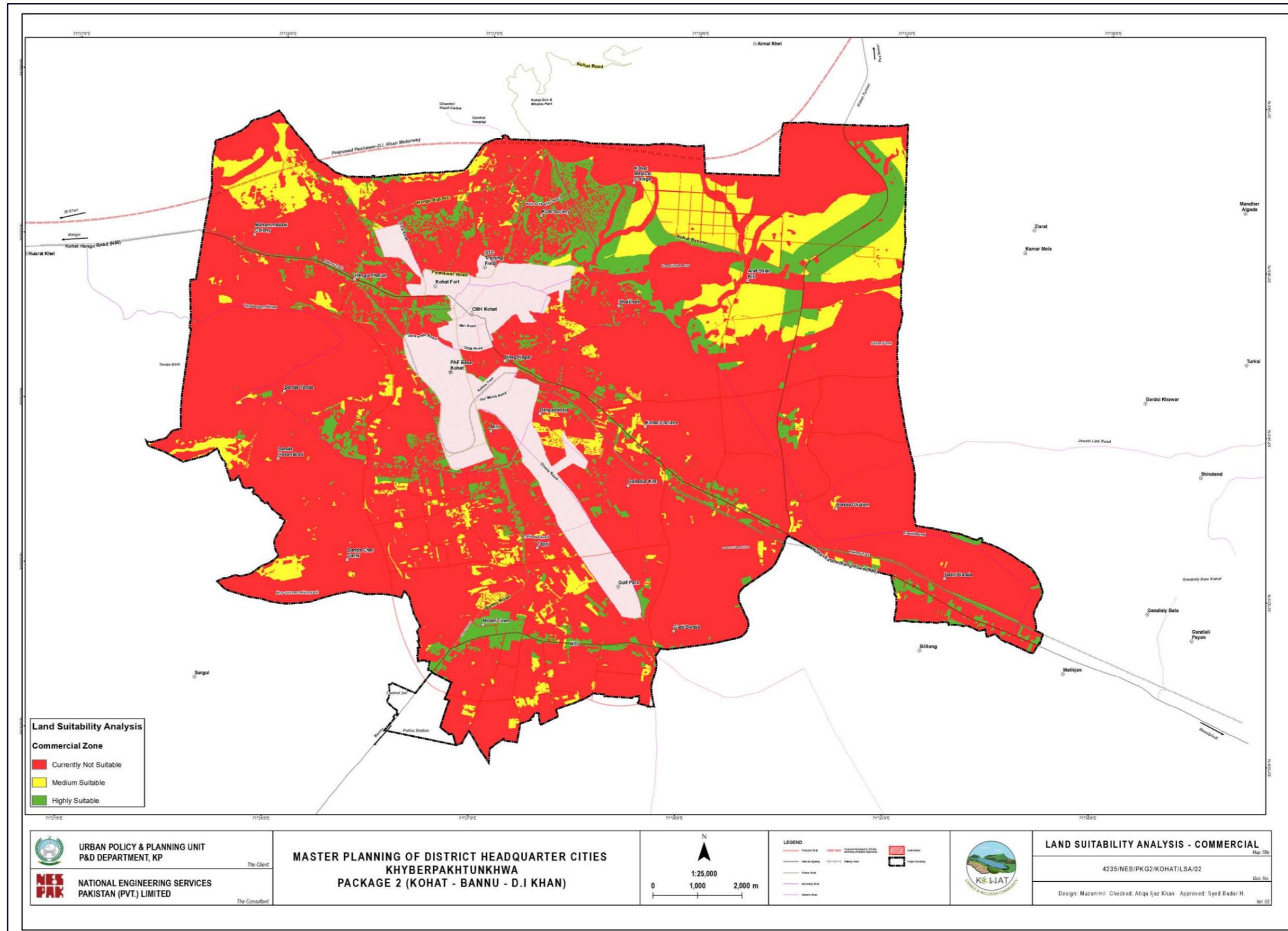


Figure 10-2 Landuse Suitability Analysis Map



### 10.3. Industrial Zone

Suitability map is generated through GIS based quantitative multi-criteria, to identify the potential of land for suitability of different Landuses, which considers various parameters and their weightage to determine the best locations and allocation for different industrial zones. Three categories have been used to identify and designate for industrial zones which are as follows:-

1. Not Suitable
2. Moderately Suitable
3. Highly Suitable

Restricted areas have already been identified and merged in the maps with the not suitable for construction/development activity for industrial Landuse indicated with red tone color. The other areas which are suitable for industrial zones regardless of scale of zone have been shown/presented with Green and Yellow color tones. Overall suitability map indicates, a significant portion of the area is not suitable for industrial development. However, there are areas with moderate suitability that can be effectively utilized for industrial purposes.

Land constraints for industrial development include Highly Hazardous zones, highly multi-hazard zones, land suitable for agricultural use including cultivation, orchards & forest, areas near landfill site/dumping sites & STP (200m), near protected areas including high tension (HT) Lines, land parcels with slopes over 20% or above. On the other hand, parameters that contribute to medium and high suitability for industrial zones includes medium-multi hazard zones, low-multi hazard zones, land parcels along major highways, land proximal to existing main trunk utility lines, land parcels proximal to existing industries, availability of large land parcels and land parcels over slope less than 20%.

The land suitability map have been generated by taking into account the various parameters and assigned weightage to determine the potential and constraint areas for industrial activities.

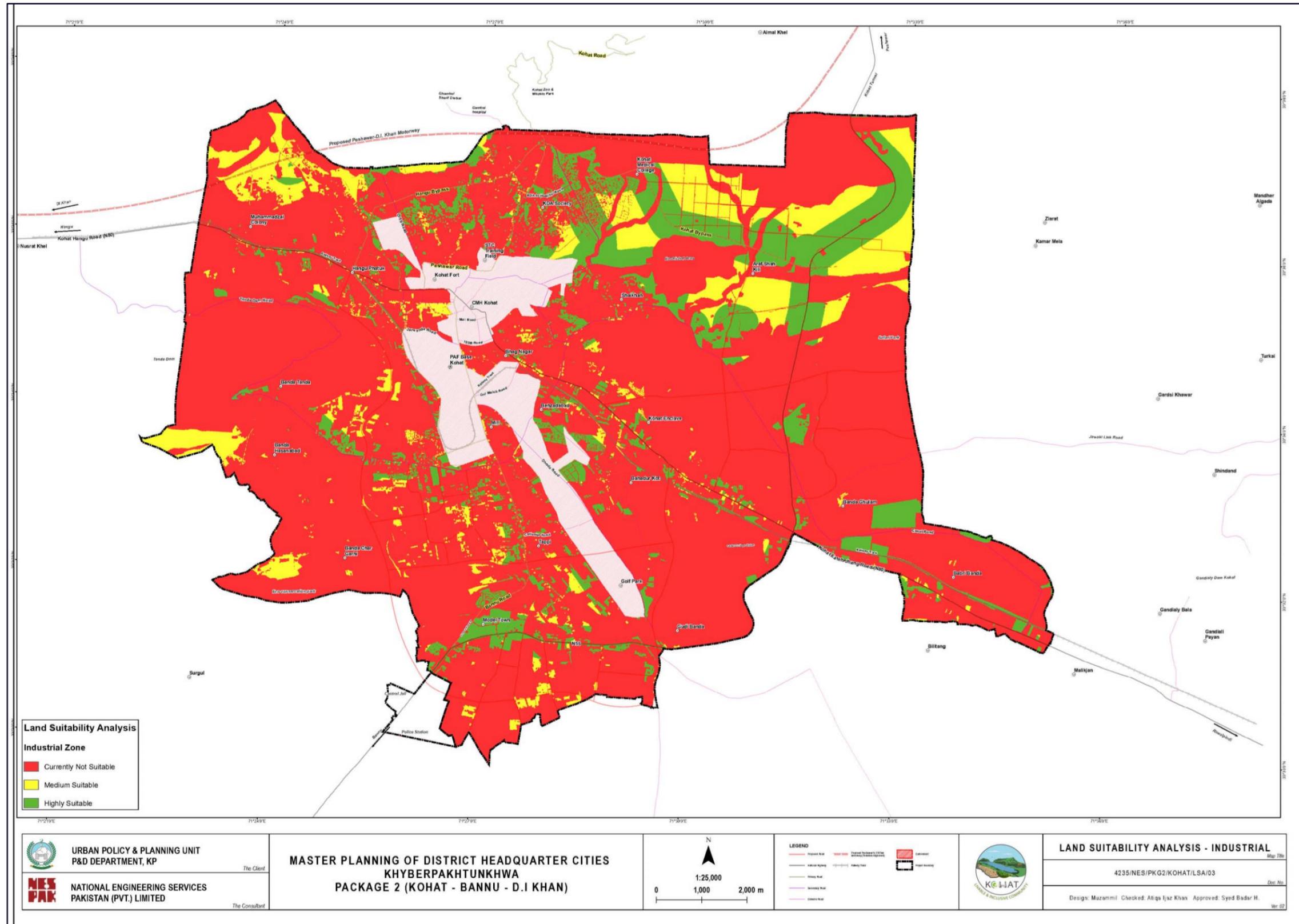


Figure 0-1 Industrial Land Suitability Map

#### 10.4. Civic Zone

Suitability map is generated through GIS based quantitative multi-criteria, to identify the potential of land for suitability of different Landuses, which considers various parameters and their weightage to determine the best locations and allocation for different civic zones. Three categories have been used to identify and designate for civic zones which are as follows:-

1. Not Suitable
2. Moderately Suitable
3. Highly Suitable

Restricted areas have already been identified and merged in the maps which is not suitable for construction/development activity for civic centres indicated with red tone color. The other areas which are suitable for civic zones regardless of scale of zone have been shown/presented with Green and Yellow color tones. Overall suitability map indicates, a significant portion of the area is not suitable for civic zone development. However, there are areas with moderate suitability that can be effectively utilized for civic activities.

Land constraints for industrial development include Highly Hazardous zones, highly multi-hazard zones, land suitable for agricultural use including cultivation, orchards & forest, areas near landfill site/dumping sites & STP (200m), near protected areas including high tension (HT) Lines, land parcels available near obnoxious industries and land parcels over slope 20% or above. Area that have potential for civic development includes,

On the other hand, parameters that contribute to medium and highly suitable for civic zones includes medium-multi hazard zones, low-multi hazard zones, vacant land parcels within built up areas, land parcels other than built up areas, land parcels accessible to public transport corridors, land proximal to existing physical infrastructure services, availability of suitable land parcel on central location with reference to new development, availability of large land parcels and land parcels over slope less than 20%.

The land suitability map have been generated by taking into account the various parameters and assigned weightage to determine the potential and constraint areas for civic zones.

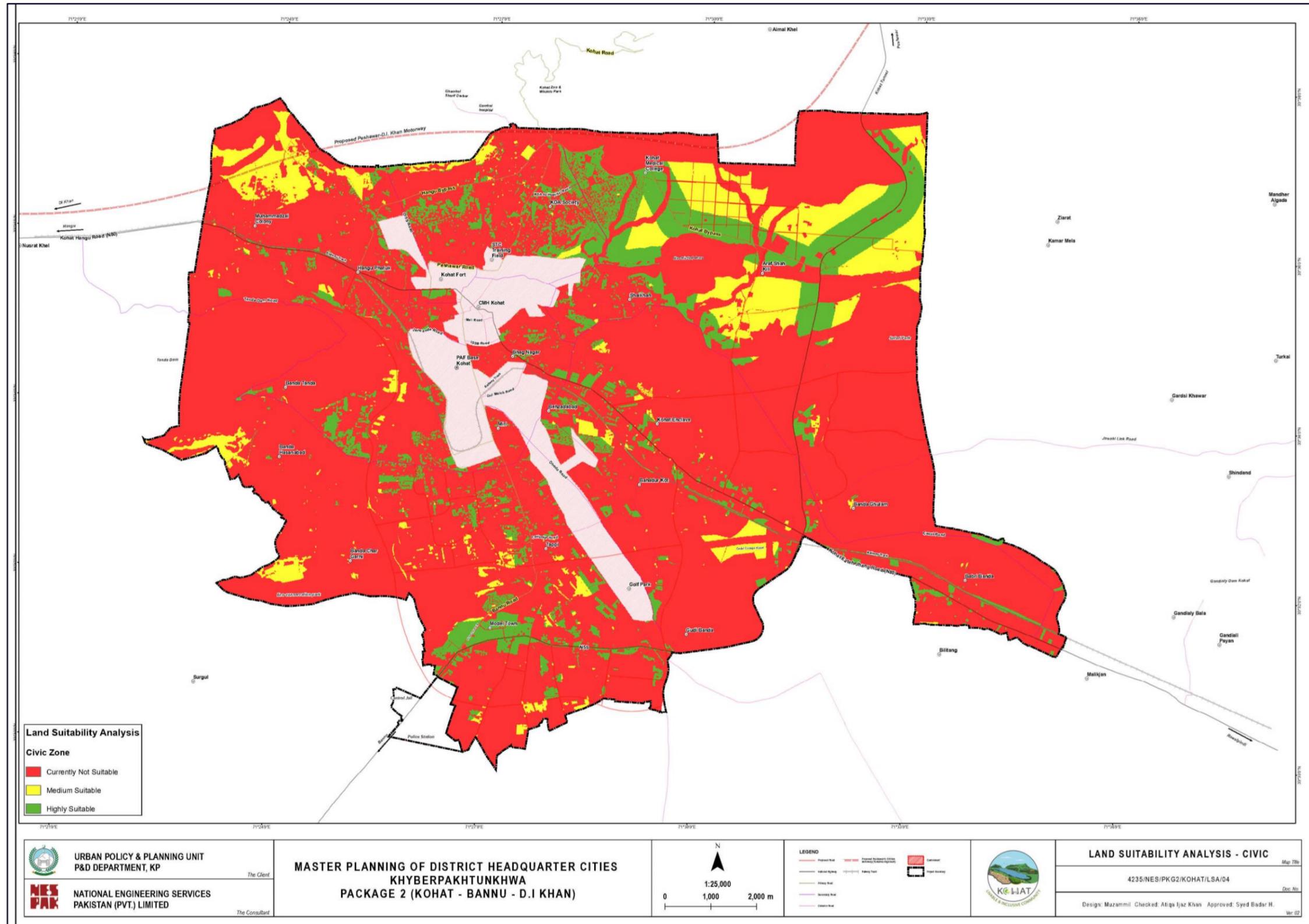


Figure 0-1 Civic Land Suitability Map



## 10.5. Sports & Recreational Zone

Suitability map is generated through GIS based quantitative multi-criteria, to identify the potential of land for suitability of different Landuses, which considers various parameters and their weightage to determine the best locations and allocation for different sports & recreational zone. Three categories have been used to identify and designate for sports & recreational zone which are as follows:-

1. Not Suitable
2. Moderately Suitable
3. Highly Suitable

Restricted areas have already been identified and merged in the maps which is not suitable for construction/development activity for sports & recreational indicated with red tone color. The other areas which are suitable for sports & recreational regardless of scale of zone have been shown/presented with Green and Yellow color tones. Overall suitability map indicates, a significant portion of the area is not suitable for sports & recreational development. However, Northern east area that have a moderate and high level of suitability for sports and recreational activities are well-suited for such purposes.

Land constraints for industrial development include Highly Hazardous zones, highly multi-hazard zones, land suitable for agricultural use including cultivation, orchards & forest, areas near landfill site/dumping sites & STP (200m), near protected areas including high tension (HT) Lines and land parcels available near obnoxious industries.

On the other hand, parameters that contribute to medium and highly suitable for civic zones includes medium-multi hazard zones, low-multi hazard zones, vacant land parcels within built up areas, land parcels other than built up areas, Lands proximal to existing water bodies (lakes, canals & water channels), Availability of suitable land parcel on central location with reference to new development, Availability of land parcels over Slope less than 20%, Availability of land parcels over Slope from 20-30% and Availability of land parcels over Slope above 30%.

The land suitability map have been generated by taking into account the various parameters and assigned weightage to determine the potential and constraint areas for sport & recreational zone.



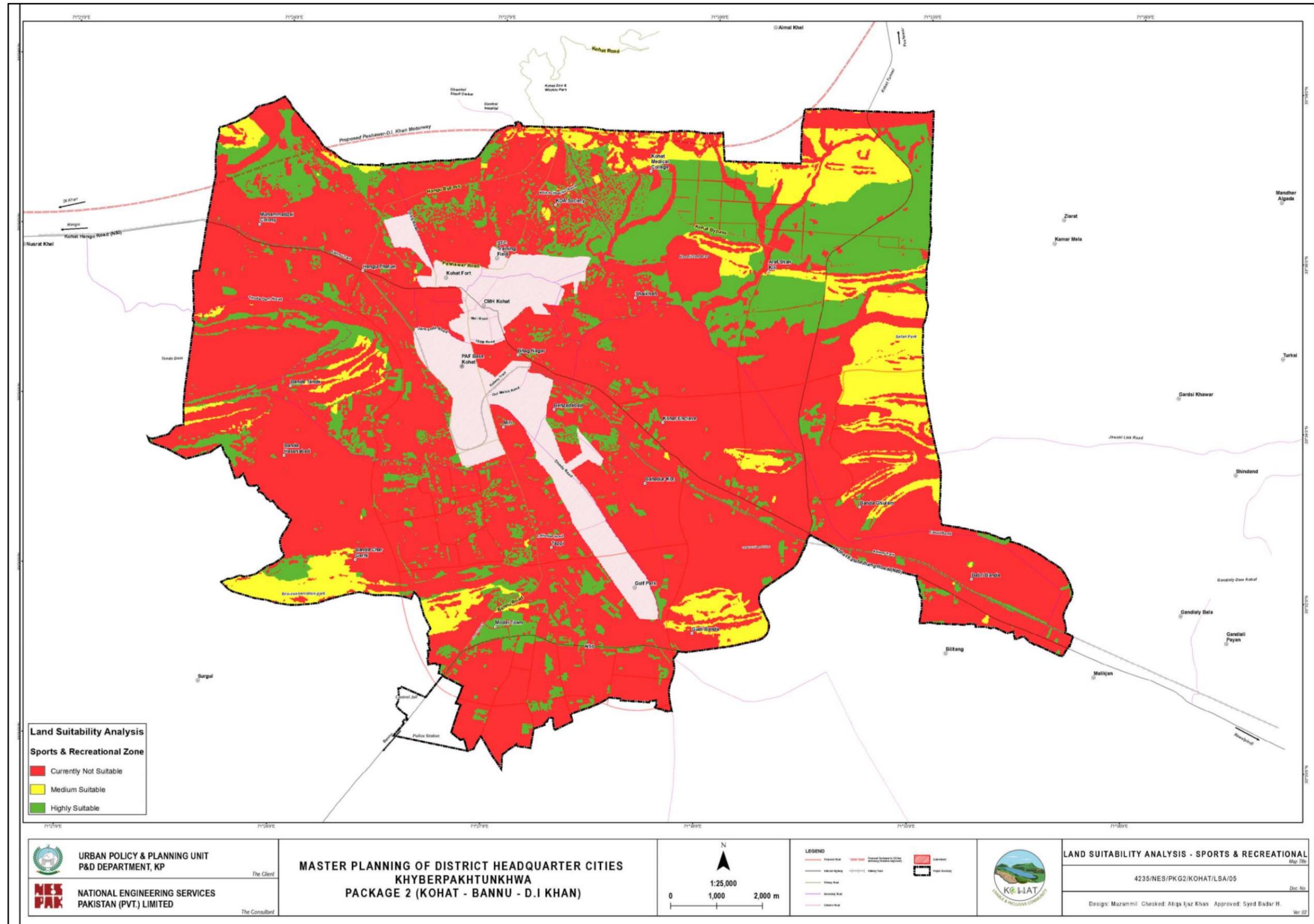


Figure 0-1 Recreational Land suitability Map



## 10.6. Agriculture Zone

Suitability map is generated through GIS based quantitative multi-criteria, to identify the potential of land for suitability of different Landuses, which considers various parameters and their weightage to determine the best locations and allocation for different Agriculture zones. Three categories have been used to identify and designate for Agriculture zone which are as follows:-

1. Not Suitable
2. Moderately Suitable
3. Highly Suitable

Restricted areas have already been identified and merged in the maps which is not suitable for construction/development activity for sports & recreational indicated with red tone color. The other areas which are suitable for sports & recreational regardless of scale of zone have been shown/presented with Green and Yellow color tones. Overall suitability map indicates, a significant portion of the area that is suitable for Agriculture development. However, there are areas with moderate suitability that can be effectively utilized for Agriculture purposes.

Land constraints for Agriculture development include land parcels available near obnoxious industries and Land available near landfill/dumping sites & STP.

On the other hand, parameters that contribute to medium and highly suitable for agriculture zones includes Land parcels suitable for cultivation outside Established Built-up Area, Land parcels along/near water irrigation system, Land proximal to transport services, Lands proximal to farm markets, Lands proximal to existing agricultural activities, Availability of land parcels over Slope less than 20%, Availability of land parcels over Slope from 20-30% and Availability of land parcels over Slope above 30%.

The land suitability map have been generated by taking into account the various parameters and assigned weightage to determine the potential and constraint areas for agriculture zone.



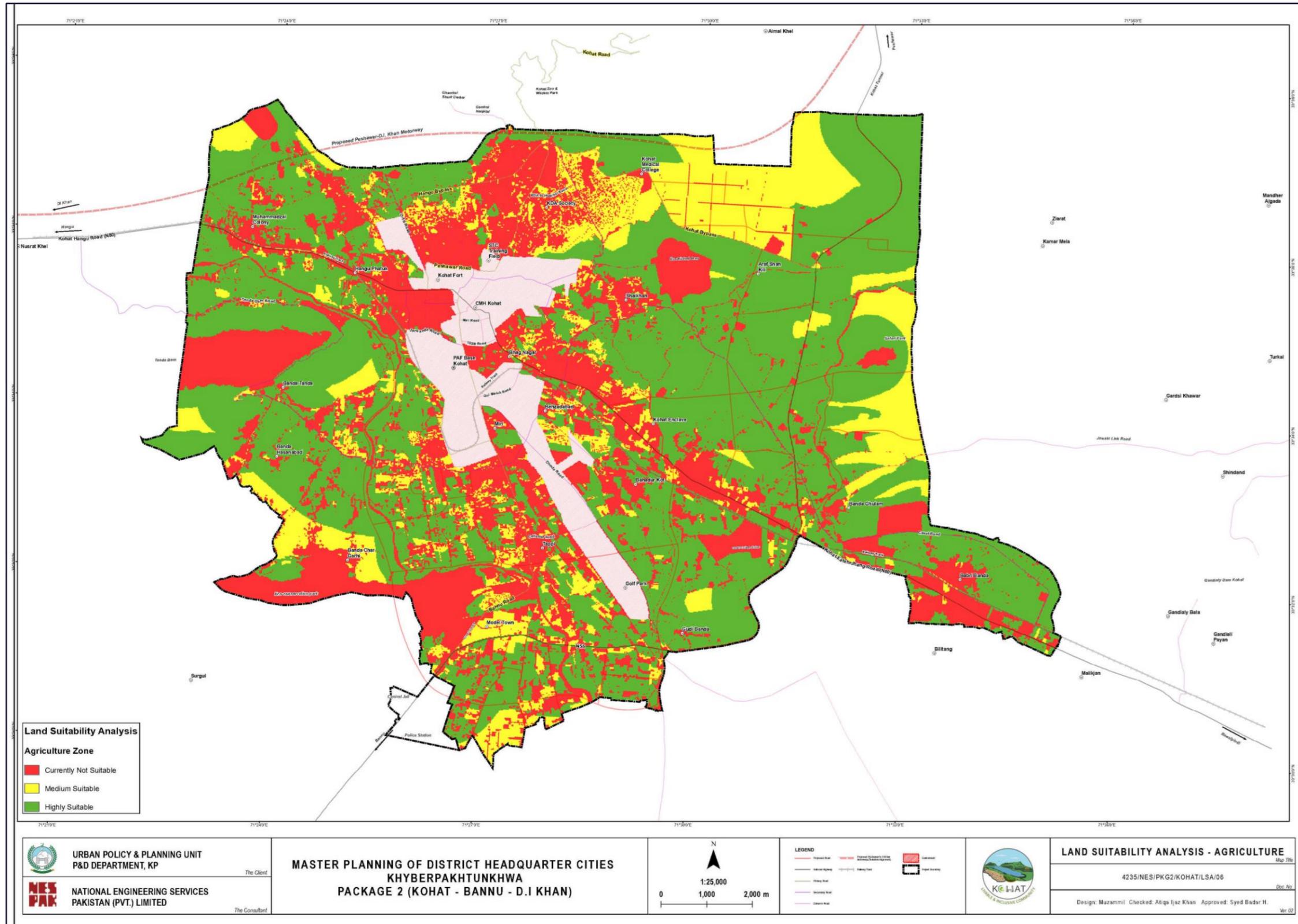


Figure 0-2 Agriculture Land Suitability Map

## **11. URBAN GROWTH STRATEGY**

The Urban Growth Strategy is the comprehensive review of the growth issues faced by the city of Kohat. There is a need for a single, unified concept to guide decisions on City-wide issues. This Strategy should provide an integrated approach to coordinated growth management of the City for the next 20 years.

The population of Kohat Tehsil grew from about 112,530 to 848,997 between 1951 and 2017 and is projected to increase to about 1.6 million i.e. almost double in the next 20 years. About 45% of the total Tehsil Population would be living in Kohat City and its adjoining urban extents which is around 10 % of the total Tehsil Land. The Urban Growth Strategy has to evaluate where and how this growth should be accommodated, through examining existing growth patterns, committed land developments in public & private sector, urban land expansion requirements, and capacity of existing development to absorb future growth etc.

The Urban Growth Strategy (UGS) also examined the issues affecting how development should occur. This included considerations such as the urban boundary, phasing, commercial development, “smart growth,” density, infilling, alternative development standards and related issues, many of which were raised by the stakeholders during consultation process. The aim of the UGS is to provide long term guidance for the management of our urban environment in and around Kohat, so we can enjoy the variety of lifestyles the City offers while living and working in clean and safe surrounds.

This Strategy identifies those areas most suitable for urban growth based on providing a suitable and sustainable urban form. The timing, environmental, servicing, land use and other issues relevant to facilitating urban development will also be important determinants in identifying expansion areas.

In doing so the Strategy represents an integral tool in ensuring progressive and planned expansion of the Kohat urban area. This will enable government/servicing authorities and the development industry to confidently proceed with accommodating urban growth within an established framework in a manner consistent with the unique character of Kohat and its surrounds.

### **11.1. DISTRICT SPATIAL STRATEGY**

Strategic Plan is a flexible plan or road map of sector strategies, subtly integrated, and derived from analysis of surveys, investigations and consultations with different stakeholders. It is likely to steer the Local Government, District Administration and Kohat Development Authority in a focused direction. Strategic planning is more than just long-term planning, where goals are set for a specific period of time; Strategic planning is more pro-active, based on anticipated changes over a period of time, thus making corrective alterations in the plan after appropriate intervals, and involving various stakeholders at different levels of planning process.

Broadly, goals of a long-term planning strategy are to address the major challenges facing District Kohat. The towns and villages in the District should maintain their character and vitality. The growth opportunities should be supported throughout the District, and not just in the urban areas. At the same time however, there should be minimum adverse impacts on agricultural land and the environment (especially water quality), and public services. Agriculture should remain a vital part of life in the District, without compromising industrial development and planned urban growth. But growth benefiting the agricultural economy and agro-based industry should be strongly encouraged.

Comprehensive District level decision-making approaches are needed to explore future expansion alternatives and promote growth patterns that are economically viable and environmentally sustainable.

At District Level, the following factors should be considered while deciding core urban expansion area:



*Figure 11-1: Factors to consider the urban expansion at District Level*

## 11.2. District Level Economic Potential

Kohat District holds immense reserves of industrial rocks (limestone and gypsum). There is already a cement factory working in the area with a potential to install more factories in the district, given the amount of expected limestone reserves of 780 million tons and regional demand. Certainly with such potential Kohat can serve as the “**Cement Hub**” of South Asia in the future and establishing a “**Mineral City**” may also be considered in Kohat

The district of Kohat is estimated to have huge reserves of hydrocarbons including oil, gas and coal. There are already operational gas fields and oil fields in the area, with exploration and feasibility for more such fields being carried out. There are 24 Oil and Gas seepages reported in Khyber Pakhtunkhwa, the following are reported in Kohat district:

- ✚ Jainu Malgin (Oil)
- ✚ Panoba (Oil)
- ✚ Chorlakki (Oil)
- ✚ Khushal Ghar (Oil)
- ✚ Qamar Dhok (Oil)

Plans have also being developed to establish an oil refinery in the region (Khushal Ghar). Pakistan along with China looking for double digit growth in the next fifteen years, these hydrocarbon reserves from Kohat can certainly play their role in driving the regional economy.

### Horticulture

In the horticulture sector, the fruit products of Kohat are famous all over Pakistan. In particular, guava and citrus fruit are found to be of exceptional quality and taste. In addition honey production via bee farming is also very common in the district. The annual output of horticulture sector of Kohat is relatively higher than many other districts of the province. In conclusion, it is fair to say that Kohat has a high development potential in this sector, and appropriate attention should be diverted towards this course.

### Agriculture

Like the sector of horticulture, Kohat District also carries a significant comparative advantage in production of cereal crops (wheat, maize, barley etc). In fact, the agricultural production of Kohat is among the highest in the entire province, largely thanks to strong irrigation system and fertility of the land. Though

the agriculture sector is fairly developed there is still an opportunity to improve and make it an able sector that can compete with global markets.

### Forestry

Kohat District has a Considerable forest cover 4,539 hectares, cultivated area 72,786 hectares, cropped area 37,707 hectares, uncultivated area of 222,345 hectares while forest cover extends Kohat, Hangu and Karak districts as per Billion Tree Afforestation Project the entire area falls under sub-tropical zone.

There are also some small scale industrial units in the area which make some good quality furniture. Plus, there is opportunity to earn some “carbon credits’ with the available forest, as developed countries have well exceeded their quota of carbon emission and hence can buy it from Pakistan.

### Manufacturing Sector

Kohat host an industrial setup that manufactures cement, textiles, arms and ammunition. Among these, cement, fertilizers and sporting arms products are exported worldwide. With the normalization of security situation in the province and advent of CPEC, it is high time that the industrial setup of Kohat is given a boost by wooing local and foreign investors to move in and setup new industrial units, especially focusing on sophisticated technology (automobile, agriculture support equipment, LPG cylinders etc.)

#### **11.3. Landuse Guidelines under Newly Approved Khyber Pakhtunkhwa Urban Policy, 2030**

- Indicative land use plans shall be prepared at city level while detailed and enforceable land use plans must be prepared at Neighborhood Council (NC) level.
- Plans shall incorporate and design a proper grid-and-iron layout (where the terrain is conducive) for new cities or developments and for urban regeneration.
- The new development plots or urban regeneration parcels shall be rectangular in shape.
- Planning shall encompass existing green spaces and natural elements of the terrain and surroundings. Natural features like trees, lakes, rivers, streams etc. shall be protected, and planning and construction shall be done around them.
- Plans shall incorporate polycentric development with more than one Central Business District (CBD) to alleviate pressure from one city center.
- Housing societies and other residential development shall be established adjacent to the previous residential development in a contiguous manner to avoid leapfrog development.
- Housing societies and other mega projects shall be developed in arid areas and banned in cultivated areas.
- Land use plans developed at neighborhood and housing society level shall be based on density targets and flexible standards
- Proposed densities shall vary by density zone or by distance from transit line in the Central Zones
- Medium population density shall be maintained with the aim of an average density of 20,000 persons per square kilometer (80 Persons per Acre (PPA)) in the Central zones (especially for new development or urban regeneration).
- Proposed densities shall vary by density zone or by distance from transit line in the Central Zones

#### 11.4. EVOLUTION OF URBAN FORM OF KOHAT

The first historical mention of Kohat is to be found in the memoirs of Emperor Babar who visited Kohat in 1505 AD. Babar in his memoirs calls the inhabitants of the area as Afghans. From 16th to 18th centuries, Kohat remained as a part of Afghanistan Kingdom, administered by the Chiefs of two tribes i.e. Khattak and Bangash. In the beginning of 19th century Kohat came under the control of Sikhs who ultimately withdrew leaving the administrative control of Khan of Teri in 1836 AD. Kohat was finally annexed to the British dominion on 28th March 1849 with the rest of Punjab and an Assistant Commissioner was posted here to run the administration and to look after the British interests.

#### 11.5. DEVELOPMENTS OF RECENT PAST INFLUENCING URBAN FORM

The significant developments of the recent past, which would have far reaching influence on the future urban form and growth are:-

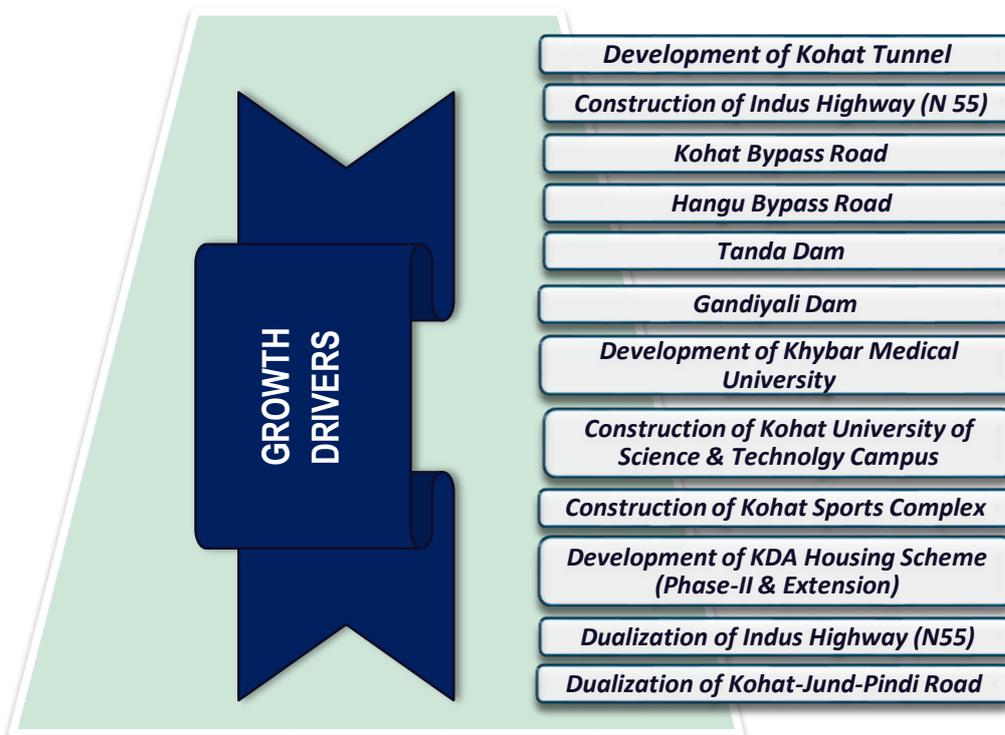


Figure 11-2: Significant developments of the recent past

These development actions of recent past are expected to modify the form through engulfing the green wedges that had been left undeveloped earlier. The urban structure beyond the present built-up areas is also expected to shift from a predominantly low-density low-rise scattered development to medium density developments interspersed with high density mid-rise mixed use buildings particularly along main inter-city radials and bypasses.

#### 11.6. FUTURE VISION FOR GROWTH OF KOHAT

Kohat city is rich with urban as well as natural potentials. The growth of the city is driven by the development of industrial sites, employment opportunities and linkages between major urban settlements. So, the future of the city will be dependent on more efficient, convenient and sustainable urban policies by allowing the city to grow with maximum social and urban convenience.

### 11.7. Objectives for the spatial growth strategy of Kohat

The objectives of the spatial growth strategy for Kohat are to provide:

- Optimum utilization of land by channalising the developments in the right directions and locations.
- The suitable land for development of the Kohat by recognizing the existing growth trends and strengthening the most needed infrastructure links.
- Efficient transportation network, integrating work, living, shopping and recreation areas to arrive at balanced developments.
- Wider scope for decentralized employment locations and economic development.
- Preservation and conservation of ecologically sensitive areas and natural and built heritage (orchards, historically significant built heritage, natural water bodies such as lakes, river and canals).

### 11.8. IDENTIFICATION OF AREAS OF EXPANSION

The expansion of the urban area is occurring rapidly in certain directions. Recommendations must take account of these pressures and their causes. In order to identify the opportunities for urban growth, it is necessary to consider three factors:-

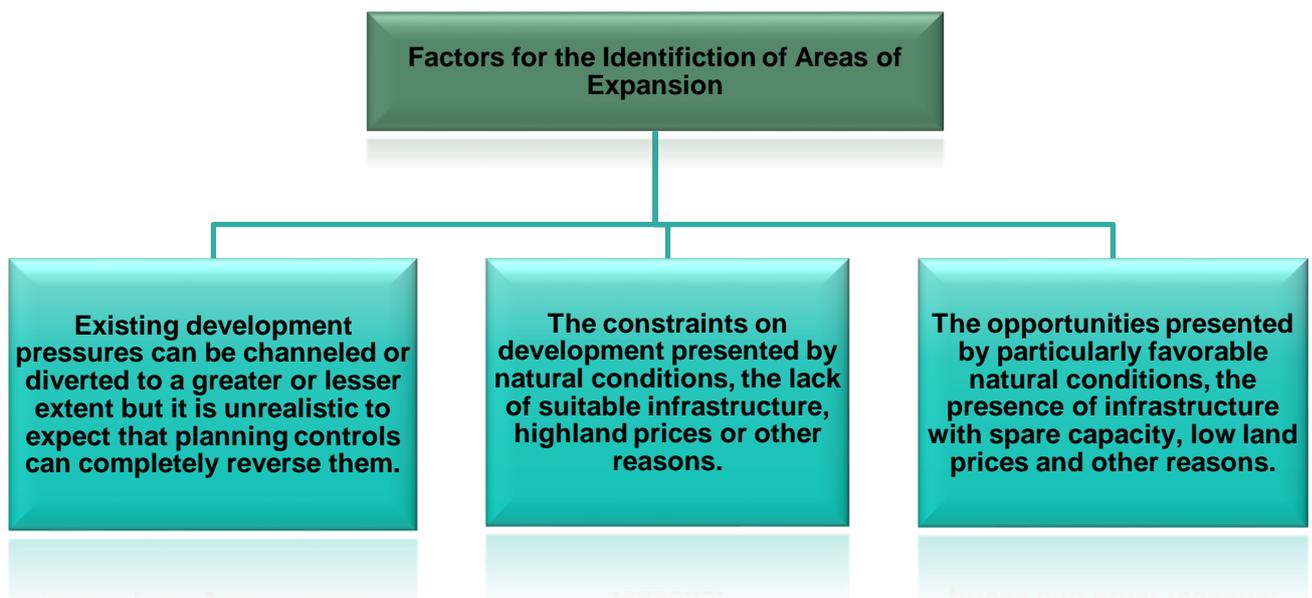


Figure 11-3: Factors to identify the growth of urban expansion

### 11.9. PRESSURES FOR DEVELOPMENT

The location of pressures for development can be deduced from various sources. These are:

- An analysis of recent historical growth trends, based on comparison of census data and survey maps of different dates;
- A review of locations of unapproved private housing schemes, slums and katchi abadis as a reflection of spontaneous selection of convenient sites

Detailed patterns of growth cannot easily be deduced from census data partly because enumeration district and ward boundaries change between censuses. However there is sufficient information to indicate that the majority of growth is being absorbed in new development areas and infill around the

fringe of the previously urbanized area. There is also evidence to suggest that growth in the older parts of the city may be slowing down but has by no means halted or been reversed to date.

Unapproved housing schemes and land subdivisions by private developers respond to the short-term need to provide shelter and as such are a good guide to immediate pressures for development. Such schemes of various sizes are invariably found around the existing urban area. Notable concentrations however occur:

- a) To the north-west along Hangu Road and Hangu Bypass
- b) On both Sides of Bannu Road
- c) In the areas between Dhoda Road and Pindi Road
- d) In the areas adjacent to KUST Campus
- e) Mostly, the orchards and cultivation areas in the urban fringe are being converted into unapproved and unplanned land subdivisions

#### **11.10. CONSTRAINTS AND OPPORTUNITIES ON URBAN EXPANSION**

The main physical (and to a certain extent psychological) constraint on growth is the presence of hillocks in the northern parts of the City although some of the areas close to the City may be developed with lesser steep slopes but may be with some increased infrastructure costs.

##### Utility Constraints and Opportunities

Electricity supplies are relatively evenly spread throughout the Kohat City area so that they present no special constraint or opportunity for any particular area. Similarly, the presence of accessible groundwater throughout the area means that water supply has no significant influence of an urban growth strategy.

This leaves sewerage and drainage which do have an influence. Trunk sewerage lines have been laid in the northern and southern side of the Urban fringe to cater for present and future requirements of Kohat. In the short term, the presence of trunk sewers presents the possibility of providing served development in these areas. All other areas require not only new trunk sewers but also, new disposal / treatment facilities will have to be constructed.

##### Access and Transport Constraints and Opportunities

The main access constraint on development is the lack of roads capacity to serve areas outside the existing built up area. This means that any new developments in these areas will throw additional traffic onto existing roads. Improvements to existing roads will not be sufficient to cope with increased traffic flows and new road access must be provided if the respective sectors of the city are not to become completely choked. Existing roads and right of ways will form part of the secondary distribution network but there is an urgent need for new primary distributors to serve both the eastern & western expansion and southern growth areas.

Elsewhere new roads will be required to serve new development areas. Future Road sector development projects in the urban fringe as well as improved connectivity of new development within the central city will influence the pace of growth in Kohat. Upgradation of all major city radials, development of New loop and construction of Proposed Peshawar DI Khan Motorway passing through north of existing Kohat City will greatly effect pace & direction of growth in Kohat in the years to come.

Travel between new development areas and other parts of the city, particularly centres of employment, must be considered. Much of this travel will be by public transport, both public and privately owned. A

possible constraint for low-income developments will be the cost of travel and this will mitigate against new schemes which are remote from existing centres of employment.

### Opportunities for Urban Expansion

Analysis of the land potential have identified very few absolute constraints. Among these are major power lines to the east and south, burial grounds, military land (though some of this could be released at a later date), and a no-development reserve to the north and south of the main airport runway. The areas of brick kilns may be developable as the lower land costs may make the necessary land reclamation and formation works viable particularly for public parks and lakes, where the depressions are a positive opportunity.

Other than these specific constraints, urban expansion could occur in all directions around Kohat. Limits to the sensible development of the city to the north, south-east and south occur because of the long distances involved in journeys to central areas. Even so, distance will diminish as a constraint after the development of road network in all periphery areas as well as after introduction of a quality public transport service on all primary corridors. Furthermore, the educational opportunities like KUST and linkages like Indus Highway can provide a room for both residential and commercial development.

### Land Values

The main issue which affects the decisions on the preferred areas for urban expansion is land price as this reflects the existing land use and aspects of locational advantage. In this respect the marked differential between land values for frontage properties and for back land is especially important. In certain cases extreme differentials of up to 10 times may be found for properties in close proximity, but in all cases differences of 2 to 3 times are found between front and back lands. This pattern reflects the availability of services or the expectation of the same – and ease of access along road frontages, but the same pattern is also found to a lesser extent along canals.

In addition, there is a general gradient of values falling away radially from the central areas to the city limits and this pattern is found both north and south of the town with differentials for similar uses of 6 to 7 times from the inner ring road to the edge of the urban area. There are clear distinctions between current use values at the same locations, so that residential land prices are some 3 to 5 times greater than agricultural land prices in the same area. However, in certain fringe urban areas of the city the distinction has become blurred and prices reflect potential future use values, especially in areas where development projects have already been announced or are expected. Such inflation of values may well be expected in areas targeted for development in the Integrated Master Plan.

## **11.11. DEVELOPMENT REQUIREMENTS**

### Density Assumptions & Land Requirements

To calculate the areas of land needed to keep pace with the requirements for urban growth, we have used the estimates zones for the expected population growth and applied various density assumptions.

**Table 11-1: Density for Future Proposed Zones**

Sr No.	Zone category	Proposed Density (person per acre)
1	Central Business District (CBD)	80-120
2	Regeneration zones	50-70
3	Low income Housing zones	100-120
4	Infill Development (Housing)	50-100
5	Future new Housing Zones	50

**Table 11-2: Proposed Built-up Landuses Distribution- Kohat City**

Proposed Built-up Landuse Distribution- Kohat City			
No	Landuse	Area In Acres	Percentage
1	Residential including internal street	14054.71	59.18
2	Commercial & Mixed use (SDZ, Urban Regeneration, Corridors, CBD, Trade & Business Hub)	1987.56	8.37
3	Public & Admin Buildings	759.77	3.20
4	Green/Open spaces (including Parks, Playgrounds & wildlife park, safari park, eco-conservation park and green buffer)	4304.65	18.12
5	Industrial Zone, Technology Zone & Logistics Hub	982.65	4.14
6	Graveyard	328.56	1.38
7	Roads (including Transport Terminals )	1229.76	5.18
8	Public Utility Buildings	102.98	0.43
Total Proposed Area		23750.64	100.00

The base year population (2017) within Kohat area is estimated to be 381,794; while after 25 years, in the year 2042, the projected population is assessed to be 825,638. The net incremental population after the next 25 years would thus be 443,844. The gross land requirements for the incremental population till the year 2042 have been calculated on 5-yearly basis.

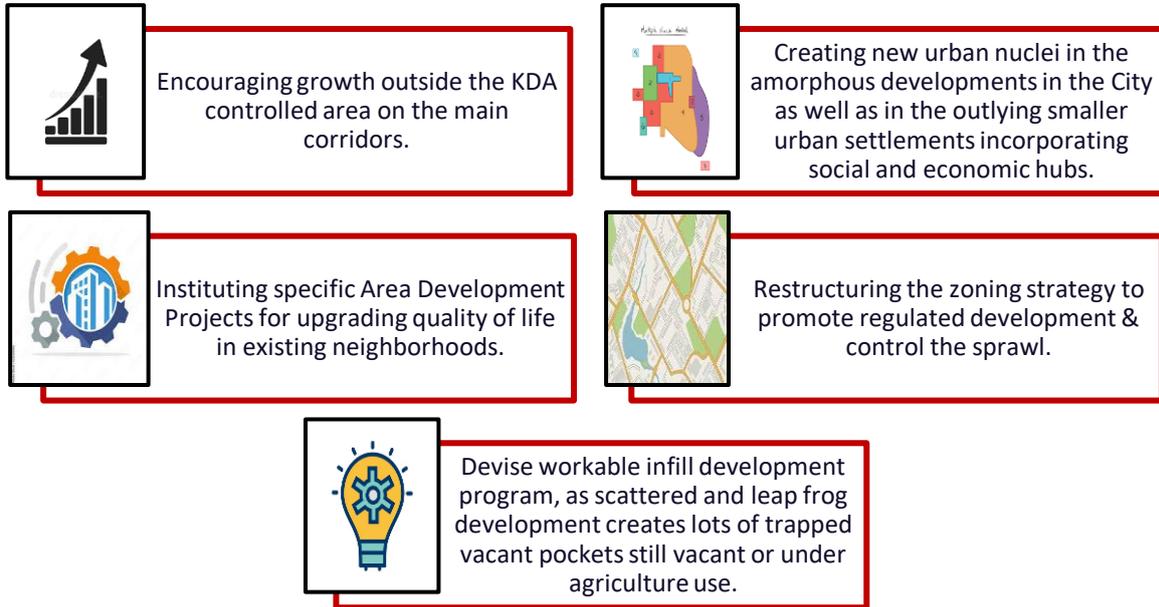
**Table 11-3: Land Requirements for Future Population**

Time Period	Population	Incremental Population	Land Requirements @ 45 PPA (Acres)	Cumulative Land Requirements (Acres)
Projected Population 2017-22	453,897	72,103	1602.29	1602.29
Projected Population 2023-27	528,416	74,519	1655.97	3258.27
Projected Population 2027-32	614,480	86,064	1912.53	5,170.79
Projected Population 2032-37	713,001	98,521	2189.36	7,360.15
Projected Population 2037-2042	825,638	112,637	2503.04	9,863.19
<b>Total</b>	<b>3,135,432</b>	<b>443,844</b>	<b>9863.2</b>	<b>9,863.19</b>

In total, 9,863.19 acres of land suitable for all categories of urban growth around the existing built-up area of Kohat are required.

**Strategies for Urban Expansion**

This metropolitan growth scenario based on the vision is proposed to be effected through the following strategies:



**11.12. Broad Strategies for Development**

Kohat is expanding in all directions; expansion is however more pronounced in some directions because of a number of factors such as existing physical & social infrastructure, better transport linkages, easier accessibility to different facilities and services and the resulting economies of scale. In some directions of Kohat urban area, the expansion is restricted or limited because of certain physical constraints; for example towards west, the expansion of City is restricted by Tanda Lake and hilly terrain. After densifying these areas, the prime focus will be on the development of low density residential zones along the fault in the south of the Kohat city.

There is potential for major expansion on all directions except limited expansion to the north–west and south west. Each zone has its particular advantages and disadvantages. Though the costs of utility infrastructure provisions will vary only slightly with the development of different areas around the city, the provision of a suitable road network would require different phasing with greater early investment for growth in some locations. Equally the travel to work costs would vary significantly. The benefits to future populations of creating attractive and functional environments can be best achieved in new communities, whereas infill development can provide the greatest benefits to the existing population by introducing new trunk infrastructure. The main implementation concerns are the extent to which any strategy requires government action to assemble and develop land and the extent to which the private sector can be guided to develop in the most appropriate manner and locations. Flexibility is necessary in any strategy especially where the private sector will be required to provide significant development efforts. There are various criteria for evaluation and the suggested measures enable the strengths and weaknesses of each approach to be identified.

### Alternative One



*“To concentrate the majority of the urban expansion on the least expensive land, where agriculture is not successful and where there are fewer existing settlements so enabling new, well planned communities to be created”.*

The first strategy would be based on the sectoral urban growth model in which the low income residential tends to be close to railroad lines, and commercial foundations along the business areas. These are mainly occupied by the low income people who usually work in the factories, so they have to live close to the industry to save transportation costs. The places, due to traffic, noise, and smells and pollution emitted from the industries, tend to be less desirable for living. The travel time and distance to the main city employment areas is the second major cost. The impact of this would be significant on low income families. The benefits are the increased opportunity to develop; new well planned communities. In this strategy, the primary benefits go to the expanding population who are relocating rather than those who will remain in their existing mohallas.

With this strategy there are greater opportunities for KP government’s involvement in the land acquisition and development. This could enable the rate of land availability to be speeded up and the implementation of a significant programme to relieve the housing needs. Opening up these new areas will require government intervention, since development in these areas would be unlikely without government involvement. In terms of flexibility, the issue of the need for government involvement creates some limitations. The private sector could not be expected to assemble the land for extensive new areas and make the major investments necessary. Significant infrastructure links are required in advance with this strategy, which can only be economically justified by completing that area. Once a new community is started, it should be completed at the earliest possible date as a new residential suburb in sectoral modal urban growth.

### Alternative Two



*“To concentrate most of the development close to work opportunities and in locations where existing under serviced urban areas could be upgraded in conjunction with the integration of new communities and developments. The emphasis of this strategy would be the opportunity to assist the existing low income families where they are living now, and to provide future opportunities that do not require heavy travel to work costs”.*

The second strategy would primarily be driven by the multiple nucleie growth model in which the city will be developed in different commercial and civic centers. In Kohat city, the central business district along the bannu road is the main driver of major commercial activities of the city. So, by implementing multiple nucleie growth model, we can create new urban and economic revival through the development of a new CBD. In this strategy the areas for most urban expansion would be infill to the south along the commercial corridor. The significant cost with this strategy will be the land costs. The full implications of this cost and the extent to which it affects the affordability levels of low income housing schemes will be tested in the detailed shelter studies. The indirect costs of travel to work and facilities will be low. The great benefits of this strategy are the opportunities to improve the trunk infrastructure in the existing under serviced areas and to locate new development in locations preferred by the majority of the residents. On the other

hand, it will not be so easy to create large attractively planned areas as much of the development in this strategy will be smaller scale infill between existing unplanned areas.

To implement this strategy, there is less requirement for government involvement in plot development. Within a local plan framework the private sector developers could be guided both by the sitting of trunk infrastructure and planning controls to ensure development is not located in a haphazard manner. However, the difficulties in slotting roads into congested, unplanned areas should not be underestimated. Apart from this, though there will be less dependence on Government action with this strategy, developed with appropriate housing for the needs of the expanding population. A large housing programme will almost certainly require government intervention where low class residential area will be closer to the manufacturing jobs which tend to be non-minimal skilled jobs. They also tend to have low wages which in turn lead to a low-class residential zone. This strategy will depend on a larger number of smaller scale actions. As such it will be more flexible to implement and will not depend on a long term irrevocable commitment to one course of action. The comparison of both sectoral and nucleic model development of Kohat city is represented below:

**Table 11-4: Comparison of growth strategy in sector and multiple nucleic model in Kohat City**

Comparison Of Developmental Models In Kohat City		
	Sector model	Multiple nucleic model
	Occupied by low income residential along the business areas. Due to traffic, noise and pollution emitted from the industries, tend to be less desirable for living.	Having multiple centers of activity, not just a single CBD. City developed in different commercial and civic centers. Majorly the growth of city towards south will be acknowledged.
	The private sector could not be expected to acquire the land for large-scale new developments and make the major investments necessary.	Within a local plan framework the private sector developers could be guided both by the sitting of trunk infrastructure and planning controls to ensure development is not located in a haphazard manner.
	Once a new community is started, it should be completed at the earliest possible date as a new residential suburb in sectoral modal urban growth.	To improve the trunk infrastructure in the existing under serviced areas and to locate new development in locations preferred by the majority of the residents. High Quality housing does not generally arise next to industrial areas.

**The Preferred Approach to Development**



***“To let the city grow in a multiple nucleic model growth strategy to maintain and cater the demands of future population in a sustainable manner. ”***

Both sectoral and nuclei model strategies have significant strengths. In Nucleic model, some of these nuclei are pre-existing settlements, others arise from urbanization and external economies. Distinctive land use zones develop because some activities repel each other; not all land users can afford the high costs of the most desirable locations, and some require easy access. As a result of this evaluation it is considered that the most appropriate approach for the expansion of Kohat is to start both strategies, if possible, but to introduce development predominantly in the north-east and the south of the city, by following the nucleic model urban expansion. This will not only balance the ratio and social divide of urban

amenities in the city but will also provide many low and middle income residential zones which match the economic strength of the local Kohatis. The growth of urban settlements in the south along Bannu road will serve as the functional area of city.

### 11.13. Strategy for Infill Development

Infill development is the process of developing vacant or underutilized parcels within existing urban areas that are already largely developed. Kohat City has a significant potential for infill and redevelopment on lots, which for various reasons have been passed over in the normal course of urbanization.

The prime objectives of the Infill Strategy would be: -



**Figure 11-4: Prime objectives for Infill Strategy in Kohat City**

Our Local Governments should use infill incentives to promote the development of vacant land or rehabilitation of existing structures in already urbanized areas where infrastructure and services are in place. Prime locations for infill development include downtowns, transit corridors and locations near employment, shopping, and recreational and cultural amenities. Various infill incentives may be offered for a number of reasons:

- Infill development reuses properties that may have been underutilized or blighted, helping to catalyze revitalization.
- Infill has the potential to boost jobs, purchasing power, and public amenities in urban core neighborhoods and generate tax for local government.
- Infill housing is dense in comparison with housing in suburban areas and represents an effective way to meet a jurisdiction's affordable housing or population growth needs.
- Located in proximity to existing transit routes or within walking distance of services and entertainment, infill development can reduce auto use and accompanying congestion and pollution.

### 11.14. Land Acquisition Issues

The concern for flexibility also reflects an awareness of the problems connected with land acquisition.. Any attempts by either the public or private sector to assemble large tracts of land for development have



to face the difficulties of negotiating with numerous individuals. Most landowners are reluctant to sell as their land provides the livelihood for their family. In most cases, it has been passed down through generations and there are strong emotional ties. Although variations in priorities can be expected to occur, the proposed strategy presents an appropriate balance between social needs, and the known land and infrastructure costs and opportunities. As a result the broad approach described should be followed even where this requires significant political determination. Land assembly will be the key problem. Compulsory purchase at current value is possible, but where there is local resistance, programmes of development can be held up for long periods. The present methods of land pricing for land acquisition need to be reconsidered. The 1894 Land Acquisition Act, requires a uniform average price per unit area of property to be offered as compensation to owners. When a large area of land is required, the average price will seem much too low for those in the most favourable locations which command high market prices. As a result their resistance can hold up important projects i.e., sites and services schemes, as well as commercial-cum-recreational centres.

### 11.15. Land Management

Secure land tenure and property rights are fundamental to shelter and livelihoods that serve as cornerstones for the realization of human rights and poverty reduction. Secure land rights are particularly important in helping reverse gender discrimination, social exclusion of vulnerable groups, and wider social and economic inequalities linked to inequitable and insecure access to land. It is well recognized that secure land and property rights for all are essential to reducing poverty, because they underpin economic development and social inclusion. Secure land tenure and property rights enable people in rural and urban areas to invest in improved homes and livelihoods. They also help to promote good environmental management, improve revenue collection, improve food security, and assist directly in the realization of human rights, including the elimination of discrimination against women, the vulnerable, indigenous groups and minorities. In Pakistan with a population of 225 million, one of the bottlenecks in land and revenue administration is the complex and outdated records in addition to their manual processing and management. The procedure to obtain ownership details by a land owner is extremely difficult due to a number of reasons, such as a few designated Government officials (e.g. Patwari – the custodian of land revenue record) have full custody of the records and normally these officials are not easily available to the public. People have to spend a lot of time and money and most of the times resort to illegitimate means to get information about their land holding. Such information is needed for various reasons like a sale/purchase of their land, application for bank loans, for preparation of National Identity Cards, passports and other day to day related matters.

#### Old Land Management System in Kohat

The Deputy Commissioner Kohat is empowered as the District Collector for the purposes of the Land Revenue Administration as per the Land Revenue Act, 1967. He is the Appellate Authority for all the land revenue matters in jurisdiction. He has to perform and look after all the matters related to Partition, Acquisition, Encroachment, Land Records, Settlement, Consolidation, etc. In Kohat, the power of transfer, posting and dismissal/removal of the Patwaris is the prerogative of the District Collector. Moreover, the District Collector is further entrusted with the supervision of the digitization of Land Records. In the performance of his functions, the DC can delegate any of his tasks to the Additional District Collectors.



Table 11-5: Old Land Management System in Kohat

Tehsil Name	Numbers of Qanungo Circles	Number of Patwar Circles	Number of Mouzas
Kohat	4	37	175

**Revenue Hierarchy in Kohat**

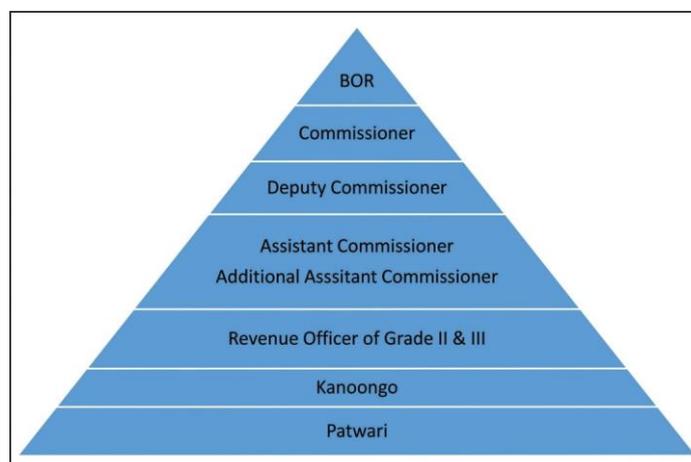


Figure 11-5: Revenue Hierarchy in Kohat City

**New/ Current Land Management System in Kohat**

The project of the computerization of land records Phase-I was initiated in 2013 in 07 districts of KPK, including Kohat.

**Need of Computerization**

1. The Patwaris are the sole authority in issuance of land documents. A key and objective concern about the Patwaris is the high transaction cost for requiring land related services and the prevalent corruption.
2. The writing in manual land records is almost incomprehensible.
3. There was hardly any digital signature to ascertain the authenticity of manual record.
4. Auditing the land calculation seems impossible since minute editing in the record is hard to spot. In Service Delivery Center, all mutations are biometrically attested by the Revenue Officer. Biometric fingerprints and pictures of the parties are captured, which eliminates the chances of fraudulent transaction.
5. Computerization also provides easy and fast data analysis for different purposes, such as tax collection, number of transactions, type of transactions, etc.
6. In manual system, the Register Haqdarar Zameen is updated after 4 years through consolidation of mutations while in digital data, every transaction is updated instantly.

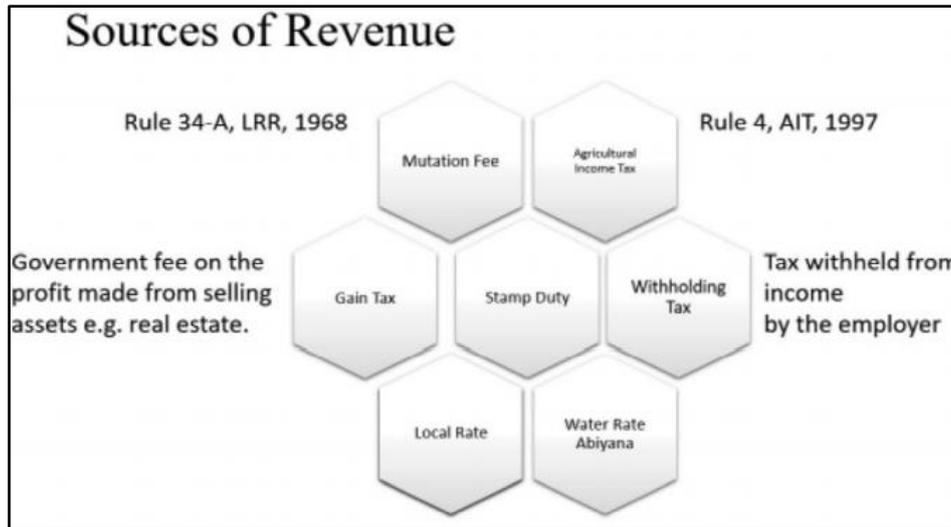
**Process of Computerization**

- Register Haqdarar-e-Zamin Process
  - 1) RHZ (Register Haqdarar-e-Zamin) Scanning
  - 2) RHZ Data Entry
  - 3) FB (Fard-e-Badar) Data Entry
- Mutation Process
  - 4) Mutation Scanning
  - 5) Mutation Data Entry
  - 6) Resolving Mutation Revenue Issues

**Flowchart of Issuance of Fard through Service Delivery Center**



**Sources of Land Revenue in District Kohat**



*Figure 11-6: Source of revenue in Kohat District*

**11.16. Land Readjustment**

Land banking is a technique by which the public sector acquires privately owned land in advance of demand and then releases the land for development as needed. Land banking however, does not have a successful history in developing countries, as it requires huge resources and an efficient and powerful institution/agency. Hence the preferred option is Land Readjustment. There are various forms of land readjustment/land pooling techniques. The aim of such schemes is to develop land and rationalize its delivery at little or no cost to the public sector at the urban fringes. This technique can equally be applied to redevelop inner city areas. Typically the process begins by declaring an area of privately owned land to be the subject of such a scheme. A layout plan of the area is prepared and calculations are made for the percentages of land required for roads, infrastructure and community uses. The cost of infrastructure and such services is calculated and a proportionate land is deducted which can yield the costs incurred on putting the infrastructure and community uses. The remainder of the land is returned to the owners, who now hold a developed smaller land parcel but one, which has increased in value because of the investment in infrastructure and services. The city meanwhile sells its share of the improved land to recover the cost of services installed. Alternatively, the city's share can be sold to provide low-income housing or any such priority needs to the disadvantaged groups.

An additional advantage of this technique is in the instance when the land to be developed is held in small fragmented parcels. The readjustment process can be used to consolidate and allow replotting of parcels into more rational and more viable plots for sale and development. Given adequate administrative setup and political, such programmes appear to meet many of the criteria for efficient and equitable land management. In Land pooling, ownership of the land is transferred from the land owner to the pooling



agency, consolidated and returned to the owner in one parcel. In Land readjustment, ownership remains with each landowner but the readjustment agency has the right to enter and undertake construction activities on the land. The technique may be used by District Government or selectively by a Provincial housing authority or a group of landowners on cooperative basis.

The benefits of land pooling/readjustment to the city authorities include the opportunity to structure urban fringe development as and when required with appropriate subdivision layouts, infrastructure, community land uses, at little or no cost to government. The landowner receives a net gain in the value of his land either because off-site services are made available and/or because he can develop land parcels that may not have been suitable for urban development separately. However, land readjustment/land pooling arrangement scheme does not necessarily ensure that land returned to the landowners will not be held vacant for speculative purposes. In such a case building/planning conditions and zoning laws need to be imposed on land returned to the owners. Alternatively, either the agency and private land owners or the land owners themselves could work out/ agree upon various profit sharing arrangements on land development. KDA should seriously examine this technique to guide future urban land development at the fringes and Local Governments may also undertake urban regeneration projects in the CBD. This concept is also recommended in the National Human Settlements Policy Study under the nomenclature of ADR (acquire, develop and return).

Private sector particularly informal land developers and owner-builders increasingly dominate land development in Kohat. At the same time, KDA is increasingly beset by financial and management constraints. In such situation it is imperative for the public sector to develop a new relationship with the private sector in pursuing land and urban development objectives. The role of the public sector will be restricted to the provision of basic infrastructure to guide the general direction and form of urban growth and the use of limited tools for regulating land use. The city authorities will therefore need to adopt the general principle of legitimizing the activities of the private sector and to apply basic environmental protection measures.

Few incentives to land development will be needed in the areas of preferred urban expansion. Such incentives can include: the rights of way for future infrastructure; purchase of selected sites for future community uses; financial incentives for commercial and residential development such as tax holidays; relaxation of building regulations to allow minimum affordable plot sizes, reduced land transaction charges, etc. The current trend of land development by private sector at the city fringes can be categorized in this cadre, where no financial or other incentives are provided by Local Government or any other regulating agency.

#### **11.17. Rationalized Land Development by KDA**

Kohat Development Authority is only meant to develop its own scheme originally in the name of Kotal Township, or now called KDA Scheme. KDA has acquired and developed 1066 acres of land in its 1st two phases comprising 7600 residential plot of various categories. It has major impact on planned expansion of the Kohat City as there was no planned housing schemes of such scale in Kohat. Further to this, Total of 175 acres land has already been acquired for phase II Extension. A major problem has been the lack of land distribution strategy which could ensure a steady flow of serviced urban land for all segments of the population. Acquisition of land for future expansion is a major hurdle for KDA. This has created a land bottleneck for KDA. To get out of this situation, KDA would have to examine the option of land readjustment. The land would not be acquired by KDA upon payment, but will be consolidated in a



scheme framed by KDA with proportion required for roads and other amenities. It will be returned to original owners in the proportion held by them minus the land used for roads/streets and amenities. KDA, in order, to recover the cost of infrastructure will retain and dispose off a proportion of developed land through public auctions.

In line with the recommendations of the National Housing Policy, future housing schemes of KDA should be planned and developed keeping in view the target groups, mainly low income and middle income groups. A small proportion of plots targeted towards upper income groups may also be planned which would provide the required funds through auctions.

### **11.18. Dual Land Markets**

Increasingly, cities in the developing countries are characterized by a dual land market in which a formal market, controlled by zoning, density and other statutory regulations and serving predominantly middle and high income households and businesses, contrasts with a rapidly growing informal market, characterized by a variety of settlement types, with few or no services. Informal land transactions are often subject to control by middlemen and serving predominantly low income households. Existing regulations suggest that decision makers and planners continue to resist recognizing the existence of this type of economic activity. It usually involves small, often family-based, labor-intensive households that would benefit from the allowance of mixed land use and freedom from harassment by authorities.

The emergence of informal land settlements reflects the inability of the formal land market to supply adequate land for the urban poor. In the case of Kohat, a vibrant informal land development sector is in existence in various parts of the city, which caters to the housing needs of the low income groups. Investment in land is a prime vehicle for personal saving as alternative avenues for investment are either absent or not trusted. This practice leads to land speculation. The use of fiscal measures as an effective tool of managing land especially as a method of curbing speculation and price escalation has not been tried much in Kohat.

### **11.19. Formal and Informal Land Development in Kohat**

In Kohat, we can observe two institutions of different nature, which are involved in development of lands located on urban fringes. The first one is the formal sector which includes KDA and a very organized private sector. The other is the informal sector which develops land, also at the urban fringes but in a more relaxed manner and in an uncontrolled environment. The target groups of these two institutions are also different. While the formal sector caters to the upper and middle income groups, the informal sector caters to the shelter needs of the vast majority of low (and medium) income groups. On the other hand, the formal sector housing schemes are developed to high standards, the informal sector uses the incremental approach which makes the plots affordable to the specific target group.

The infrastructure in the formal sector schemes is put in well before the plots are handed over to the owners. This results in deterioration of the infrastructure by the time the scheme is occupied. Moreover there is general lag of five years between the launch of the scheme and completion of infrastructure at site. This time difference adds to the development costs and the market value of the plots is also enhanced, which is encashed by the allottees.

### **11.20. Land for Urban Poor**

The housing shortage for the low income groups can be overcome through better access to land by the following measures:

### Cross Subsidies

Cross-subsidies are common techniques for reducing land costs to low income groups. Such subsidies are often built into site and services projects, for example, whereby the profits from selling some of the plots at market prices for commercial use are utilised to subsidise the cost of other plots. This principle can also be applied in land readjustment schemes and has been recommended in the National Housing Policy as well.

### Affordable Standards

Since the level of infrastructure and services is a major factor affecting the cost of land, the application of affordable standards can have a great impact on increasing low income groups' access to land. First, lower permissible standards can be introduced either city wide or in areas likely to serve low income groups. The second approach that of incremental upgrading, may be more satisfactory because it allows more low income groups to have access to affordable land.

A strong sectoral recommendation of the National Human Settlements Policy Study is to reduce the plot sizes and rationalize bylaws and building codes in line with the financial affordability. Controls need to be reformed for low-income residential development to allow incremental construction of shelter. Planning controls should be flexible to allow incremental installation of services.

#### **11.21. Urban Regeneration for Inner City Mixed Use Areas**

In order to revitalize the inner city / old urban fabrics, a comprehensive program should be launched initially through a Pilot Project with the participation of public and private sectors for old and dilapidated parts of the Kohat City. Kohat has a unique cultural heritage manifested in its special architecture and urban design. Stronger focus is required on the CBD and its adjacent precincts. Much of the commercial and administrative areas in the Central Kohat may be revitalized by effective control of changes in building use, upgrading the level of existing physical infrastructure and building conservation. An urban revitalization programme identifying areas requiring urban renewal would be initiated. The criteria for identification of urban revitalization sites should include availability of sizable tracts of vacant land in high population density areas, land in the vicinity of high priced commercial property, aging and structurally unsound buildings, areas with deficient infrastructure, incompatible land uses etc.

## **12. LAND COMMITMENTS**

The following land commitments have been taken into consideration while planning and proposing every possible and sustainable urban growth strategy for Kohat City. Various projects of KP government which have been approved or are in the status of completion are mentioned below:

**Table 12-1: Land Commitments in Kohat City**

Land Commitments in Kohat
1. Feasibility study for identification of Hydropower Potential on Tanda Dam Kohat. Cost of Project 150 million (PPP Mode)
2. Up-gradation of Togh Mangara Safari Park in Kohat.
3. Up-gradation of Civil Hospital Shakardara to Cat-D Hospital Kohat.
4. Reconstruction of Women and Children Liaqat Memorial Teaching Hospital Kohat.
5. F/S and Construction of Cat-D Hospitals at Miryan Bannu and Jarma, District Kohat.
6. Establishment of Kohat Institute of Medical Sciences (KIMS)

<b>Land Commitments in Kohat</b>	
7.	Up gradation of existing 09 Nursing Schools of Province to Nursing Colleges (HMC, LRH, KTH Peshawar, Kohat, Bannu, D.I.Khan, Mardan, Swat & Abbottabad) (Phase-I & II).
8.	District Development Plan for Kohat Division & Kohat
9.	Kohat Area Development Project (To be funded from 10% Oil and Gas Royalty)
10.	Establishment of Khyber Pakhtunkhwa Emergency Rescue Service (Rescue 1122) in District Kohat
11.	Construction of C&W roads in Tehsil Kohat, Gumbat and Lachi District Kohat
12.	Construction of Kacheri chowk to Shaheen Plaza Bannu Road, Kohat
13.	Improvement & Rehabilitation of roads in District Kohat, <ul style="list-style-type: none"> <li>• Sodal to Tapi Road 12-KMs,</li> <li>• Dar Malak to Walai Road 15-Kms</li> <li>• Lachi Gulsha Khel link Road 14-Kms</li> <li>• Tanda Dam to Cadet College Kohat Road</li> </ul>
14.	Establishment of Cricket Coaching Academy at Kohat Sports Complex

### 13. PLANNING STANDARDS & LAND REQUIREMENTS

For the efficient management of land and proper use of the proposed land use, certain planning standards have been defined for relevant land uses. These planning standards have been fetched from National Reference Manual (NRM) and the land requirements for relevant uses have been calculated. In residential sector, existing housing stock of Kohat city 40,641 housing units while the required housing units are 30,481. To cater the housing demand, the housing demand replacement @25% of the existing housing stock is 10,160. Furthermore, the further division of housing units have been categorized as 5 marla, 10 Marla, and 1 kanal and the total land requirement for the residential purposes in collectively 25.91 sq. km.

**Table 13-1 Planning Standard & Land Requirements for Residential Sector**

Sr.	Land Requirements In Residential Sector	Population (2022-2042)	Low Income 45%	Middle Income 45%	High Income 10%	TOTAL
		825638	371537	371537	82564	
1	Additional Population	371741	167283	167283	37174	
2	HH Size MC-Kohat		7.50	7.50	7.50	
3	HH Size Urban-Kohat		7.34	7.34	7.34	
4	Houses Required @ 7.50 Growth Rate		22304	22304	4957	49565
5	Existing Housing Stock of Kohat City	40641				
6	Replacement Demand @ 25 % of existing Stock including Overcrowding, Old & Katcha Houses		4572	4572	1016	10160
7	Required Housing Stock of Kohat City upto 2042	30481				
8	Future Replacement Demand @ 15 % of Existing Stock		2057	2057	457	4572
9	Total Replacement Demand of Housing Stock upto 2042		28934	28934	6430	64298
10	Land Requirement upto 2042		5-Marla	10-Marla	1-Kanal	
			5983.60	11967.19	5318.75	23269.55
11	Add. Of Amentias 120% (including all neighborhood level amenities)		7180.32	14360.63	6382.50	27923.45
12	<b>Total of Land Requirement</b>					



Sr.	Land Requirements In Residential Sector	Population (2022-2042)	Low Income 45%	Middle Income 45%	High Income 10%	TOTAL
		825638	371537	371537	82564	
13	Kanal		13163.91	26327.83	11701.26	51193.00
14	Acres		1645.5	3291.0	1462.7	6399.12
15	Sq Km.		6.7	13.3	5.9	25.91

Table 13-2 Other Uses for Future Land Requirement

Sr.	Landuse	Area (acres)
1	Religion	526.03
2	Education	492.38
3	Health	138
4	Commercial	111.25
5	Parks/Playgrounds	280
6	Civic	174
7	Industry	85
Sub Total		1806
8	Roads (Add. 20% of above total area)	361
Total		2167

In Kohat City, the total requirements for the projected population of 850,000 approx. 170 Mullah Masjids are required of 3 kanal each. Total 34 Jamia mosques for the prayers and weekly sermons of Jummah prayer have been proposed for which 25.50 acres will be required. 8 central mosque on the area of 12.75 acres and 500 acres area is required for the placement of graveyard. In educational sector, 113 Primary School (Boys Urban) and 104 Primary school (Girls Urban) have been proposed.

For the enhancement of beauty of the city and giving the local residents a viable area to live and commute, 699.83 acres would be required to provide 283 Mohalla Level Parks. 110.5 And 136.89 acres will be required for the placement of neighborhood level parks and play grounds. For commercial purposes, Sub Mohalla Centre, Mohalla Shopping Centers, Neighborhood Centers, Community Level Commercial Centre, Grain Market, Wholesale Markets, Meat Markets, Business & Trade Centre and Food Courts have been proposed and a total area of around 564.59 acre will be required for these commercial developments. While mentioning civic and urban facilities, a city level post office, Rescue office, regional level session and high courts etc. have been proposed. Further details of the land uses and their area requirement for the projected population of Kohat City has been mentioned in the table:

Table 13-3: Land Requirements for Kohat City based on Applicable Planning Standards

Land Requirements for Kohat City based on Applicable Planning Standards					
Sr No.	Landuse Type	NRM Standard	Total Requirements for Projected Population of Approx. 850,000 in Year 2043		
			Nos	Area / Unit (Kanal)	Total Required Area
<b>RELIGIOUS</b>					
1	Muhallah Masjid	1 / 5000 pop	170	3	63.75
	Neighborhood / Jamia Masjid	1 / 25000 pop	34	6	25.50
	Central Mosque	1 / 100,000 pop	8.5	12	12.75
	Grand Mosque	1 / 400,000	2	50	13.28





	Graveyard	2-3%			500
<b>Education</b>					
2	Primary School (Boys Urban)	1/ 7500 pop	113	1.48	167.73
	Primary School (Girls Urban)	1/ 8200 pop	104	1.48	153.41
	Primary School	1 / 12,000 pop	217	3.69	321.14
	Secondary School (Boys)	1 / 23,000 pop	37.0	5	184.78
	Secondary School (Girls)	1 / 31,000 pop	27.4	5	137.10
	Inter College (Boys)	1 / 2 Lac pop	4.3	8.5	36.13
	Inter College (Girls)	1 / 2 Lac pop	4.3	5.6	23.80
	Degree College (Male)	1 / 2.5 Lac	3.4	10	34.00
	Degree College (Female)	1/ 3.5 lac	2	7.4	17.97
	Polytechnical College	3-5 hectares	2	7.4	14.80
	Vocational Training Institute	3-5 hectares	2	7.4	14.80
	University (General / Spec.)	3-5 hectares	1	25	25
	Youth Hostels		4	1	4.00
<b>Sports &amp; Receptions (8-10%)</b>					
3	<b>Muhallah Park (6000-8000)</b>	3-8 Parks (1.6 to 3.6 Hec)	283.33	2.47	699.83
		(0.26-0.58 Hec / 1000 pop )			
	<b>Neighbourhood Parks</b>	1 for 25000 pop.(3.25 Hec to 4 Hec)	34	3.25	110.5
		(0.13 - 0.16 Hec / 1000 pop)			
	<b>Neighbourhood Playgrounds</b>	One Combined Playfield for 25000 pop	34	4.03	136.89
		1.63 Hectare			
	<b>Community Level Park</b>	1 / 100,000 pop (4-5 Hectare)	8.5	9.88	83.98
		(0.04 -0.05 Hec. / 1000 pop)			
	<b>City Level Park</b>	1/ 400000 pop (12-15 Hec)	2.125	29.64	62.985
		(0.03 - 0.037 Hec / 1000 pop)			
	<b>Community Level Sports Ground</b>	1 / 100,000 pop (2.14 Hec)	8.5	5.29	44.93
		(separate fields for cricket, hockey, football & other games)			
	<b>City Stadium / Sports Complex</b>	1 / 300,000 pop	2	20	40.00
	<b>Cricket</b>	1 / 300,000 pop (2 Hec) + Parking	2.8	6.18	17.50
	<b>Hockey</b>	1 / 200,000 pop (1.15 Hec) + Parking	4.25	3.71	15.75
<b>Football</b>	1 / 200,000 pop (1.4 Hec) + Parking	4.25	3.71	15.75	
<b>Divisional Level Parks / Sports Complex</b>	Existing (Specialized)	1			
<b>Zoological Garden / Zoo / Wildlife Park / Safari Park</b>	Existing (Specialized)	1			





	Specialized Recreational Facility (Lake / Dam/ Water Park / Botanical Garden)	Existing (Specialized)	1			
<b>Health Facilities</b>						
<b>Primary Care</b>						
4	Basic Health Unit	1/13000 pop	65	2.5 Kanal	20.43	
	Rural Health Centre (10-12 Beds)	1/50,000 pop	17	1.5 Acres	25.5	
	Civil Dispensaries (Urban Disp.)	1/25000 pop.	34	10 Marla	2.125	
	Mother and child health centers (MCH) up to 25 Bed	1/100000 pop	9	2.4 Acres	20.4	
	<b>Tertiary &amp; Secondary Care</b>					
	Category A Hospitals / MTI (350 Beds)	1 for every 1,000,000 pop	1	10	10	
	Specialized Hospitals (Metropolitan City)		1	10	10	
	DHQ Hospital (100-250 Beds)	1 in every DHQ City	1	12.5 Acres	12.5	
	THQ Hospital (60 Beds)	1 in every THQ City	1	4.8 Acres	4.78	
	Category B Hospital (210 Beds)	1 for every 500,000 pop	2	4	6.8	
	Category C Hospital (110 Beds)	1 for every 300,000 pop	3	3	8.5	
	Category D Hospital (40 Beds)	1 for every 100,000 pop	9	2	17	
<b>Commercial Facilities</b>						
5	Sub Muhallah Centre (3000 pop)	3-4 Shops	283.3	0.5	141.67	
	Muhallah Shopping Centres (6000)	10-12 Shops	141.67	1	141.67	
	Neighbourhood Centres (25,000)	40-50 Shops	34	5	170	
	Coommunity Level Commercial Centre (100000)	125-150 Shops	8.5	2.5	21.25	
	Regional Shopping Centre	450-500 Shops	1	20	20	
	Fruit & Vegetable Markets	-	1	5	5	
	Grain Market	-	1	5	5	
	Wholesale Markets	-	1	5	5	
	Meat Markets	-	1	5	5	
	Business & Trade Centre	-	1	10	10	
	Food Courts	-	2	5	10	
	Hyper Markets / Shopping Malls	-	2	5	10	
Occasional / Sunday Bazars	-	2	10	20		
<b>Civic Facilities</b>						
6.	Head Post Office (Grade A & B)	0.5 Hec (Grade A) for Divisional	1	1.235	1.235	
		0.25 Hec (Grade A) for District	1	0.6175	0.617	
	Rescue 1122 / Fire Services	1 for Every 1 lac pop, 2025 Sq M each	8	0.5	4	
		Community Centre / Public Halls / Auditorium	-	2	5	10





	<b>Type A (7-9 Sq m per seat ) 500 seats</b>	4150 Sq M			
	<b>Youth Hostels</b>	-	1	2	2
	<b>Library</b>	-	1	2	2
	<b>Museum / Art Gallery</b>	-	1	2	2
	<b>Public Toilets</b>	Numerous at Commercial & Public places	10	0.15	1.5
	<b>E-Khidmat / Public Facilitation Centres</b>	-	1	1	1
	<b>Courts &amp; Judicial Complexes (District)</b>	-	1	3	3
	<b>Session Court</b>	4047 Sq M	1	1	1
	<b>Civil Court</b>	3035 sq M	1	1	1
	<b>Prison &amp; Correctional Facilities</b>	-	1	20	20
	<b>Central Jail (Divisional Level)</b>	1000 prisoners (31 Hec. Min)	1	20	20
	<b>District Jail (District Level)</b>	500 prisoners (14 Hec. Min)	1	15	15
	<b>Telephone Exchange (At DHQ Level)</b>	1000 Sq M	2	0.5	1
	<b>Grid Station</b>	-	4	5	20
	<b>Municipal Secretariat</b>	3 to 5 Hectare	1	37.05	37.05
	<b>DHQ Offices</b>	10 Hectare			
	<b>Divisional HQ Office</b>	15 Hectare			
	<b>Police Stations</b>	1 for each 50,000 pop. (0.4 - 0.8 Hec.)	17	1	17
	<b>Police Check Post</b>	500 Sq Mt.			
	<b>District Cultural Complex</b>	-	1	10	10
	<b>Hotel ( 4 star ) (75 Beds)</b>	2223 Sq M.	1	5	5
	<b>Hotel ( 3 star ) (50 Beds)</b>	1963 Sq M.			
<b>Industry</b>					
<b>7.</b>	<b>50 Industrial Workers per Acre</b>				<b>85</b>

## 14. PLANNING OF WATER SUPPLY SYSTEM

Urbanization has indeed had a significant impact on water resources, both in terms of quantity and quality. As more people concentrate in urban areas, the natural landscape undergoes changes that lead to water-related problems affecting daily life. This is also true for Kohat, where the concentration of people in the city has resulted in increased water demands for domestic and industrial purposes.

Currently, Kohat relies on both groundwater and surface water sources for its water supply. Groundwater is accessed through tube wells, and the water is pumped directly into supply pipes. However, with the growing water demand, it may become necessary to explore additional water sources to meet the future needs of the city. In the case of Kohat, potential surface water sources that could help fulfill the future water demand include the Kohat Toi River and the Gandially Dam. These resources are located within the boundaries of the Kohat district. Utilizing these surface water sources can provide an alternative or supplementary water supply to meet the increasing demands of the urban population. However, it is important to consider the sustainability and environmental impact of extracting water from these sources to ensure long-term water availability and ecosystem preservation.





### **Water Demand**

Sufficient potable water is required to fulfill the requirement of domestic and various non-domestic consumptions. Importance of water demand estimation cannot be overstated for the planning and design of water supply systems.

Calculation of water demand of project area is fundamentally based on the value of average per capita water demand and the number of persons to be served in a project area.

Existing population (year 2022)	= 468,195 Persons
Per Capita Water demand	= 35 gpcd
Total domestic average demand	= 16,386,825 Gallons/day = 16.4 MGD
Projected Population (year 2042)	= 843,999 Persons
Per Capita Water demand	= 35 gpcd
Total domestic average demand	= 29,539,965 Gallons/day = 29.5 MGD
Total maximum day demand	= 44,309,948 Gallons/day = 44.3 MGD

The source will be designed on maximum day demand either tube well or surface water treatment plant. The area required for water treatment plant will be around 30 acres. Overhead storage based on 1/10th of diurnal water demand will be provided for balancing reservoir.

## **15. PLANNING OF SEWERAGE SYSTEM**

The description of the existing wastewater collection system in Kohat city highlights the use of a partially combined system, which involves a combination of sewer pipes, open and covered drains to collect both wastewater and stormwater in the developed area. The existing sewerage system in Kohat City lacks any arrangement for the treatment of raw sewage. As a result, all wastewater generated in the city is discharged untreated into the receiving water bodies, leading to environmental pollution.

Proper sewerage system shall be proposed for Kohat City. Total catchment area shall be divided into different zones depending upon the topography of the area and trunk sewers shall be proposed to collect and transport the sewage from the project area and carried to Sewage disposal station (if any) by gravity, situated at the downstream of the project area. The sewage from disposal station will be pumped through force main pipe to Sewage Treatment Plant (STP) for its treatment. The sewage after treatment from STP will be disposed-off into water body passing in the vicinity of the project area or stored for reuse.

Proposed sewerage system will consist of the following components:

-  Primary trunk sewer
-  Secondary sewers
-  Disposal stations (if any)
-  Sewage Treatment Plant (STP)

### **Sewage Generation**

Calculation of sewage flow generated in project area is fundamentally based on the value of average per capita water demand and the number of persons to be served in a project area.

Projected Population (year 2042)	= 843,999 Persons
Per Capita Sewage generation	= 85% of water consumption (35 gpcd)
Total average Sewage Generation	= 25,108,971 Gallons/day = 25.10 MGD





### **Sewage Treatment Plant (STP)**

Sewage treatment is a crucial process that aims to remove contaminants from wastewater, making it suitable for discharge into the environment or for reuse. In the case of Kohat City, the implementation of a sewage treatment plant (STP) is recommended to treat the wastewater effectively. The sewage treatment plant will be designed on average flow. The area requirement for sewage treatment plant will depend on sewage treatment technology and number of treatment plant to be installed. The location of STP will be provided in later stage.

STP site location with a low elevation level shall be chosen. This will allow gravity flow, where wastewater can flow naturally without the need for excessive pumping. Gravity flow can be more energy-efficient and cost-effective compared to relying solely on pumping systems. However, other factors such as proximity to water sources, environmental considerations, and land availability also need to be taken into account when selecting the site for the STP.

Implementing a sewage treatment plant in Kohat City will significantly improve the quality of water discharged into the environment, helping to prevent water pollution and protect the surrounding ecosystems.

## **16. PLANNING OF SOLID WASTE MANAGEMENT**

Solid waste is being produced since the inception of human history. Solid waste production has increased over time due to population growth, expanding human activities, and increased resource utilization. Solid waste management poses a significant challenge, especially for developing countries that often face resource shortages and have inadequate institutional setups to handle waste effectively.

In the case of Kohat city, there is currently no permanent dumping or sanitary landfill site available. As a temporary solution, the Water and Sanitation Services Company (WSSC) is dumping all the garbage and municipal solid waste of Kohat city at the village of Muhammad Zai. Unfortunately, this situation has resulted in health problems for nearby residents who are continuously exposed to chemicals, inhaling toxic fumes and dust from the landfill site.

To address this issue, it is essential for Kohat city to establish a permanent sanitary landfill site. The total production of solid waste up to year 2042 will be 2,592,860 Ton by assuming generation rate 0.5-0.6 kg/c/d. The total land requirement for landfill site is estimated to be around 50 acres. This landfill site should be carefully planned and designed to ensure proper waste disposal, minimize environmental impact and mitigate health risks for the surrounding communities.

When selecting a location for the sanitary landfill site, factors such as distance from residential areas, hydrogeological considerations, and environmental regulations need to be taken into account. Additionally, proper waste management practices, including waste segregation, recycling, and composting, should be implemented to minimize the volume of waste going to the landfill and promote sustainable waste management practices.

Establishing a permanent sanitary landfill site in Kohat city will provide a long-term solution for managing solid waste effectively, protecting public health, and minimizing environmental pollution caused by improper waste disposal.



## **17. PROPOSED LANDUSE POLICY & ZONING**

### **17.1. Delineation of EBA**

The existing built up area has been marked by the observing the major urban fabric of the city including cantonment, existing CBD, residential and small industrial estate. The total area of marked EBA is 60 sqkm. The areas for Infill development, Regeneration and densification are including in the boundaries of Existing Built-Up area.

### **17.2. Delineation of CBD**

Existing major commercial activities of Kohat tehsil has been observed along the primary roads of the city including Kohat fateh jhang road, Bannu road and Hangu bypass. The main cluster of bazars exists in the area including Terrah bazar, main Kohat bazar, zargaran bazar and miankhel bazar. The Main Bazar is one of the popular places as local business in Kohat tehsil. The functions and services provided by this area is higher than other areas of the city. The boundary of existing of CBD has been marked after observing the following parameters:-

1. Highest services centralization and concentration of economic activities
2. Extensive services for economy
3. Major road linkages
4. Highly dense areas
5. High land values
6. Traffic congestion and traffic calming measures, including pedestrianized streets

### **17.3. Delineation of Future Planning Zones**

For the scenario development, a zoning concept plan was adopted. The zones has been defined and classified in three major zones;

- ❖ Inner urban zone
- ❖ Outer urban zone, and
- ❖ Outskirts zone and urban clusters.

**Table 17-1: Delineation of Future Planning Zones**

Major Zoning	Function	Landuse
<b>Inner urban zone (Including Historic conservation zone)</b>	<ul style="list-style-type: none"> <li>Center of Administration</li> <li>Regional hub of business and Service</li> <li>Commerce &amp; commercial corridors</li> <li>Urban Residence</li> <li>International/national gateway and tourism hub (if available)</li> <li>Cultural heritage for the residents of Kohat</li> </ul>	<ul style="list-style-type: none"> <li>Historical landscape and buildings conservation:</li> <li>Natural conservation:</li> <li>Higher density for accelerating redevelopment for business and commerce:</li> <li>Housing oriented area in the inner urban area</li> </ul>
<b>Outer urban zone (Including Sub-center zone)</b>	<ul style="list-style-type: none"> <li>Sub-centers</li> <li>Residential area</li> <li>Conservation of lower land and swamp land field for flood control and recreational activities</li> </ul>	<ul style="list-style-type: none"> <li>Sub-centers</li> <li>Residential oriented area in outer urban area:</li> <li>Conservation of forest and water areas:</li> <li>Conservation of agricultural area: (accepting minimum housing development in existing settlements)</li> </ul>
<b>Outskirts zone (Including Sub-center zone)</b>	<ul style="list-style-type: none"> <li>Conservation of naturally important areas and agricultural land with higher yield:</li> <li>Sub-Centers</li> </ul>	<ul style="list-style-type: none"> <li>Conservation of forest and water areas:</li> <li>Conservation for agricultural area: (accepting minimum housing development of existing settlements)</li> </ul>

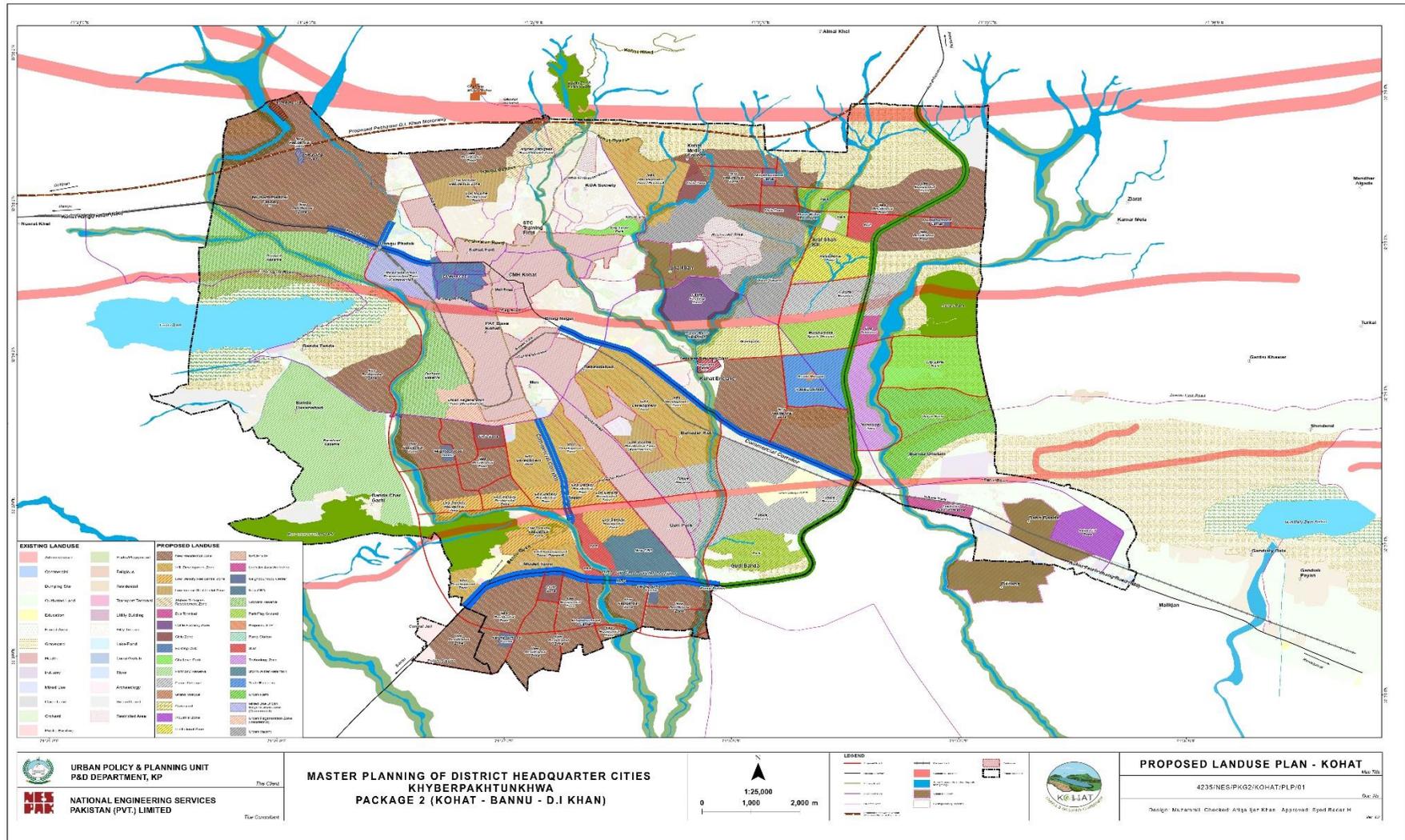
By taking in account of the basic policies for the future urban structure as explained in above table, the future scenario development planning of the core urban area and the peripheral expansion areas for next 20 years has been established. This plan is based upon satellite image analysis, existing land use, other past growth trends and other plans of relevant projects. The development plan for the outer urban zone, outskirts zone and sub-centers follows the concept of multi-core structure. Therefore the land use plans of these areas are spatially coordinated not only with the existing land use but also with the urbanization simulation of multi-core structure including infill development and regeneration of core areas.

#### **17.4. Existing Commercial Corridors (Bannu Road, Pindi Road and Hangu Road)**

Major commercial corridors has been marked on the percentage of ongoing commercial activities along the major roads including Bannu Road, Pindi Road and Hangu Bypass Road and Indus Highway. To reduce the unplanned growth of commercial activities, planned linear corridors has been proposed. The corridors will cater the major commercial activities along the Highway and primary road network of the Kohat city.



## Strategic Scenario Development of Kohat City



**Figure 17-1: Proposed Landuse Map of Kohat City**



## 18. PROPOSED SECTORAL SCENARIO DEVELOPMENT OF KOHAT CITY

### 18.1. RESIDENTIAL SECTOR

#### Current Condition

The residential sector covered 6287.5 acre i.e., 42.09% of total area including planned and unplanned old residential areas. The total number of residential units/housing units in the city, based on an average per-household size of 7.5 persons, is approximately 40,641 and urban residential density is 6.46 housing units/Acre. This residential percentage includes narrow street pattern of old slum areas where street width mostly ranges between 5 to 15 feet.

The Residential areas mainly comprises old unplanned housing areas in the north & south west of Kohat Cantonment. These areas are characterized by narrow and irregular street patterns, small and irregular plot sizes, high density, lack of open spaces. KDA Housing scheme is the only major and public sector housing project in the north east of existing city which covers about 15-20% of the total residential footprint of the city, but most of the plots are still vacant.

Few other small housing schemes like Kohat Enclave, Jerma Housing and Kohat Model Town etc. has been developed along major arteries like Peshawar Road, Bannu Road & Pindi Road which are still vacant and need to be colonized on priority. Lots of unapproved land subdivisions featured with no proper access, no public infrastructure are coming up and trapped within agricultural areas / guava orchards of the city. Few large village settlements such as Sheikhan Village, Togh Bala, Babri Banda, Jarma and Bilitang etc also exist within proposed City Boundary.

#### Development Concept

The development of the residential sector is conceptually and preliminary delineated with the following points of view:

**Table 18-1: Development concept of residential sector**

Items	Concepts
<b>Function &amp; Role</b>	Infill, Densify and regenerate the existing and most suitable locations for future housing development of Kohat.
<b>Core Facilities</b>	<ul style="list-style-type: none"> <li>• Infill Housing options (Low, Medium and High Density)</li> <li>• Neighborhood Centers/Subsector Commercial centers</li> <li>• Existing local center functions</li> <li>• Proposals of new access roads</li> <li>• Civic zones</li> </ul>

#### Proposed Landuse Plan

As per residential land requirement calculations 25.91 sqkm area is required to serve the projected population of Kohat City which is approximately 825,638 Person and 78% Housing. The construction suitability of Kohat city has been observed critically and Residential zones has been proposed with different categories of densities and development patterns. It is indispensable for the development of future Residential Areas to carefully and widely utilize the available vacant and open land parcels to fulfill the future requirement. For that the balance between residential densities of proposed Zones play very



vital role here. The major NC's with sufficient available land parcels has been proposed as residential Zones with the provision of infill housing.

- ❖ The KDA extension areas has been proposed as residential zone along Kohat bypass and Kohat Road (N55).
- ❖ For infill low density development the total 4 zones has been proposed. Zone 12 along Hangu Bypass for infill low density development because of least Suitability of construction. Zone 12 has further divided into two sub-Zone. The North Part id reserved as
- ❖ Zone-4 has been proposed along Bannu Road and Indus Highway on south of Kohat City as New Residential Zones with high density. Core functions has also been proposed in the zones as Civic zones and neighborhood level commercial centers and parks.
- ❖ The south part of Kohat city has divided into different zones for future new housing with higher density.

### Low Income Housing & Apartments

- Access to public transport
- Accessible to Employment center
- Availability of Parks/Open spaces, Landscape
- Availability of affordable basic utilities/services and Public sector social amenities
- Security and safety
- Better quality of life
- Highly dense areas
- Proximity to industrial area
- Proximity to existing low income residential areas
- Affordable land prices
- Supply of subsidized state land

### Middle Income

- Affordable access to quality housing
- Neighborhood scale
- Low/medium density detached housing
- Sense of Community
- Availability of basic utilities and services
- Affordable land prices
- Access to public transport and quality roads
- Access to social amenities
- Less environmental issues

### High Income

- Efficient size and design
- Low density areas
- Sense of community
- Livable /calm societies
- Safe and secure neighborhoods
- Green & clean environment
- Good quality road infrastructure
- Uninterrupted supply of basic utilities and services
- Access to quality social amenities
- High land prices
- Connectivity to existing high income areas

Figure 18-1: Multi-Criteria Analysis for Proposed Residential Zone

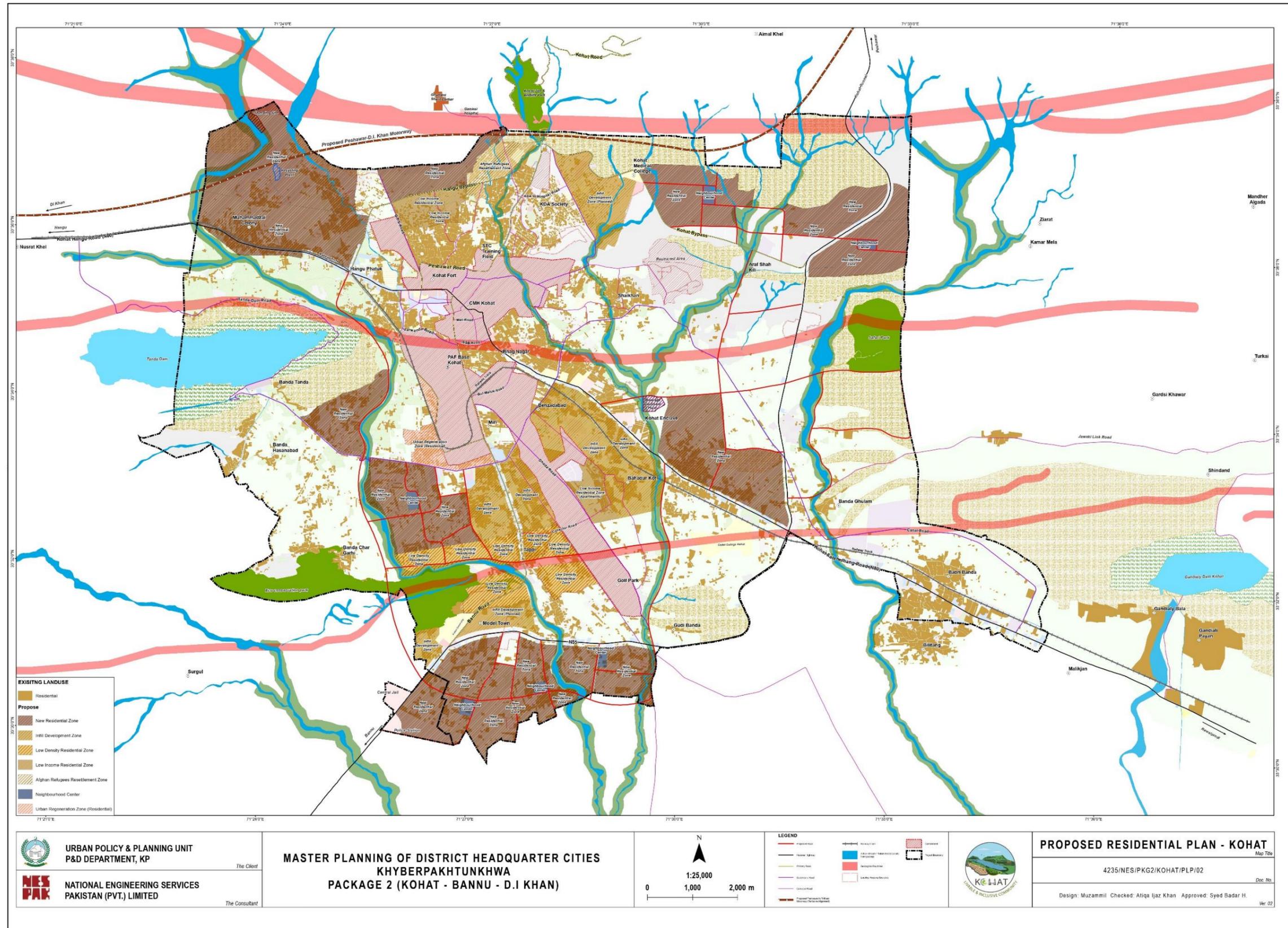


Figure 18-2: Proposed Residential Plan of Kohat City





## 18.2. COMMERCIAL SECTOR

### Current Condition

The commercial area occupies 3.02 percent and 450 Acres of land. Most of the commercial activities/uses are along Primary roads, such as, the centrally located intersection of Bannu Road and Rawalpindi Road is the main commercial hub of the city. In the absence of any planned housing & commercial developments in the past, commercial activities spreads out everywhere in the city including along major arteries, old city areas, streets and only few designed commercial plazas exist in the city. The areas adjacent to the old Laari Adda and Main Kohat Bazar in its south are the most congested linear commercial bazars penetrated inside small and narrow streets. New Planned fruit & vegetable markets in the south of Kohat Air Base, commercial zones of KDA Scheme and other commercial plazas have also been developed in the recent past.

### Development Concept

The development of the Commercial sector is conceptually and preliminary delineated with the following points of view:

Table 18-2: Development concept of industrial sector

Items	Concepts
Function & Role	Decentralization of urban functions in CBD and Commercial corridors. <ul style="list-style-type: none"> <li>• Sub Mohalla Level</li> <li>• Neighborhood Level</li> <li>• Community Level</li> <li>• Regional Level</li> <li>• Delineation of Existing CBD</li> <li>• New proposed CBD</li> <li>• Proposed Commercial Corridors</li> </ul>
Core Facilities	<ul style="list-style-type: none"> <li>• Specialized Markets</li> <li>• City level shopping centers</li> <li>• Mohalla shops</li> <li>• Mixed used commercial Corridor</li> <li>• Business Hubs/centers</li> <li>• Food courts</li> <li>• Hyper markets</li> <li>• Shopping plazas</li> <li>• Sunday/Occasional bazar</li> </ul>

### Proposed Landuse Plan

As per calculated requirements, 111.15 acre land other than existing commercial activity is required to fulfill the demand of the city. Existing CBD has been marked on the basis of existing commercial activity. The major two NC's Haji Bahadarkot and Garhi Benorian cater the major existing commercial activity of kohat city. New CBD has been marked along Indus highway 55 near Shadeed Banda Orakzai Chowk. It will the southern part of the city specifically. Commercial Corridors has been marked along Hangu Road, Bannu Road and Pindi Road. Specialized markets, City level shopping centers and hyper markets/plazas has been





proposed as future uses. Proper zones has been demarcated for commercial uses to avoid disorder and sprawled development. The multi criteria analysis for proposing commercial activities has been presented below:

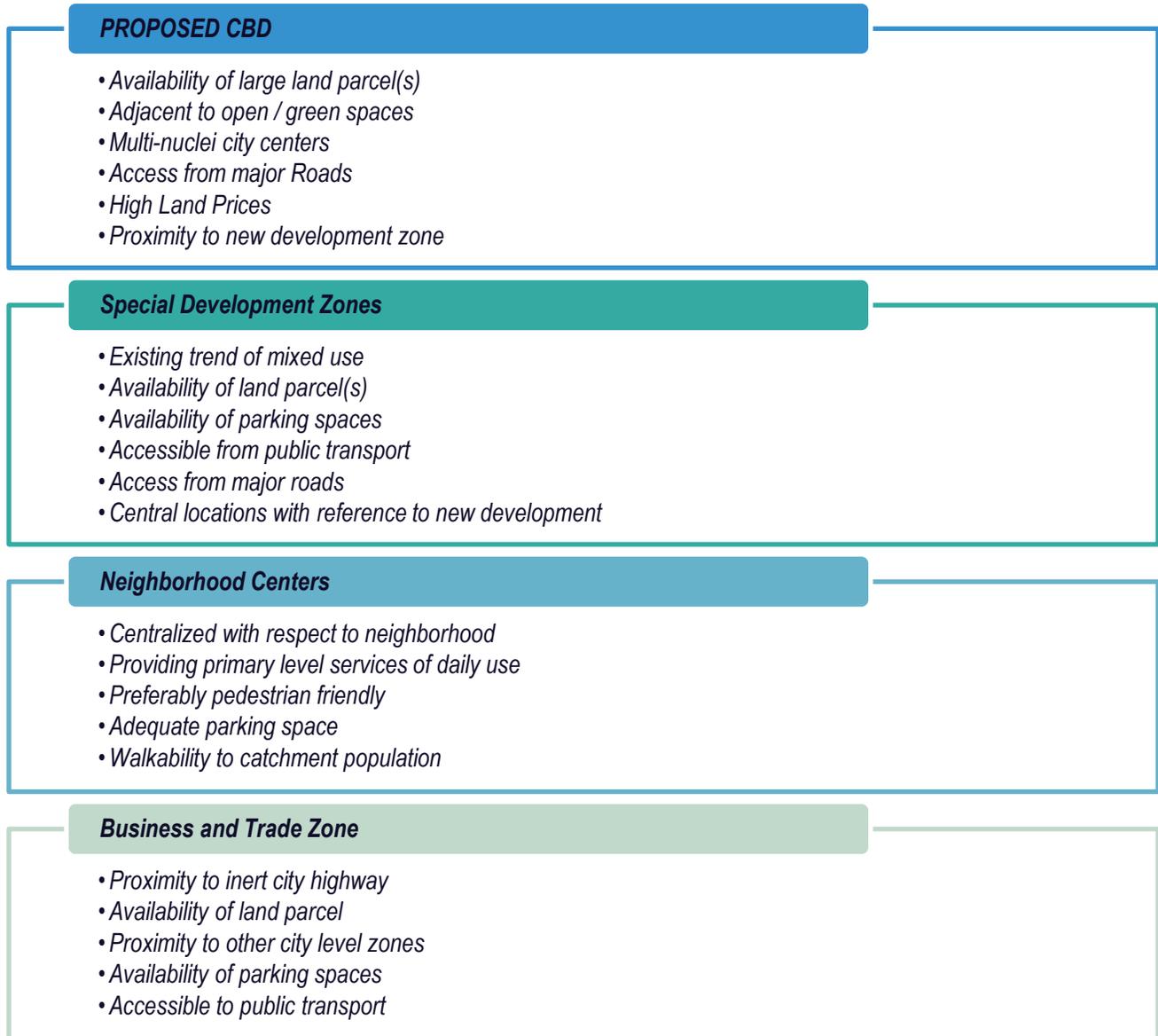


Figure 18-3: Multi-Criteria Analysis for proposing Commercial zone







### 18.3. INDUSTRIAL SECTOR

#### Current Condition

The industrial uses occupy a total of 2.42 percent area of the total built up area. Kohat district has a vast industrial potential in various manufacturing sectors in addition to the mines and mineral explorations particularly coal and gas reserves. In the city limits of Kohat, major industrial establishments includes Kohat Cement Factory located on Pindi Road, Janana Textile Mills and Kohat Textile mills both located in close proximity of PAF Base. A Small Industrial Estate (SIE) built way back in early 1980's also located on Dhoda Road while an OGDCL Gas processing field is also operational in the outskirts along Kohat Bypass Road.

#### Development Concept

The development of the Industrial sector is conceptually and preliminary delineated with the following points of view:

*Table 18-3: Development concept of industrial sector*

Items	Concepts
<b>Function &amp; Role</b>	<ul style="list-style-type: none"><li>• New Technology Zone</li><li>• Industrial Zone</li><li>• Industrial development in existing small industrial estate</li></ul>
<b>Core Facilities</b>	<ul style="list-style-type: none"><li>• Labor Housing</li><li>• High Tech Industries</li><li>• Medium and Small scale enterprises</li></ul>

#### Proposed Landuse

The existing percentage of industry 1.46% which is currently serving the purpose, but for future the double percentage is required on the 85 acres of land. Two major sites has been proposed for the industrial uses. Technology zone site has been proposed on main Indus highway-55 and an industrial estate has been places along kohat Rawalpindi Road. The Kohat cement factory is also situated on near Kohat Rawalpindi Road but mainly on Canal Raod.



### **Economic/Technology Zone**

- Accessible from major roads
- Adjacent to transport terminal(s)
- Nearby existing economic activities
- nearby city peripheral areas
- Buffer of residential areas
- Close to city level recreational activities
- Close proximity to high utility lines
- Proximity to the existing ecological corridors

### **Industrial Zone**

- Nearby existing industries
- Favorable wind direction
- Accessible from major roads
- Away from city center
- Nearby transport terminal(s)
- Close proximity to target labor

### **Logistics Hub**

- Multiple transport options – major inter-modal facilities and road highway interchanges.
- Connections to other divisional logistics hubs
- Access to a large consumer market
- Domestic economy engaged in trade of goods and services

**Figure 18-5: Multi Criteria Analysis for Industrial Zone**



## 18.4. Recreational Facilities

### Current Condition

The area under use of parks, play grounds and recreational facilities accounts for approximately 19 % of the total built up area. But it primarily includes Ecological Conservation Park adjacent to KUST Campus in the west and trapped Guava orchards inside various low density residential expansions in the urban periphery. Parks & Playgrounds only accounts for 4.66 % of the total built up which includes Kohat Sports Complex. Old residential parts of the City seriously lacks in green spaces or play fields. Only KDA Housing Scheme is relatively well served as far as neighborhood parks, play grounds and indoor sports are concerned. Two wildlife parks namely Togh mangara Safari Park located east of Peshawar Road and Kohat Wildlife park located north of the city near Hangu Chowk are also providing some recreational opportunities for the residents of the Kohat City. Dense forest, tourist point and a wildlife sanctuary also exist alongside the Tanda lake which provides good leisure time activities for outdoor recreations. Fishing points and boating facilities also available for Tanda Lake visitors.

### Development Concept

The development of the Recreational sector is conceptually and preliminary delineated with the following points of view:

**Table 18-4: Development Concept of Recreational Activities**

Items	Concepts
<b>Function &amp; Role</b>	<ul style="list-style-type: none"> <li>• City level parks</li> <li>• City level play grounds</li> <li>• Neighborhood Parks</li> <li>• Proposals for better potential tourism sites</li> </ul>
<b>Core Facilities</b>	<ul style="list-style-type: none"> <li>• Playgrounds,</li> <li>• Hiking, Running And Fitness Trails Or Paths,</li> <li>• Bridle Paths, Sports Fields And Courts,</li> <li>• Public Restrooms,</li> <li>• Boat Ramps,</li> <li>• And/or Picnic Facilities</li> </ul>

### Proposed Landuse

As per projected future areas total 280 Acre of total land is further required for recreational facilities including parks, open spaces, buffers and other tourism places. Few areas of Kohat has higher potential for tourism development including Lakes, Hills and other open spaces. It is very important to utilize and well control the natural urbanization pressure to the areas and preservation of natural terrain. The tourism facilities shall be provided along Tanda Lake and Gandiyali Lake. The proper maintenance of Wildlife and safari park with better provision of facilities has highly recommended.



### City level Facilities

- Availability of large land parcel(s)
- Approachable from major roads
- Either available at center or at outskirts of town
- Adequate parking spaces
- Around existing water resource

### Neighborhood Level

- Within each neighborhood
- Pedestrian friendly approach
- Accessible for catchment population
- Suitable to all income groups

Figure 18-7: Multi Criteria Analysis for proposing recreational zone





### 18.5. Educational & Health Facilities

#### Current Condition

Educational institutions spread over 418 acres of land and health uses occupy only 38.95 acres of total land. Among Educational institutes, lots of private schools, mostly primary & middle level as well as academies located in various parts of the city. However public sector schools, colleges and universities are very few in number. Among notable higher educational institute includes the Kohat University of Science & Technology, KMU Medical Institute, Kohat Medical College, Kohat Cadet College, Garrison Cadet College, Govt. Polytechnic Institute, Nishtar Special Education Centre, KMU Institute of Dental Sciences.

Health Facilities accounts for only about 0.25 % of the total Built up area of the City. Small private clinics can be found everywhere however specialized and general public sector health facilities also exists. Among few notable health facilities include DHQ Hospital, Al Shifa Trust Eye Hospital, Liaqat Memorial Hospital, Kohat Institute of Cardiology.

#### Development Concept

The development of the Educational & Health facilities area conceptually and preliminary delineated with the following points of view:

Table 18-5: Development Concept of Health and Educational Facilities

Items	Concepts
Function & Role	<ul style="list-style-type: none"> <li>• Women University</li> <li>• Education &amp; Health Zone</li> <li>• Different level of Educational Facilities</li> <li>• Hospitals</li> <li>• Other Health facilities</li> </ul>
Core Facilities	<ul style="list-style-type: none"> <li>• Proper Education and Health Facilities</li> <li>• Schools, Colleges, University and hostels</li> <li>• Health Centers</li> <li>• Other related facilities</li> </ul>

#### Proposed Landuse

The existing ratio of Education and health is fine as per population, but in future the total of 492.38 acre is required for the education and 138 acre will be required for health facilities. The provision of district level women university has been proposed. The health facilities, including BHU, RHC and other facilities have been proposed. Category D hospital are required in city and further to it, a basic specialized hospital is also required. When it comes to education, degree colleges, polytechnical college and vocational institutes are required in Kohat city. For this purpose, land has been marked from the available vacant pockets.



### **Educational Facilities (Schools)**

- Preferably on walking distance for Low income groups
- Nearby residential development
- Adjacent to open / green spaces
- Suitable for all income groups
- Away from noisy business areas
- Away from intercity highways

### **Educational Facilities (Colleges)**

- Nearby mixed use facilities
- Approachable via secondary roads
- Adjacent to open / green spaces
- Adequate parking space
- Adjacent to playgrounds

### **Educational Facilities (Universities)**

- Approachable from intercity & primary roads
- Nearby periphery areas
- Availability of large land parcels

### **Health**

- Preferably on walking distance for low income group especially
- Nearby residential development
- Adjacent to green spaces
- Nearby mixed use facilities
- Adequate parking space
- Approachable from major roads
- Accessible through public transport
- Availability of land parcel(s)

**Figure 18-9: Multi Criteria analysis for Health and Educational Facilities**

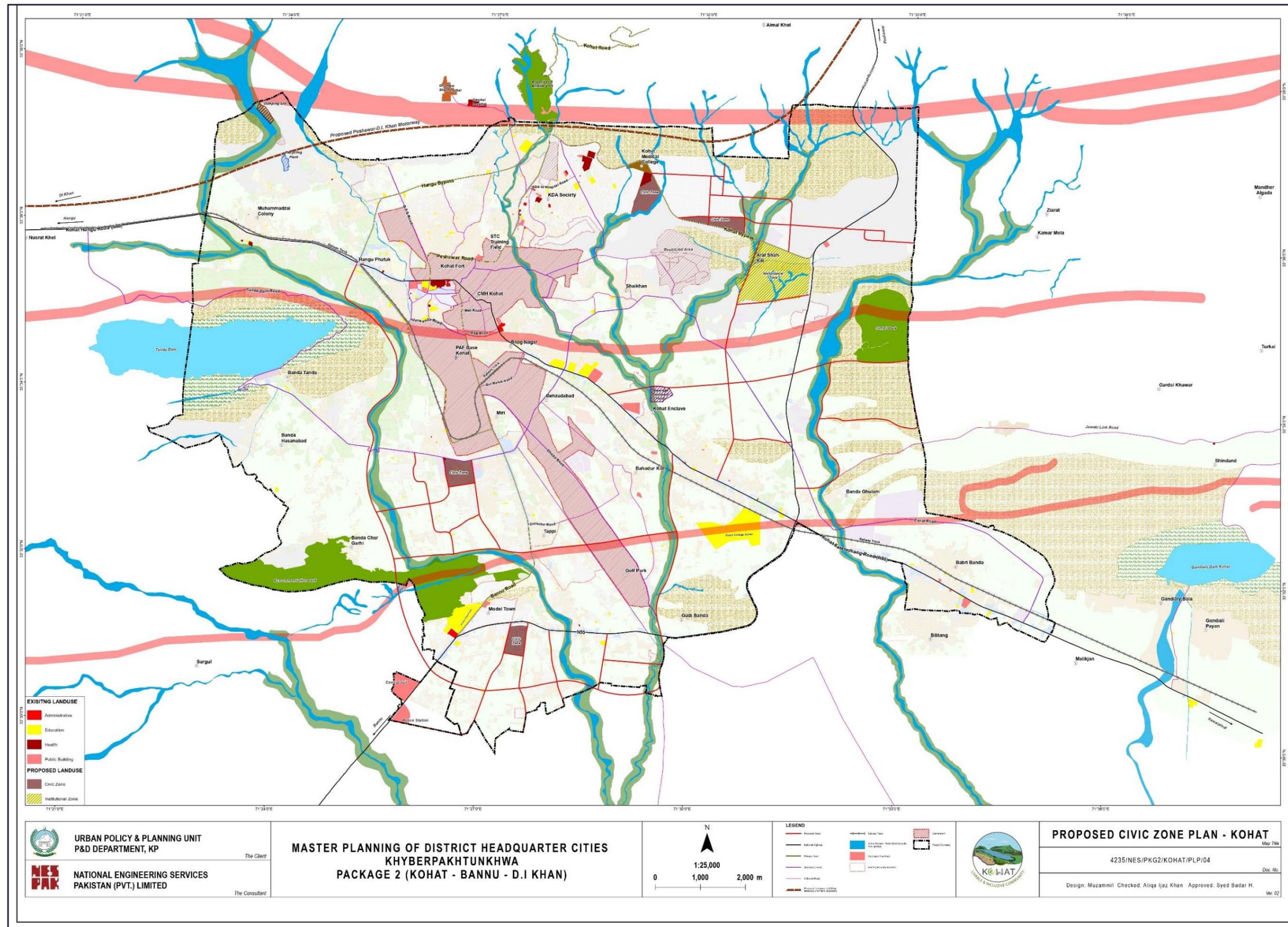


Figure 18-10: Proposed Civic Zone Plan of Kohat City



### 18.6. Other Public Buildings & Graveyards

#### Current Condition

The graveyards occupy about 1.94 percent respectively of the area. The public buildings, religious buildings, post office and police station occupy very insignificant portion (6.57 percent) of the area in Kohat City.

#### Development Concept

The development of the Public Buildings other than Education and health facilities of the area conceptually and preliminary delineated with the following points of view:

Table 18-6: Development Concept of Public Buildings and graveyards

Items	Concepts
Function & Role	<ul style="list-style-type: none"> <li>• Town purposes</li> <li>• Public Services</li> <li>• Location consistent with public facilities</li> </ul>
Core Facilities	<ul style="list-style-type: none"> <li>• Graveyard</li> <li>• Multi-Purpose District Complex</li> <li>• District art and Cultural Complex</li> <li>• Grand Mosque</li> </ul>

#### Proposed Landuse

Other than existing facilities and graveyard, the provision of city level grand mosques on 174 acres has been proposed. A new graveyard on 260 acres adjacent to proposed playground has also been proposed. Multi-purpose district office and city level cultural and art complex is also proposed. Other public facilities including police chukies, stations and libraries will be flexible in location and part of mostly civic zones. As, four city level civic zones has been proposed at different locations of the city to accommodate the future projected population. The balance between facilities and population of any city will lead to success towards development.



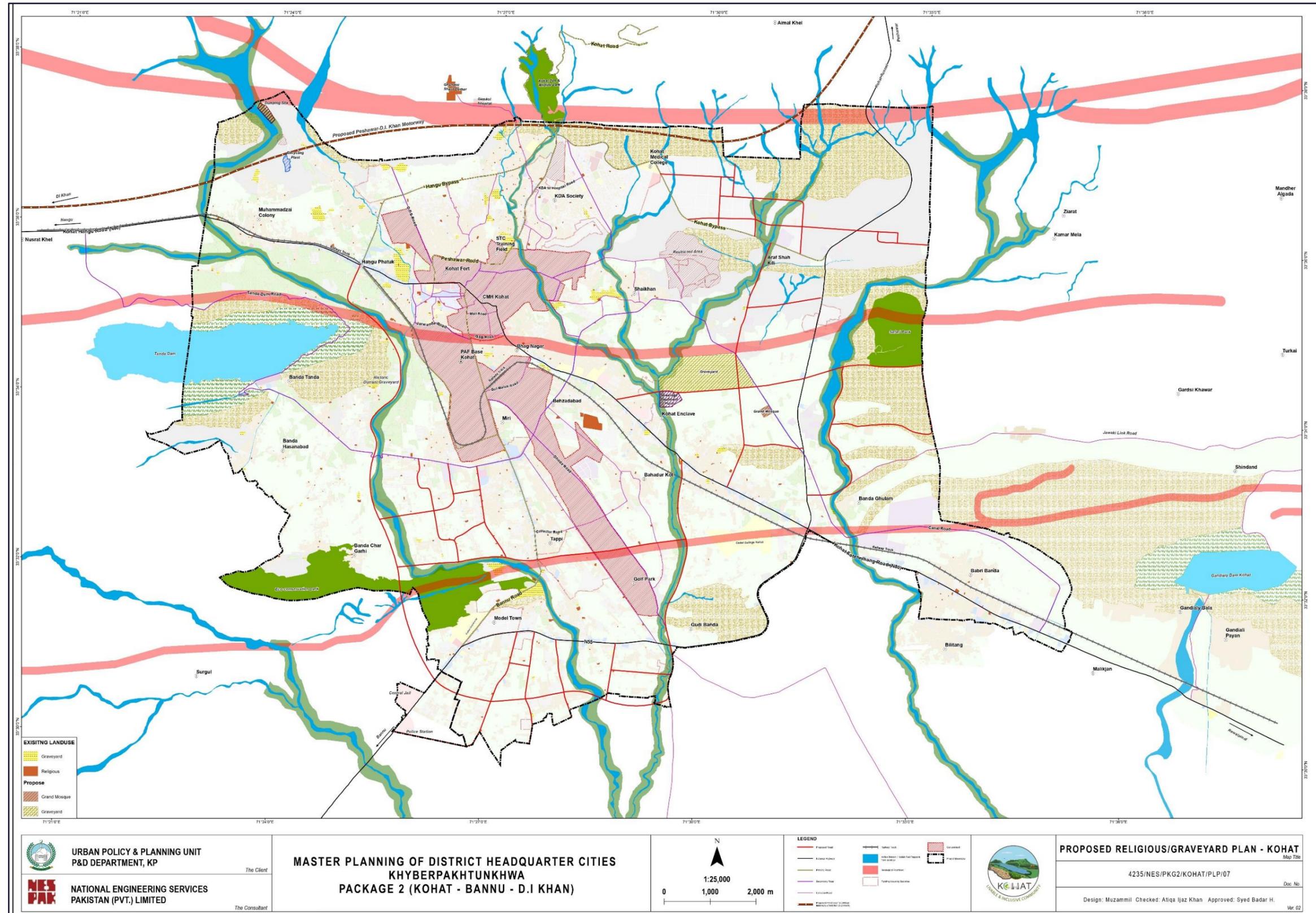


Figure 18-11: Proposed Religious Graveyard Plan of Kohat City



## 19. PROPOSED ZONES & CORE FUNCTIONS

### 19.1. DELINEATION OF PROPOSED ZONES

Following zones has been delineated in the project area:-

1. Residential zones with different population density
2. Civic zones
3. Trade and business hub
4. Commercial corridors
5. Industrial zone
6. Technology Zone
7. Recreational & Tourism Zones
8. Logistics and Auto workshop zones
9. Institutional Zone
10. City Level Parks & Playgrounds
11. Graveyard
12. Special Development Zone
13. Urban farms
14. Farmland Reserve
15. Orchard Reserve
16. Urban Vacant
17. Afghan Refugees Resettlement Zone
18. Infill development Zone
19. Future Reserve Zone
20. Cattle Farming Zone
21. Existing CBD
22. Special Development Zone
23. Bus Terminal
24. Neighbourhood Centre
25. STP
26. Urban Regeneration Zone
27. Mixed Use Urban Regeneration Zone
28. Storm Water Retention
29. KPCIP STP
30. Grand Mosque





**PROPOSED POPULATION DENSITY**

Following population density has been decided for the future zones.

*Table 19-1: Proposed Population density of Kohat City*

Category	Range (Person Per Acre)	Average Population Density (Person Per Acre)	Distance from Transit
Very Low Density	0-20	-	
Low Density	20-50	40 to 80	40 meters
Medium Density	50-80	85 to 121	400 to 800 meters
High Density	80-100	125 to 161	<400 meters
Very High Density	100-120	-	

**19.2. EXISTING AND PROPOSED LANDUSE ZONE-I**

The Zone-I has been proposed in the north of Kohat City along Indus highway-55. The proposed zone includes the major portion of KDA scheme Extension with other extended area. The total area of zone-I comprises on 1977 acres.

**Existing Landuse**

The Zone has divided into three Sub-zones for the ease in calculations. The zone is vacant and currently there is no development. The Zone is part of KDA scheme extension, but it has been remained undeveloped from years. Apparently, there is no development barrier has been observed. The approach to the Zone has been provided through the Indus Highway 55, which links Kohat with Peshawar. There is no agricultural area or cultivable land exists in the zone area.

**PROPOSED DEVELOPMENT FRAMEWORK**

Zone-I is estimated to be one of the Medium to Low Density Residential areas. The future population of the zone is estimated to be 123,763 person between 2023-2042 with the population density of 50 person per acre.

**PROPOSED LANDUSE**

The Zoning concept of Landuse in Zone-I is illustrated in Fig. The zone has proposed new residential density of 50 person per acre, which is acceptable in case of any housing scheme. Middle to low density is appropriate for the zone to be urbanized till 2042. Proposed civic zone, special development and neighborhood zone is also part of Zone-I. Parks serve 53.89 acre of land, neighbourhood centre of 24.71 acre and Civic Zone is on 69.21 acre of total land and will serve the whole city. The SDZ has been proposed on 116.55 acres of total land. New residential areas are on 1543.40 acre of land. Following uses has been proposed in the Zone:-

- a) New Residential Areas
- b) Neighborhood centers
- c) Civic zone
- d) Storm Water Retention
- e) Green areas including Parks, buffers and open spaces
- f) Special Development Zone





### 19.3. EXISTING AND PROPOSED LANDUSE ZONE-II

The zone-II has been proposed in the north of Kohat City along Kohat Bypass. The proposed zone includes the Kohat Township Scheme under KDA. The total area of zone-II comprises on 613.32 acres.

#### Existing Landuse

The proposed zone is falling under the Kohat Township Scheme. The major part of zone has developed as residential. There is Peshawar medical university and proposed site for Judicial Complex Kohat. KDA scheme land development process is slow comparatively. Main parks at neighborhood level exists in zone-II.

Apparently, there is no development barrier has been observed. The approach to the Zone has been provided through the Kohat Bypass, which links Kohat with inner city area and towards Hangu as well. There is no agricultural area or cultivable land exists in the zone area. Pockets for developments are also present in the area.

#### PROPOSED DEVELOPMENT FRAMEWORK

Zone-II is estimated to be one of the Medium to Low Density Residential areas. The future population of the zone is estimated to be 24,772 person between 2023-2042 with the population density of 50 person per acre.

#### PROPOSED LANDUSE

The Zoning concept of Landuse in Zone-II is illustrated in Fig. The zone has proposed the medium to low density of 50 person per acre, which is acceptable in case of any housing scheme. Middle to low density is appropriate for the zone to be urbanized till 2042. Proposed civic zone is also part of Zone-II. Infill Development zone is on 495.43 acre of total land. Following uses has been proposed in the Zone:-

- a) Infill Development Zone (Planned)
- b) Civic Zone
- c) KDA society
- d) Neighborhood Level Parks & Other Facilities

### 19.4. EXISTING AND PROPOSED LANDUSE ZONE-III

The zone-III has been proposed in the north-west of Kohat City along Kohat-Hangu Bypass. The total area of zone-III comprises on 1099 acres.

#### Existing Landuse

The proposed zone has developed partially as residential and agriculture zone. Rapid commercial activity has been observed along Hangu Bypass. Muhammad Zai graveyard is part of Zone-III. Majorly the Residential activity is observed along Kohat Hangu road in Muhammad Zai settlement. Other than Muhammad zai, the residential activity has been observed in Nawaly Kalay

Apparently, there is no development barrier has been observed. The approach to the Zone has been provided through the Kohat Bypass and Kohat Hangu Road which links Kohat with inner city area and towards Hangu as well. There is partially agricultural area or cultivable land exists in the zone area. Pockets for developments are also present in the area.

#### PROPOSED DEVELOPMENT FRAMEWORK

Zone-III is estimated to be one of the Medium to Low Density Residential areas. The future population of the zone is estimated to be 54,968 person between 2023-2042 with the population density of 50 person per acre.





### PROPOSED LANDUSE

The Zone is proposed as New Housing zone. The Zoning concept of Landuse in Zone-III is illustrated in Fig. The zone has proposed the medium to low density of 50 person per acre, which is acceptable in case of any housing scheme. Middle to low density is appropriate for the zone to be urbanized till 2042.

New residential area is on 1099 acre of total land and will serve the whole city. Following uses has been proposed in the Zone:-

- a) New Residential Areas
- b) Low Income Residential Area
- c) Afghan Refugees Resettlement Area
- d) Neighborhood Level Parks & Other Facilities

### **19.5. EXISTING AND PROPOSED LANDUSE ZONE-IV**

The zone-IV has been proposed in the west of Kohat City along Canal Road and Bannu Road. The total area of zone-IV comprises on 1811 acres.

#### Existing Landuse

The proposed zone is mostly under cultivation, there are some areas under residential development. Concentration of orchards have been observed in the zone. Large land parcels are vacant and prioritize for development in immediate development phase.

#### PROPOSED DEVELOPMENT FRAMEWORK

Zone-IV is estimated to be one of the Medium to Low Density Residential areas. The future population of the zone is estimated to be 79,991 person between 2023-2042 with the population density of 75-40 person per acre.

### PROPOSED LANDUSE

The southern part of zone is falling under Faultline, because of said cause few area has taken as low density. The Zoning concept of Landuse in Zone-IV is illustrated in Fig. As per construction suitability, southern part of the zone is not suitable for high rise construction or high population density. The zone has proposed the medium to low density of 75-40 person per acre, which is acceptable in case of any housing scheme.

Parks serve 53.89 acre of land, neighbourhood centre of 24.71 acre and Civic Zone is on 69.21 acre of total land and will serve the whole city. The SDZ has been proposed on 116.55 acres of total land. New residential areas are on 1543.40 acre of land.

Parks serve 53.89 acre of land, neighbourhood centre of 24.47 acre and Civic Zone is on 85.19 acre of total land and will serve the whole city. The low residential areas have been proposed on 209.78 acres of total land. New residential areas are on 1243.52 acre of land and urban regeneration zone serve 248.61 acre of land. Middle to low density is appropriate for the zone to be urbanized till 2042. Following uses has been proposed in the Zone:-

- a) New Residential Areas
- b) Civic Zone
- c) Neighborhood center
- d) Low Density Residential Area
- e) Urban Regeneration Zone (Residential)





- f) Neighborhood Level Parks & Other Facilities

#### 19.6. EXISTING AND PROPOSED LANDUSE ZONE-V

The Zone-V has been proposed in the South of Kohat City along Bannu Road. The total area of zone-V comprises on 524 acres.

##### Existing Landuse

The proposed zone has hilly terrain, there are some areas under residential development. Two major schemes of Kohat is part of Zone-V i.e. Jarma Housing scheme and Model Town. Jarma Housing Scheme is approved but Model Town is not approved from TMA. Ahmad Faraz Public Park is also situated in the proposed zone. The zone is surrounded by Kohat Ecological Conservation Park. Housing schemes are vacant from years. Kohat University of Sciences and Technology is also surrounding the zone. Few orchards have been observed in the zone. Large land parcels are vacant and prioritize for development in immediate development phase.

##### PROPOSED DEVELOPMENT FRAMEWORK

Zone-V is estimated to be one of the Medium to Low Density Residential areas. The future population of the zone is estimated to be 32,396 person between 2023-2042 with the population density of 100-50 person per acre.

##### PROPOSED LANDUSE

The Zoning concept of Landuse in Zone-V is illustrated in Fig. The zone V falling over the fault line. The zone has proposed as High to medium density of 100-50 person per acre, which is suitable for the proposed Special Development Zone. Infill development zone has been proposed on 275.54 acre of land. The SDZ has been proposed on 28.62 acres of total land. Low Density Residential Zone are on 219.31 acre of land. Low to medium density is appropriate for the zone to be urbanized till 2042. Following uses has been proposed in the Zone:-

- a) Low Density Residential area
- b) Infill Development of Residential Areas
- c) Special Development Zone
- d) Neighborhood Level Parks & Other Facilities

#### 19.7. EXISTING AND PROPOSED LANDUSE ZONE-VI

The Zone-VI has been proposed in the South of Kohat City along Indus Highway and Dhoda Road. The total area of zone-VI Comprises on 708 Acres.

##### Existing Landuse

The proposed zone have vacant areas, most of the land is under cultivation. Large parcels of vacant land is also available in the zone. The proposed zone is connected via Indus highway, which is active in commercial activity. The commercial activity is not planned and haphazard along highway.

##### PROPOSED DEVELOPMENT FRAMEWORK

Zone-VI is estimated to be one of the High to Medium Density Residential areas. The zone V falling near the fault line. The future population of the zone is estimated to be 50,038 person between 2023-2042 with the





population density of 100-50 person per acre. New CBD will serve 336.68 acre of land. The SDZ has been proposed on 118.96 acres of total land. Low density residential areas are on 251.75 acre of land.

### **PROPOSED LANDUSE**

The zone has proposed as High to medium density of 100-50 person per acre, which is suitable for the proposed New CBD. High to medium density is appropriate for the zone to be urbanized till 2042. Areas for new residential development and infill development is also available. Along Indus Highway Commercial Corridor is also proposed because of excessive commercial activity. neighbourhood centre of 24.71 acre and Civic Zone is on 69.21 acre of total land and will serve the whole city. The new residential areas have been proposed on 2.50 acres of total land. New residential areas are on 1543.40 acre of land.

Following uses has been proposed in the Zone:-

- a) Low density Residential Areas
- b) New CBD
- c) Special Development Zone

### **19.8. EXISTING AND PROPOSED LANDUSE ZONE-VII**

The Zone-VII has been proposed in the South of Kohat City along Indus Highway. The total area of zone-VII Comprises on 637 Acres.

#### **Existing Landuse**

The proposed zone have vacant areas, most of the land is under cultivation. Large parcels of vacant land is also available in the zone. The proposed zone is connected via Indus highway, which is active in commercial activity. The commercial activity is not planned and haphazard along highway. As the future growth and development has been observed in the south of the city, lack of civic and neighborhood facilities has been observed.

### **PROPOSED DEVELOPMENT FRAMEWORK**

Zone-VII is estimated to be one of the Medium to High Density Residential areas. The future population of the zone is estimated to be 48,052 person between 2023-2042 with the population density of 75 person per acre.

### **PROPOSED LANDUSE**

The zone has proposed as medium to high density of 75 person per acre, which is suitable for the new housing opportunities. The proposed density is appropriate for the zone to be urbanized till 2042. Areas for new residential development. Along Indus Highway Commercial Corridor is also proposed because of excessive commercial activity. As the proposed zones have large land pocket, civic zone and neighborhood center has been proposed. The zone is connected to Indus highway and proposed primary road of 120ft R.O.W. Following uses has been proposed in the Zone:-

- a) New future housing for all income groups
- b) Neighborhood Level Commercial Areas
- c) Commercial Corridor
- d) Pump Station





### 19.9. EXISTING AND PROPOSED LANDUSE ZONE-VIII

The Zone-VIII has been proposed in the South of Kohat City adjacent to Zone-VII along Indus Highway and Bannu Road. The total area of zone-VIII Comprises on 1492 Acres.

#### Existing Landuse

The proposed zone have vacant areas, most of the land is under cultivation. Large parcels of vacant land is also available in the zone. The proposed zone is connected via Indus highway, which is active in commercial activity. The commercial activity is not planned and haphazard along highway. As the future growth and development has been observed in the south of the city, lack of civic and neighborhood facilities has been observed. Illegal and unapproved housing scheme are also part of zone. There are few orchards in the zone.

#### PROPOSED DEVELOPMENT FRAMEWORK

Zone-VIII is estimated to be one of the Medium to High Density Residential areas. The future population of the zone is estimated to be 98,400 person between 2023-2042 with the population density of 75 person per acre.

#### PROPOSED LANDUSE

The zone has proposed as medium to high density of 75 person per acre, which is suitable for the new housing opportunities. The proposed density is appropriate for the zone to be urbanized till 2042. Areas for new residential development and infill development is also available. Along Indus Highway Commercial Corridor is also proposed because of excessive commercial activity. As the proposed zones have large land pocket, civic zone and neighborhood center has been proposed. The zone is connected to Indus highway.

Following uses has been proposed in the Zone:-

- a) New future housing for all income groups
- b) Civic Zone
- c) Neighborhood Centre
- d) Police Station
- e) Neighborhood Level Commercial Areas

### 19.10. EXISTING AND PROPOSED LANDUSE ZONE-IX

The Zone-IX has been proposed along Indus Highway. The total area of zone-IX Comprises on 669.28 Acres.

#### Existing Landuse

The proposed zone have vacant areas, health centre, residential and most of the land is under cultivation. Large parcels of vacant land is also available in the zone. The proposed zone is connected via Indus highway, which is active in commercial activity. Along Indus Highway Commercial Corridor is also proposed because of excessive commercial activity.

#### PROPOSED DEVELOPMENT FRAMEWORK

Zone-IX is proposed for infill development zone.

#### PROPOSED LANDUSE

The zone has proposed as medium to high density of 75 person per acre, which is suitable for the new housing opportunities. The proposed density is appropriate for the zone to be urbanized till 2042. Areas for low residential development and infill development is also available. Along Indus Highway Commercial





Corridor is also proposed because of excessive commercial activity. Following uses has been proposed in the Zone:-

- a) Infill Development Zone
- b) Low Density Residential Apartments

#### **19.11. EXISTING AND PROPOSED LANDUSE FUTURE RESERVE ZONES**

Total three zones have been proposed as future reserve areas. The zones including are as follows:-

- ❖ Zone 10
- ❖ Zone 11

The total areas of zones is 1237.66 acres of the project area boundary.

##### Existing Landuse

The zones are mostly vacant and undeveloped from years. There is no major development activity seen in the areas other than orchards, hilly terrain and cultivation. There are vacant housing schemes which were unapproved and illegal. Roads have been marked on the area but no development of residential and commercial areas have noticed since long. The city expansion is on the south-western direction.

##### PROPOSED DEVELOPMENT FRAMEWORK

The density of future reserve areas have not decided at this stage. The utilization of future reserve will be as per demand.

##### PROPOSED LANDUSE

As per guided future growth and development, the future reserve zones of the project area has been delineated. The proposed zones has different densities as per construction and hazard suitability. The zone on the North part of the map have high density up to 100 person per acre. These zones has been reserved to fulfill the future demand of residents. The major parts including all the neighborhood councils has been reserved for the infill development with the different population density as per construction suitability.

#### **19.12. EXISTING AND PROPOSED LANDUSE ZONE-XII**

The Zone-XII has been proposed in the South of Kohat City adjacent to Zone-XIII along commercial corridor. The total area of zone-XII Comprises on 361.82 Acres.

##### Existing Landuse

The proposed zone have vacant areas, most of the land is under cultivation. Residential land parcels are also available in the zone. The proposed zone is connected via Indus highway, which is active in commercial activity.

##### PROPOSED DEVELOPMENT FRAMEWORK

Zone-XII is estimated to be one of the Medium to High Density Residential areas. The future population of the zone is estimated to be 98,400 person between 2023-2042 with the population density of 75 person per acre.

##### PROPOSED LANDUSE

The zone has proposed as medium to high density of 75 person per acre, which is suitable for the new housing opportunities. The proposed density is appropriate for the zone to be urbanized till 2042. Areas for





new residential development and infill development is also available. Along Indus Highway Commercial Corridor is also proposed because of excessive commercial activity. Following uses has been proposed in the Zone:-

- a) New Residential Zone
- b) Trade/Business
- c) Grand Mosque
- d) Proposed STP

### **19.13. EXISTING AND PROPOSED LANDUSE ZONE-XIII**

The Zone-XIII has been proposed adjacent to Zone-III along Kohat- Hangu N80 and Peshwar- D.I Khan motorway. The total area of zone-XIII Comprises on 1509 Acres.

#### **Existing Landuse**

The proposed zone have vacant area and residential area is also available in the zone.

#### **PROPOSED DEVELOPMENT FRAMEWORK**

Zone-XIII is estimated to be one of the Medium to High Density Residential areas. The future population of the zone is estimated to be 98,400 person between 2023-2042 with the population density of 75 person per acre.

#### **PROPOSED LANDUSE**

The zone has proposed as medium to high density of 75 person per acre, which is suitable for the new housing opportunities. The proposed density is appropriate for the zone to be urbanized till 2042. Areas for new residential development. Following uses has been proposed in the Zone:-

- a) New Residential Zone
- b) Recycling Plant
- c) Dumping site

### **19.14. EXISTING AND PROPOSED LANDUSE ZONE-XIV**

The Zone-XIV has been proposed along cantonment area. The total area of zone-XIV Comprises on 385.77 Acres.

#### **Existing Landuse**

The proposed zone have vacant areas, most of the land is under cultivation. Large parcels of vacant land is also available in the zone. The proposed zone is connected via Indus highway, which is active in commercial activity. The commercial activity is not planned and haphazard along highway. As the future growth and development has been observed in the south of the city, lack of civic and neighborhood facilities has been observed. Illegal and unapproved housing scheme are also part of zone. There are few orchards in the zone.

#### **PROPOSED DEVELOPMENT FRAMEWORK**

Zone-XIV is estimated to be one of the Medium to High Density Residential areas. The future population of the zone is estimated to be 98,400 person between 2023-2042 with the population density of 75 person per acre.





## PROPOSED LANDUSE

The zone has proposed as medium to high density of 75 person per acre, which is suitable for the new housing opportunities. The proposed density is appropriate for the zone to be urbanized till 2042. Areas for new residential development and infill development is also available. Along Indus Highway Commercial Corridor is also proposed because of excessive commercial activity. As the proposed zones have large land pocket, civic zone and neighborhood center has been proposed. The zone is connected to Indus highway and proposed primary road of 120ft R.O.W. Following uses has been proposed in the Zone:-

- a) Mixed Use Urban Regeneration Zone (Commercial)
- b) Existing CBD
- c) New residential zone

### **19.15. EXISTING AND PROPOSED LANDUSE OF OTHER ZONES**

Following zones has been proposed to fulfill the future requirement of the project area other than housing needs.

- a) New Proposed CBD
- b) Special Development Zone
- c) Institutional zones
- d) City level Graveyard
- e) City level parks and playgrounds
- f) Industrial zones
- g) Technology zone
- h) Rural Urban Integration Zones
- i) Cattle farming zones
- j) Afghan Refugees resettlement Zone
- k) Urban regeneration zone
- l) Urban Farms
- m) Farmland Reserves
- n) Orchards Reserves
- o) Urban Vacant Zone
- p) Logistics & Auto workshop

### Current & Proposed Landuse of Zones

Most of the zones are along city peripheral areas. The technology zones and industrial zone have been proposed along the Indus high and canal road respectively. Technology zone, city level park, playground, institutional zone, graveyard has been proposed on the vacant land at the periphery of the city. The city Grand Mosque on 10 acres of land has been proposed on the center of Trade and Business hub of the Kohat city. The city level parks has been evenly distributed between the city to fulfill the land requirement of the project areas. Total 1200 acres of land has been delineated to the recreational uses. The agriculture activity has been reserved in the form of Agriculture reserve, urban farms and orchards reserves.





The placement criteria of New CBD is based on existing commercial areas, prevailing growth trends and inter and intra-regional connectivity. In continuation to the main proposed CBD, different special development zones and neighborhood commercial areas has been proposed.

The Rural Urban Integration plays vital role in the development of model villages and provision of cattle farms around these rural settlement. Sheikhan, Bilitang and Babri Banda are the main rural settlements which could convert into model villages. Main access roads will be provided to provide the access towards farm linkages. The existing small industrial estate was approved and established in 1980s, because of less potential and poor implementation & legal framework the state is still not fully occupied. The industrial estate should be occupied and the haphazard growth of industries inside the city should be controlled. To control this rapid increase of industries in the city technology zone and industrial zone has been proposed.

The institutional zone will cater the major need of Women University inside the city. Vocational and training centers will also part of this zone. The uses in this zone will not limited to the educational facilities but also city hall, fire stations, police stations, major health facilities and parking lots. The proposed roads have been aligned with the zone to provide efficient access to the zone from all directions.

## 20. PROPOSED LANDUSE DISTRIBUTION

The proposed built-up area of the Kohat City is 23750.64 acres as described in the following table. Area along the east and west of the city have been preserved for the future expansion of the urban boundaries. No development areas like areas along cantonment have also been mentioned. The total urban vacant area is 981.87 acres which depicts that the city would have a sound capacity for urban built environment.

Table 20-1: Proposed Landuse Distribution in Kohat city

Propose Landuse Distribution- Kohat City			
No	Landuse	Area In Acres	Percentage
1	Proposed Built-Up Area	23750.64	62.05
2	Water Body	2202.15	5.75
3	Future Reserve & Orchards Reserve	6313.61	16.50
4	Farmland Reserve + Cattle Farming Zone	1979.17	5.17
5	Urban Vacant	981.87	2.57
6	Restricted Area	3047.95	7.96
<b>Total Proposed Area</b>		<b>38275.40</b>	<b>100.00</b>

Kohat city’s major builtup landuse proportion has been defined for residential purpose i.e. 59% because the city has the potential to grow in south east and west directions. A reasonable percentage of commercial and civic activities have been proposed to meet the social and economic needs of the residents. Moreover, while taking into consideration the need of industrial development, 4.14 percent of the total built up area has been assigned for the development of industrial zone, technology zone and logistics hub. For ecological preservation and enhancement of beauty of the city, total 18% built up area has been proposed for playgrounds, wild life park and green buffers in the city.





**Table 20-2: Proposed Built-up Landuse distribution in Kohat City**

<b>Proposed Builtup Landuse Distribution- Kohat City</b>			
<b>No</b>	<b>Landuse</b>	<b>Area In Acres</b>	<b>Percentage</b>
1	Residential including internal street	14054.71	59.18
2	Commercial & Mixed use (SDZ, Urban Regeneration, Corridors, CBD, Trade & Business Hub)	1987.56	8.37
3	Public & Admin Buildings	759.77	3.20
4	Green/Open spaces (including Parks, Playgrounds & wildlife park, safari park, eco-conservation park and green buffer)	4304.65	18.12
5	Industrial Zone, Technology Zone & Logistics Hub	982.65	4.14
6	Graveyard	328.56	1.38
7	Roads (including Transport Terminals )	1229.76	5.18
8	Public Utility Buildings	102.98	0.43
<b>Total Proposed Area</b>		<b>23750.64</b>	<b>100.00</b>

**Table 20-3: Proposed Zonal Landuse Distribution in Kohat City**

<b>Proposed Landuse Distribution- Kohat City</b>			
<b>No</b>	<b>Landuse</b>	<b>Area In Acres</b>	<b>Percentage</b>
1	Residential	14054.71	36.72
2	Commercial & Mixed use (SDZ, Urban Regeneration, Corridors, CBD, Trade & Business Hub)	1987.56	5.19
3	Public & Admin Buildings	759.77	1.99
4	Green/Open spaces (including Parks, Playgrounds & Urban Farms)	4304.65	11.25
5	Industrial Zone, Technology Zone & Logistics Hub	982.65	2.57
6	Graveyard	328.56	0.86
7	Roads (including Transport Terminals & Railway Line)	1229.76	3.21
8	Public Utility Buildings	102.98	0.27
9	Water Body	2202.15	5.75
10	Future Reserve & Orchards Reserve	6313.61	16.50
11	Farmland Reserve + Cattle Farming Zone	1979.17	5.17
12	Urban Vacant	981.87	2.57
13	Restricted Area	3047.95	7.96
<b>Total Proposed Area</b>		<b>38275.40</b>	<b>100.00</b>

