Prospects of development until 2015 for each area are as follows.

(1) Barikab

It is judged that the development for up to 100,000 people may be possible with the water from shallow wells in the vicinities. Therefore, only the ongoing settlement for returned refugees should be carried out until the major water resources development is undertaken to bring water from the Panjshir basin.

(2) Dehsabz north

It is judged that the development for up to 150,000 people may be possible with the water from the Shomali aquifer. Therefore, only the ongoing 26 Dalwa project with 150,000 people should be undertaken until the major water resources development is undertaken to bring water from the Panjshir basin.

(3) Dehsabz south

It is judged that the development for up to 100,000 people may be possible with the local groundwater, which may be used either for the Paymonar project planned by the Kabul municipality or other development schemes. The use of the local groundwater should be considered temporary until the major water resources development is undertaken to bring water from the Panjshir basin. The tables of the local groundwater should be carefully monitored, and the development should be adjusted to avoid conflicts with existing water users nearby.

(4) Paymonar

Development up to about 100,000 people is judged possible based on the local groundwater. It should be noted that this groundwater source is limited to tentative and temporary use until the major water resources development is completed to bring water from the Panjshir river.

7 INFRASTRUCTURE DEVELOPMENT PLAN FOR THE NEW CITY

7.1 Transportation System

7.1.1 Traffic demand forecast

(1) Method and conditions of traffic demand forecasting

The traffic demand forecast is carried out by using the “four-step model” commonly used for the purpose. In this method, the following steps are taken.

1) Based on the present origin-destination (OD) table obtained from the person-trip (PT) survey and the present socioeconomic indices, a present generation and attraction model by each purpose is established. Afterwards, the future generation and attractions shall are estimated by applying the future socioeconomic indices to the model formula.
2) Using the present OD table and the shortest route distances on the trunk roads between the gravity center of districts, a distribution volume model by each purpose is established. Afterwards, the future OD table is constructed by applying the future generation and attraction to the model formula.
3) The traffic of non-inhabitants (cordon OD, Kabul airport users OD and donors OD) is estimated separately in accordance with the growth of GDP and other indices.
4) From the present OD table by purpose and distances between zones, a mode sharing model is established. Similarly, the public transport OD table and private transport OD are extracted from the future OD table by purpose.

(2) Trip generation and attraction in 2025

In the central districts of the Kabul city (Districts 1, 2, 3, 4, 5, 11 and15), the trip generation and attraction increases by less than 1.5 times from 2008 to 025. In other districts surrounding the central districts (Districts 6 through 17), they increase by up to 5 times. In District 18 overlapping with Paymonar of the new city and District 19 overlapping with Dehsabz south, the increase rates are about 40 and 30 times, respectively. The largest increase is observed in District 21 at about 90 times (Figure 27 and Table 15).

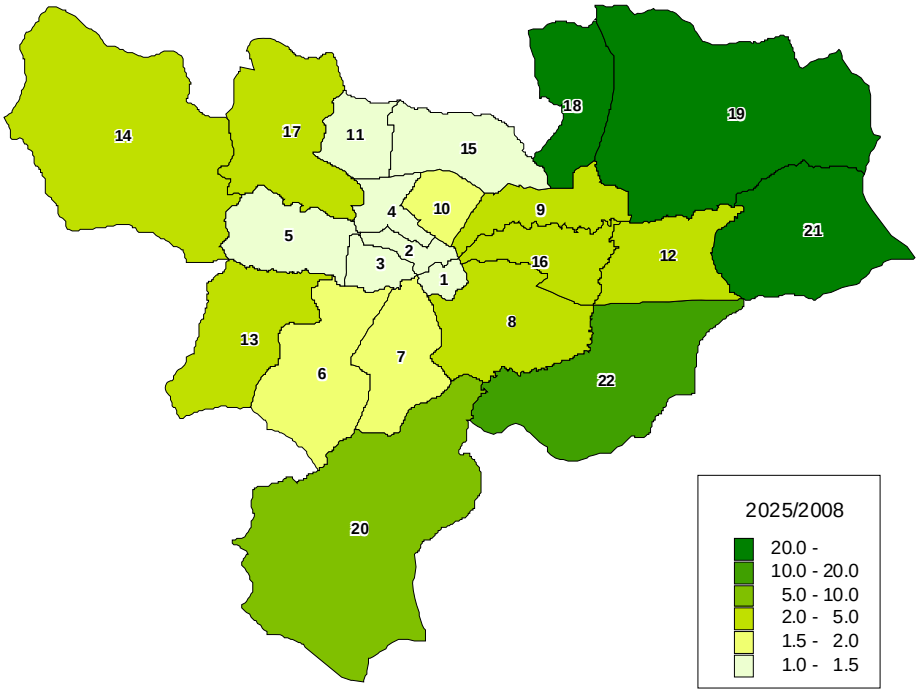


Figure 27 Classification of Kabul City Districts by Increase Rate of Trip Generation and Attraction between 2008 and 2025

Table 15 Generation and Attraction by Zone in KMA

(Unit: trips/day)

Zone	Generation			Attraction		
	2008	2025	2025/2008	2008	2025	2025/2008
1	160,596	178,493	1.1	179,818	196,255	1.1
2	247,018	294,376	1.2	271,120	311,948	1.2
3	201,222	258,148	1.3	202,422	263,631	1.3
4	257,861	302,803	1.2	254,697	304,766	1.2
5	313,677	412,420	1.3	302,039	411,244	1.4
6	140,484	250,947	1.8	139,460	253,053	1.8
7	169,563	320,895	1.9	165,785	321,627	1.9
8	173,319	412,269	2.4	163,889	398,231	2.4
9	166,647	441,644	2.7	166,667	445,397	2.7
10	331,896	511,720	1.5	333,306	509,036	1.5
11	225,127	253,395	1.1	227,900	252,242	1.1
12	111,150	225,907	2.0	108,461	228,504	2.1
13	89,615	192,400	2.1	86,294	194,213	2.3
14	96,514	253,460	2.6	93,350	245,184	2.6
15	259,501	369,556	1.4	256,275	369,090	1.4
16	69,992	203,022	2.9	67,168	195,789	2.9
17	54,001	229,833	4.3	53,162	223,456	4.2
18	5,182	200,698	38.7	4,895	200,841	41.0
19	14,193	405,248	28.6	13,598	401,738	29.5
20	24,877	175,711	7.1	22,855	174,461	7.6

Zone	Generation			Attraction		
	2008	2025	2025/2008	2008	2025	2025/2008
21	2,436	209,506	86.0	2,355	207,654	88.2
22	13,844	154,366	11.2	13,199	157,743	12.0
Subtotal	3,128,715	6,256,815	2.0	3,128,715	6,266,104	2.0
31	-	168,840	-	-	167,693	-
32	-	603,026	-	-	598,929	-
33	-	360,976	-	-	358,524	-
34	-	234,405	-	-	232,812	-
Total	-	7,624,062	-	-	7,624,062	-

(3) Trip distribution in 2025

The desired lines of traffic for all-purpose trips over 1,000 are shown in Figure 28. As expected, many trips will start and/or end at nodes in the new city.

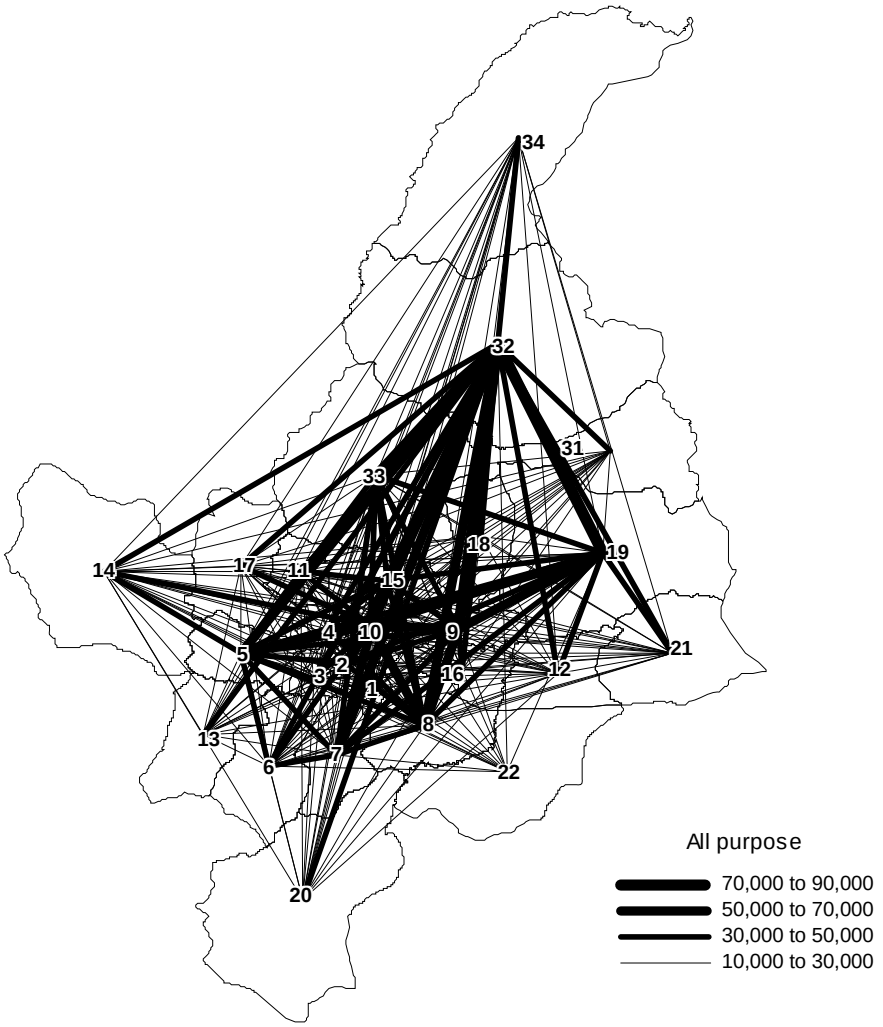


Figure 28 Desire Lines for All Purpose Trips in 2025

(4) Traffic assignment

The traffic assignment in 2025 without any development in the present road network is shown in Figure 29. Traffic congestion will apparently occur on most links. Especially on the Bagram road linking the existing Kabul city and the new city, the traffic volume will increase to 410,000PCU/day, 22 times the present traffic level, which in fact will not be passable with the present road capacity.

7.1.2 Road network development plan

The existing artery roads in the Kabul city radiate from the city center to all the directions. There exists no ring road in the artery network for Kabul. With this structure, the traffic on major radial arteries is projected to increase well beyond their respective capacity as shown in Figure 26. To relieve the traffic on major radial arteries, the Kabul city outer ring road (KCORR) would be effective. The alignment of the KCORR should be selected in such a way for it to serve as an artery road for the new city as well. The development of the new city with proper artery road system is another way to reduce the traffic between the new city and the Kabul city center.

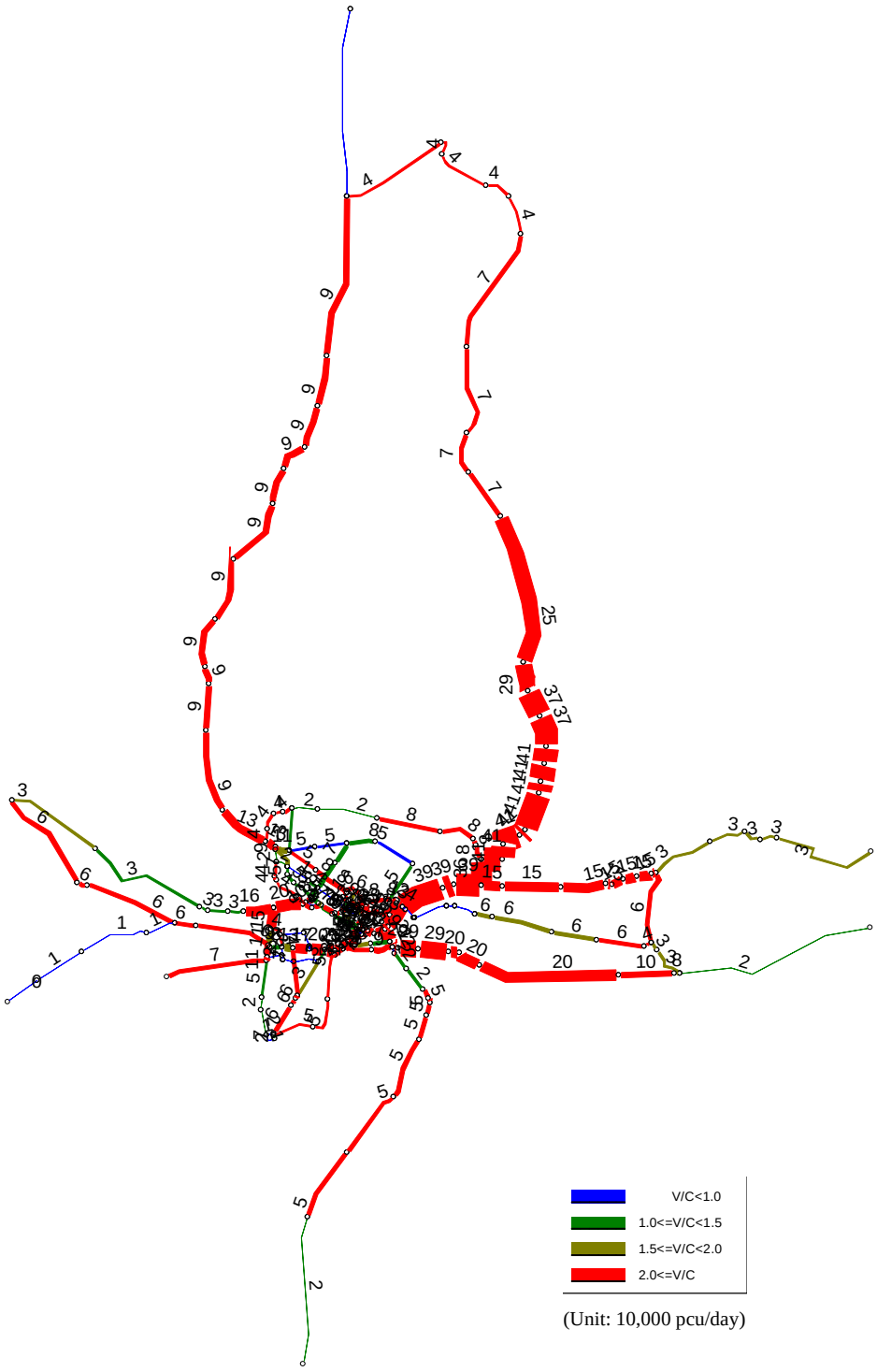


Figure 29 Traffic Flow Expected in 2025 (Without project case)

The master plan proposes to preserve and enhance the existing villages and farmland as a matter of principle. Artery roads in the new city are aligned to avoid the existing farmland and yet to serve the existing villages well by providing easy access to urban markets and facilities.

In planning for the road network for the new city, first modified road classification is proposed and design criteria are clarified with respect to right-of-way, carriageway and provision for non-motorized traffic. Then, specific road projects are proposed in line with the spatial framework described in Section 3.2 and with the specifications following the road classification and the road design criteria.

(1) Road classification

The relationship between the functional classification such as artery roads and others and design classes such as expressways is not clear in the present road classification in Afghanistan. Consequently, a road at higher functional category serving for inter-provincial traffic tends to be treated in a low design class if the present traffic is small. Many city roads may be categorized as expressways based only on large traffic. Modified road design standards are proposed in Table 16.

Table 16 Modification of Road Design Standards

Design class	Area	Design speed (km/h)	ROW (m)	Default (signals/km)
S	Rural	120-80	100	-
	Urban	100-75	50-100	-
I	Rural	90-75	50-100	0.2-0.5
	Urban	75-65	50-100	0.5-2.0
II	Rural	65-50	30-50	0.5-2.0
	Urban	55-40	20-50	2.0-4.0
III	Rural	55-40	20-30	2.0-4.0
	Urban	55-40	18-27	4.0-6.0
IV	Rural	40-20	6-20	4.0-6.0
	Urban	40-20	7-18	6.0-

(2) Design criteria

Right-of-way

Standards for the road right-of way (ROW) may be determined according to the functional classification of roads as shown in Table 17. Provision is made for spaces for utilities, and reserve for extra lanes corresponding to future traffic demand or public transport corridor.

Table 17 Road Functional Classification and Right of Way (ROW)

Classification	Area specification	Lanes (n)	ROW (m)
Expressway	Rural	4	100
	Urban	4	50-100
Major Arterial	Rural	4	30-100
	Urban	4	20-100
Arterial	Rural	2 - 4	20-50
	Urban	2 - 4	18-27
Secondary	Rural	2 - 4	6-30
	Urban	2 - 4	7-27
Community	Rural	1 - 2	6-20
	Urban	1 - 2	7-18

Carriageway

The width of road in each class and road shoulders are determined following the Afghan standards. For city roads with four lanes newly specified, the width of inner shoulders is determined to be 0.5m.

Provision for NMT

Considering the use and registration of bicycles in Kabul, bicycle excusive lanes will not be provided. Bicycles will share the same lanes with either vehicles or pedestrians, depending on the car traffic. The minimum width and standards for walkways and bicycle ways are determined based on the Afghan and Japanese standards.

(3) Proposed road projects

Proposed road projects are shown in Figure 30. Each project is outlined.

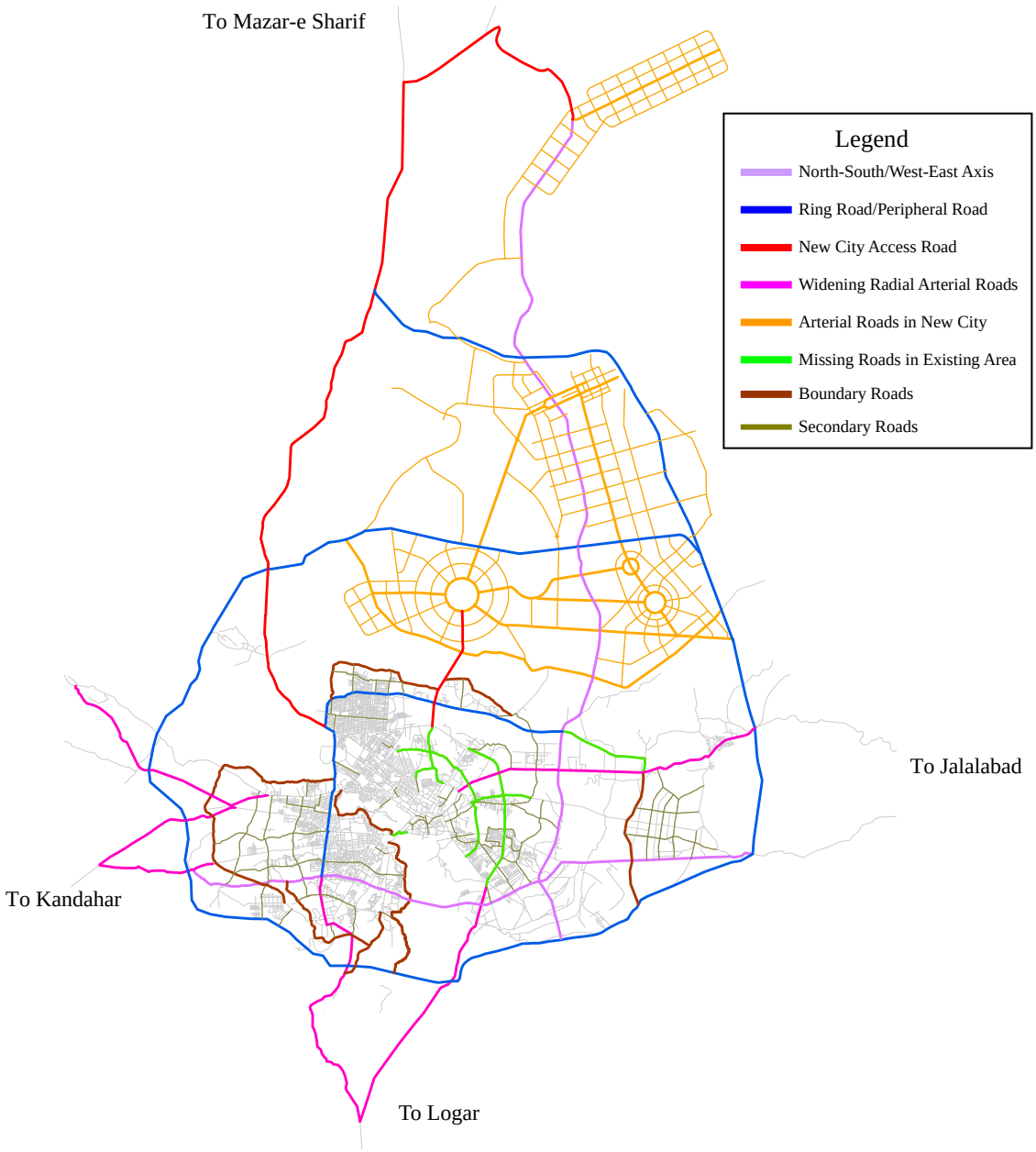


Figure 30 Proposed Road Projects for KMA Development

1) North-south and east-west axes

The north-south axis is established by the existing Bagram road and its southern extension up to the Kabul city outer ring road. The extension section functions also as the eastern portion of the Kabul city inner ring road (KCIRR). The new east-west axis is established as an alternative to the existing corridors from RH01 to RH05 and from RH01 to the Bagrami road. These axes form main

north-south and east-west axes that do not pass through the Kabul city center.

These axes are designed as Class-I in consideration of the provision for bus exclusive ways and rail transport in the future. The Bagram road is being expanded into four lanes, and additional two lanes will be provided in the future as well as bus exclusive lanes. Typical cross-sections of the roads constituting the north-south and the east-west axes are provided in Figures 31 and 32 with their stage-wise expansion.

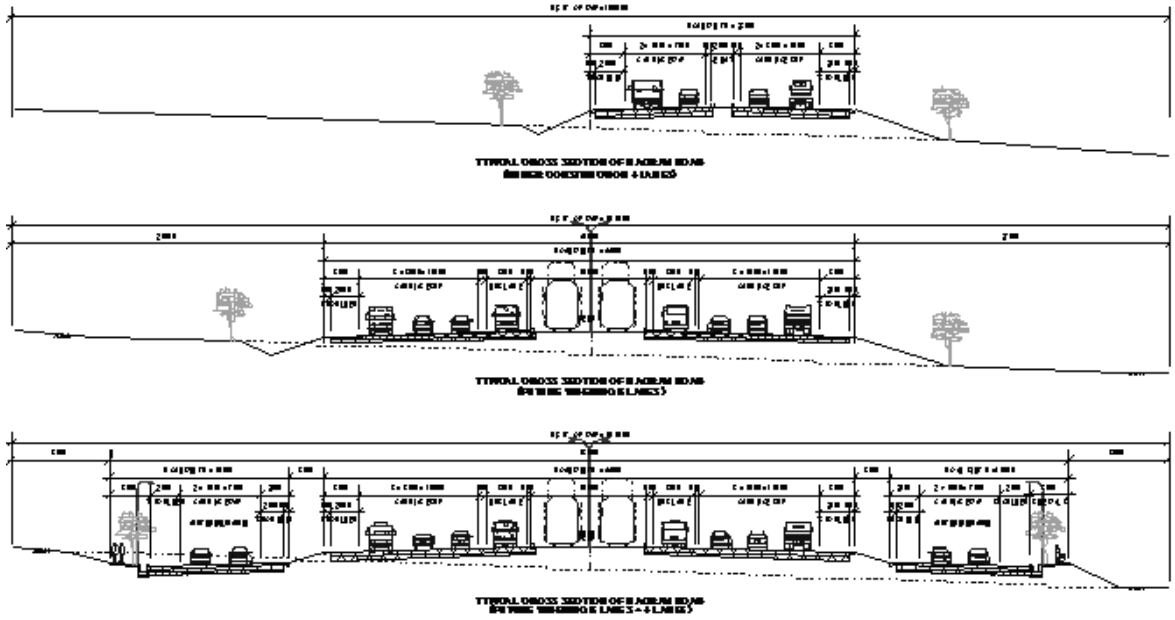


Figure 31 Stage-wise Typical Cross Section of Bagram Road

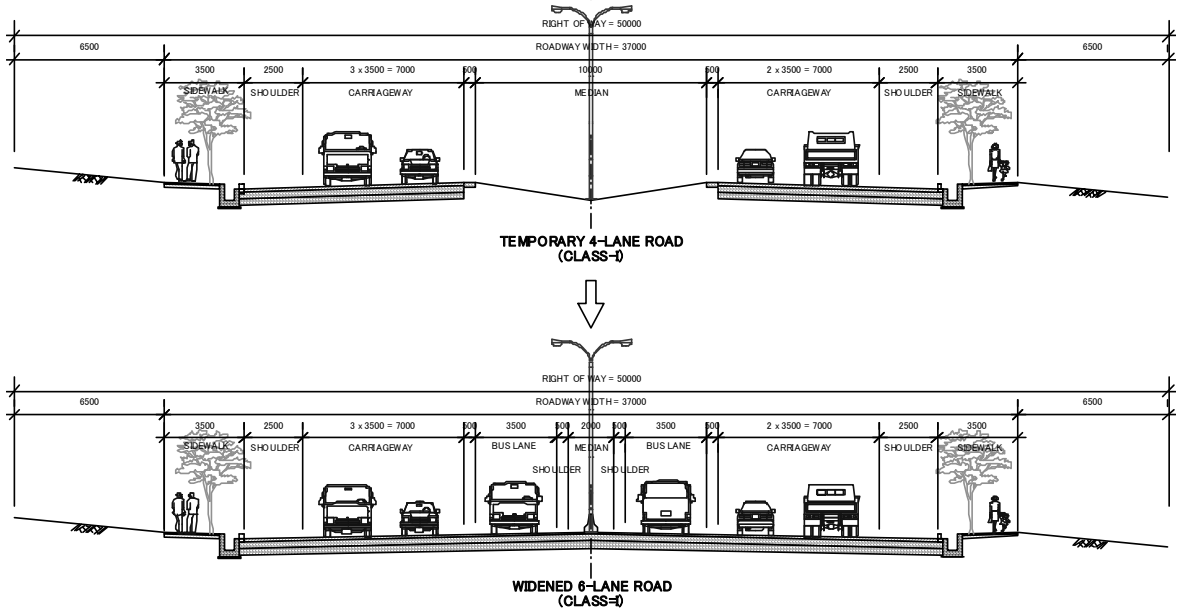


Figure 32 Stage-wise Typical Cross Section of West-East Axis

2) Ring roads and peripheral road

The Kabul city outer ring road (KCORR) is planned at 15-20km from the city center, and to function also as a main artery of the new city. The Dehsabz peripheral artery road is planned to serve the traffic between the east to Jalalabad and beyond and the north to Parwan and beyond (Figure 33). This artery will prevent the through traffic to use city roads of the new city. At the same time, this periphery artery road is aligned to serve the existing villages at the foot of the eastern mountains,

avoiding the existing farmland.

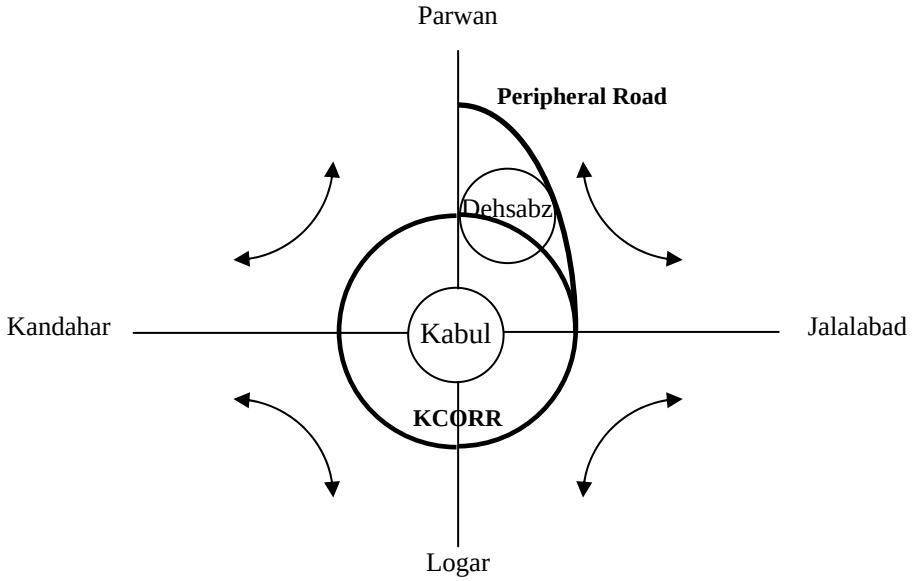


Figure 33 Function of Peripheral Road

The KCORR is designed as Class-S as planned by MoPW. The Dehsabz periphery artery road adopts the same standard. The design standards for the Kabul city inner ring road (KCIRR) vary depending on the sections. The sections expanding the existing roads are designed as Major roads as the wider right-of way cannot be secured. Typical cross-sections of these roads are shown in Figures 34 and 35 with stage-wise expansion.

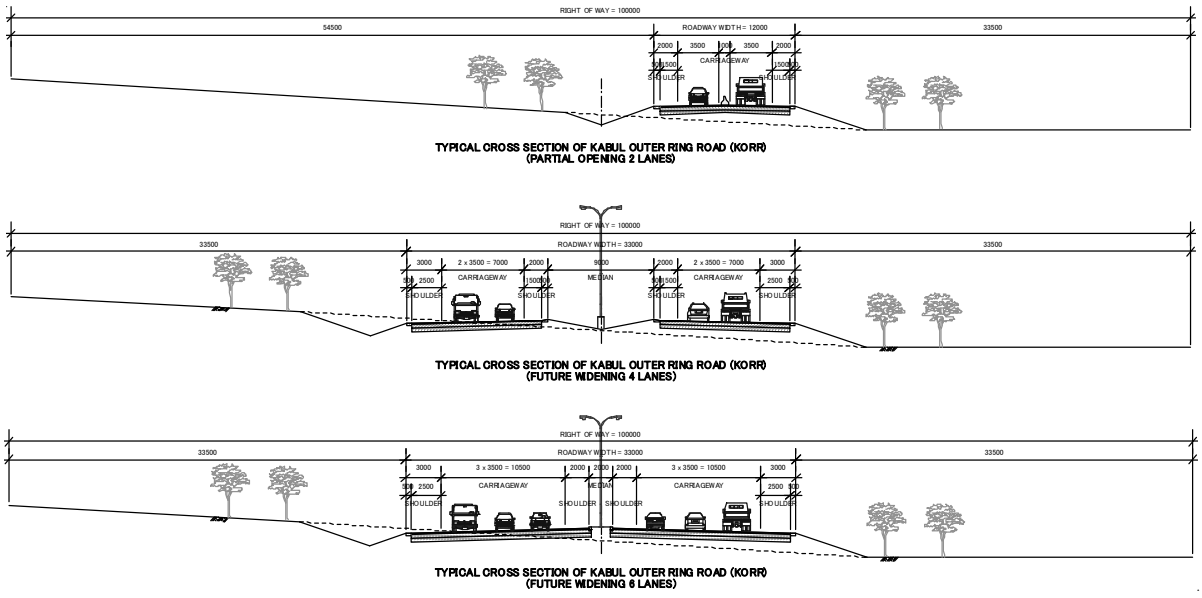


Figure 34 Typical Cross Section of KCORR and Peripheral Road

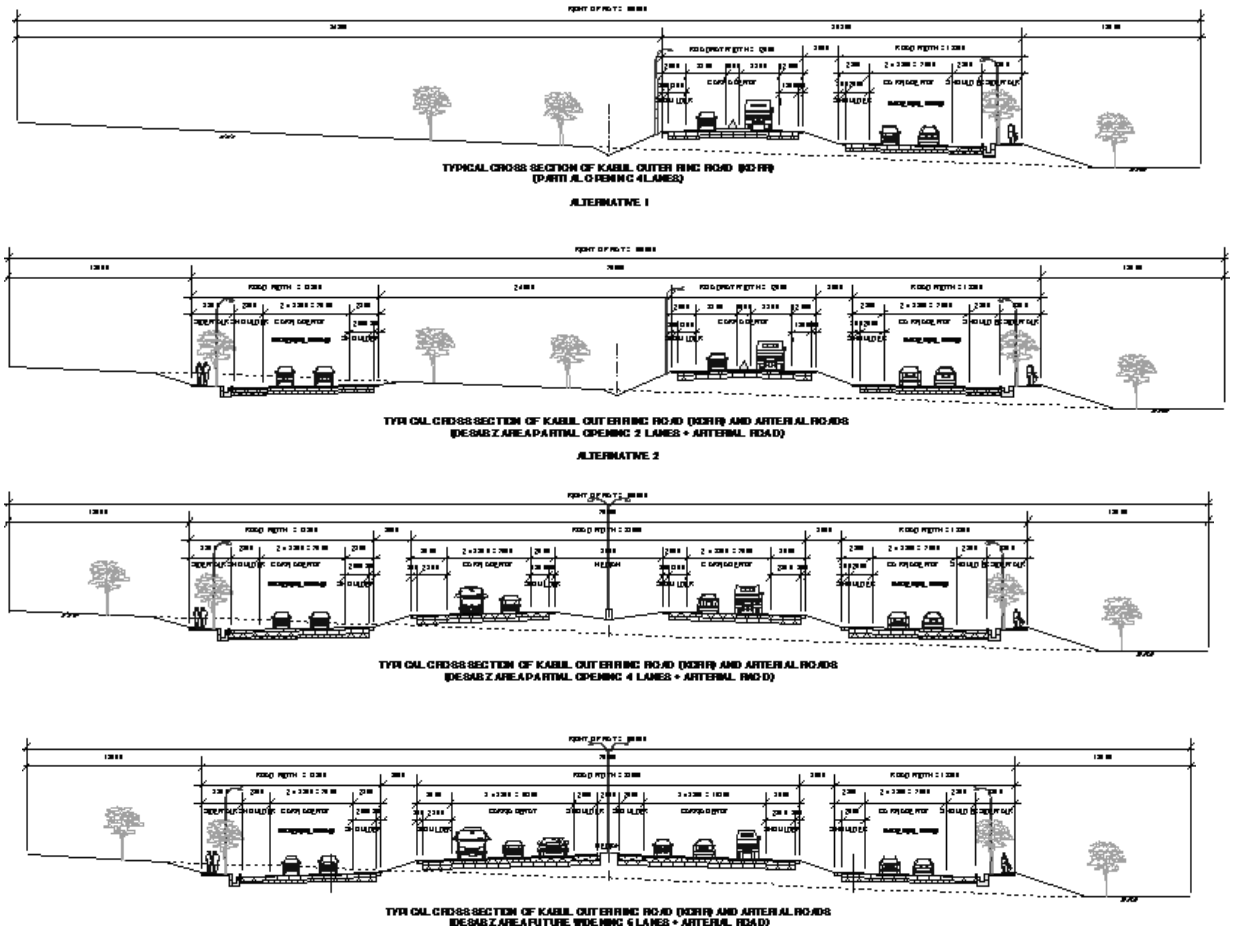


Figure 35 Stage-wise Typical Cross Section of KORR in New City Area

3) Access roads to the new city

The traffic entering to the Kabul city from the north is some 18,000PCU/day at present, which is transported by the existing Bagram road and RH04. The traffic is projected to increase by 10 times once the new city is developed with the population of 1.5million by 2025. In addition to the expansion of these existing roads and the establishment of the KCORR, other roads need to be provided as summarized in Table 18. Typical cross-sections of these roads are shown in Figures 36 and 37. Stage-wise expansion is indicated for the Mazar-e Sharif road (RH04).

Table 18 Outline of Access Road to New City Area

Road	Design class	Design speed (km/h)	Length (km)	ROW (m)	Road width (m)	Lanes (n)
Bagram Road (Upgrading section)	Class-I (Rural)	90	39.0	100	46.0 83.0*	6 + 2 bus
Barikab Road	Class-II (Rural)	65	14.4	50	24.0	4
Mazar-e Sharif Road (Outside of KCORR)	Class-S (Rural)	120	29.8	100	70.0	4
Mazar-e Sharif Road (Inside of KCORR)	Class-I (Urban)	75	10.6	37-50	37.0	6
Dehsabz Tunnel Road	Class-II (Urban)	55	7.1	37	37.0 (37.0)	(4) + 2 bus

( ): in case of opening temporary section
* In case of introducing service road outside of through traffic lane
Service road along through traffic lane is established in Mazar-e Sharif Road (out of KCORR) section

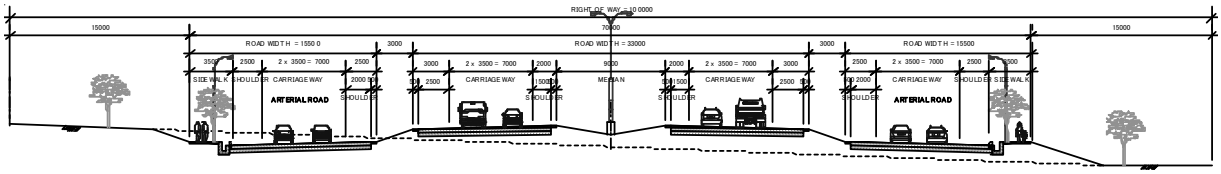
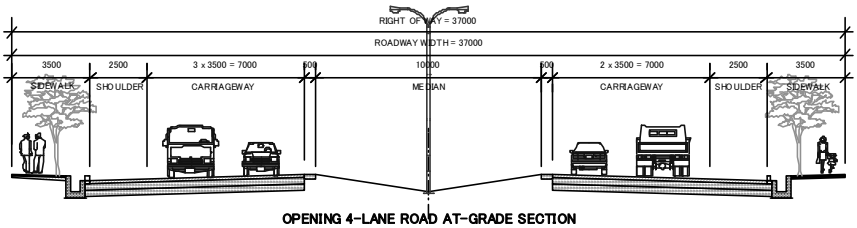
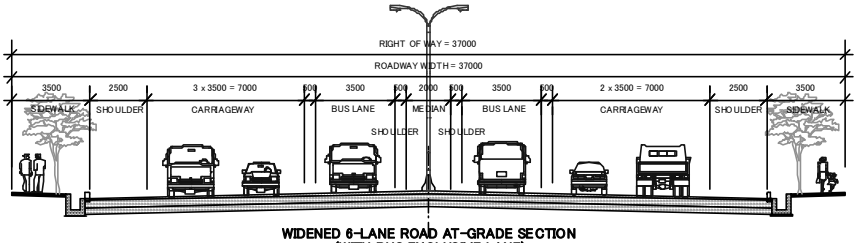


Figure 36 Typical Cross Section of RH04 (Mazar-e Sharif Road)

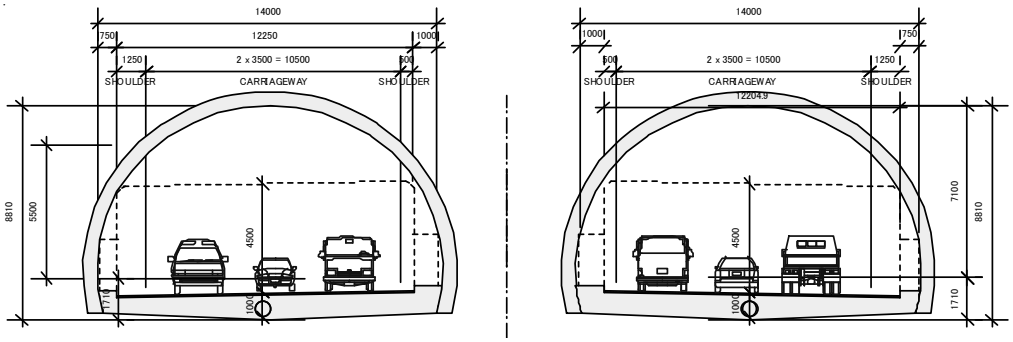


OPENING 4-LANE ROAD AT-GRADE SECTION



WIDENED 6-LANE ROAD AT-GRADE SECTION
(WITH BUS EXCLUSIVE LANE)

At-grade Section



Tunnel Section

Figure 37 Typical Cross Section of Dehsabz Tunnel Road

4) New city roads development

Roads in the new city should be developed ahead of the urban land development, starting from the artery roads. In the planned urban areas in the new city, main roads should be installed at the intervals of 1.0km on average. This will make the average road density 3.0km/km2 more or less. Artery and secondary roads are distinguished, and the former are planned as Major roads and the latter as Minor roads. Typical cross-sections of these roads are shown in Figure 38.

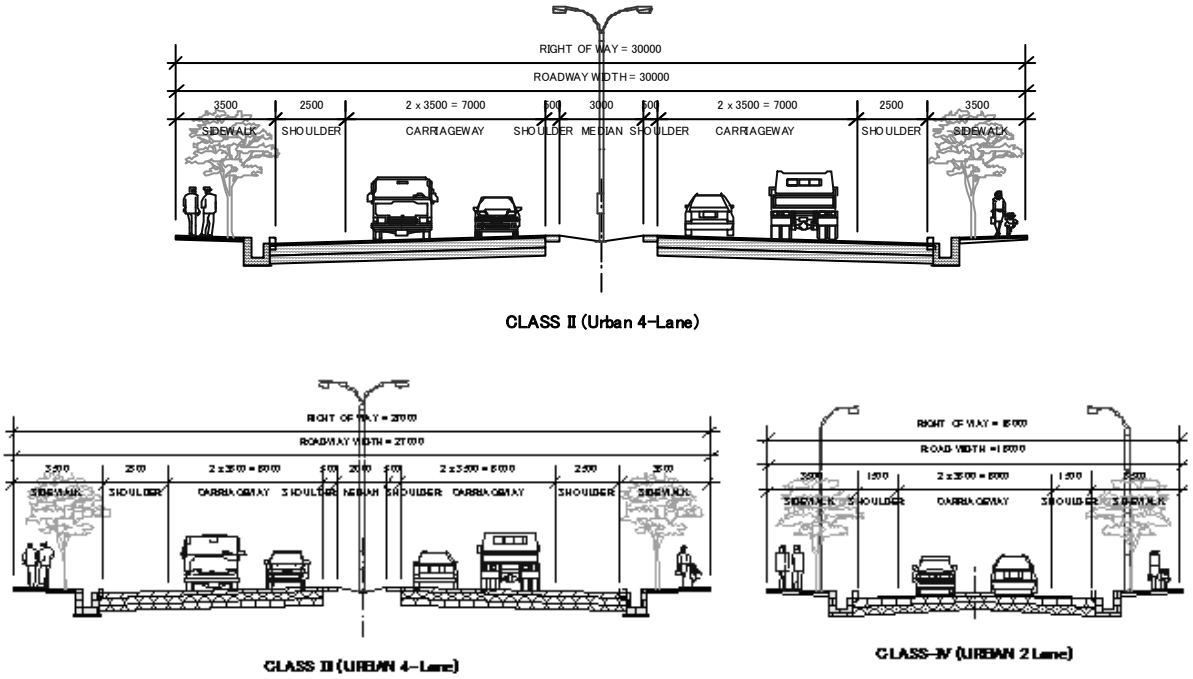


Figure 38 Typical Cross Section of Arterial and Secondary Roads in New City Area

(4) Public transport development plan

1) Bus rapid transport system

The bus rapid transport (BRT) system should be established linking the existing Kabul city with Dehsabz and Barikab. The BRT network should cover some part of the existing urban area as well. Feeder services from the BRT stations should cover the entire city area effectively. Terminals for inter-city bus services should be located in the suburbs, and linked to the city center by the BRT or feeder services. The proposed bus route network for the KMA and the Kabul city is illustrated in Figure 39.

At major bus stops for the BRT, inter-change bus stops should be provided to facilitate the transfer between the BRT and feeder services. The inter-city bus terminals should be located along the KCORR, the north-south axis, and the east-west axis for services to the east, west, north and south. The city bus terminals should be located along the Kabul City Inner Ring Road (KCIRR), inside the city center, and at each of the four sub-centers of the new city for a total of 16 terminals in the KMA.

Functions and scale required at each bus terminal are summarized in Table 19. Images of integrated bus terminal in the suburbs and inter-change bus stop for the BRT and feeder services are illustrated in Figures 40 and 41, respectively.

Table 19 Comparison for PCU of Each Bus Vehicle

	Microbus	Minibus	Large bus	Total
Vehicle capacity	8	25	60	-
PCE	1.0	2.0	3.0	-
Present				
Trips	546,853	201,759	441,292	1,189,904
Vehicles	68,357	8,070	7,355	83,782
PCU	68,357	16,141	22,065	106,562
Target				
Trips	281,239	151,319	757,346	1,189,904
Vehicles	35,155	6,053	12,622	53,830
PCU	35,155	12,106	37,867	85,128

	Microbus	Minibus	Large bus	Total
Change (%)	-49	-25	72	-20

2) Railways introduction

Demand for public transportation

Characteristics of public transportation are analyzed by the number of passengers and the average transit distance as schematically shown in Figure 42. As seen from the table, railway mass transit such as trains and subways fit to transport of a large number of passengers over long distances, and the LRT such as trams fits to medium transport over medium distance. The BRT proposed above intends to have functions similar to the LRT with exclusive bus lanes for medium transport needs. Considering the relatively long distance between the Kabul city and the new city, particularly Barikab and Dehsabz north, introduction of rail-based transport may become necessary.

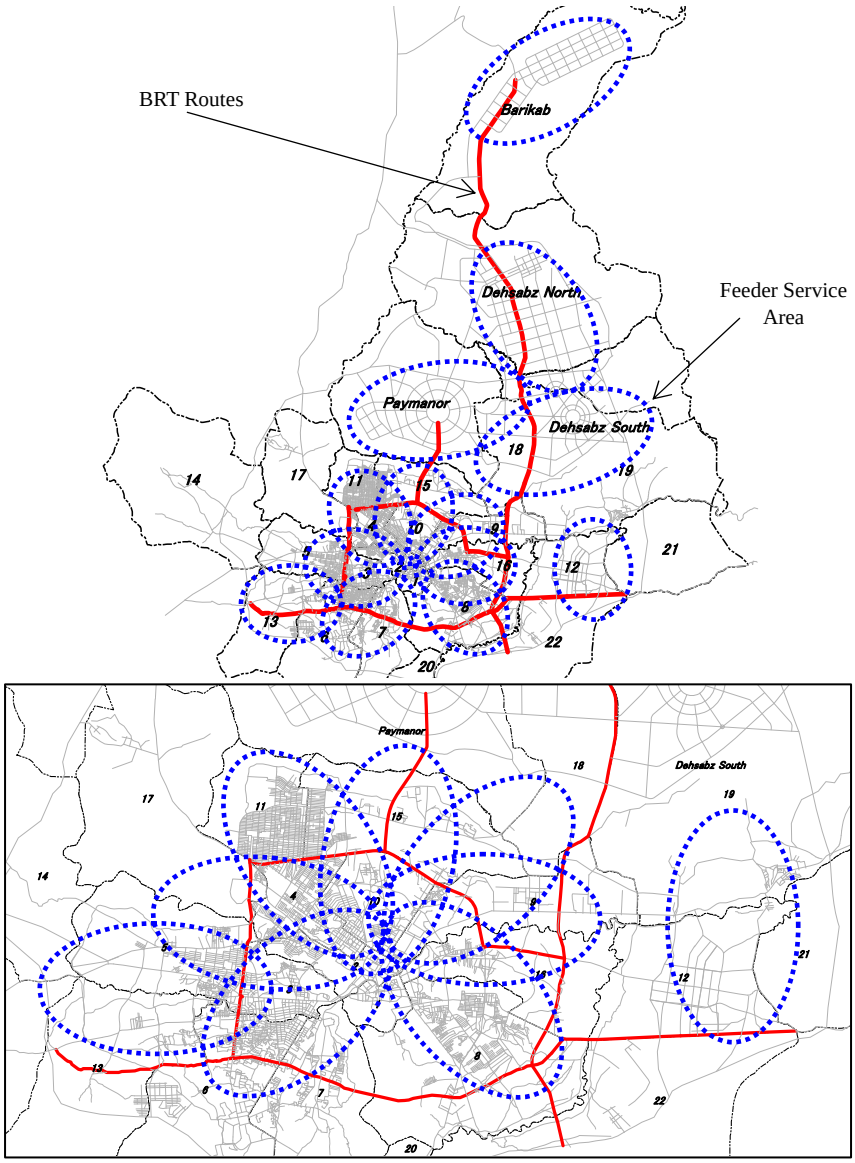


Figure 39 Proposed Future Bus Routes Network

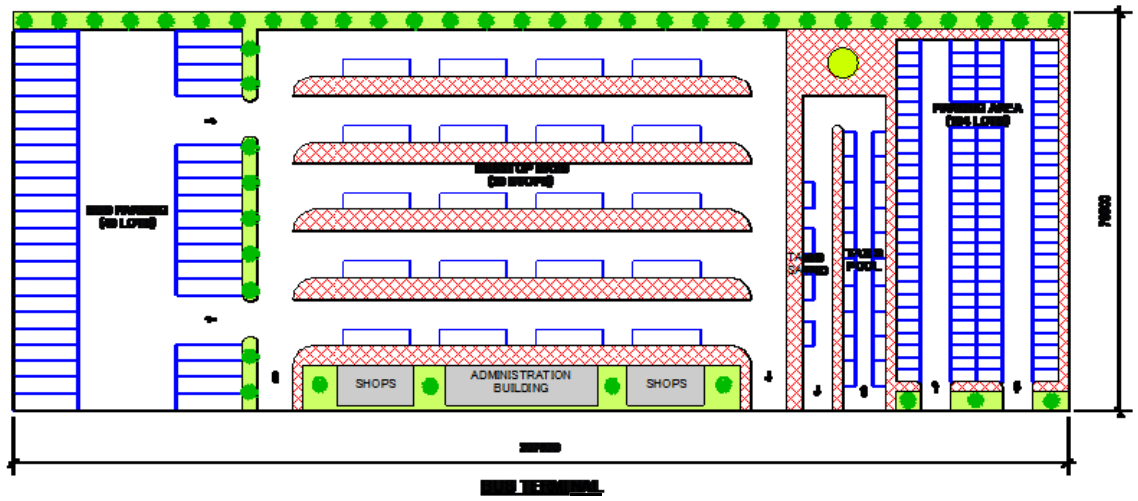


Figure 40 Image of Integrated Bus Terminals in Suburban Area

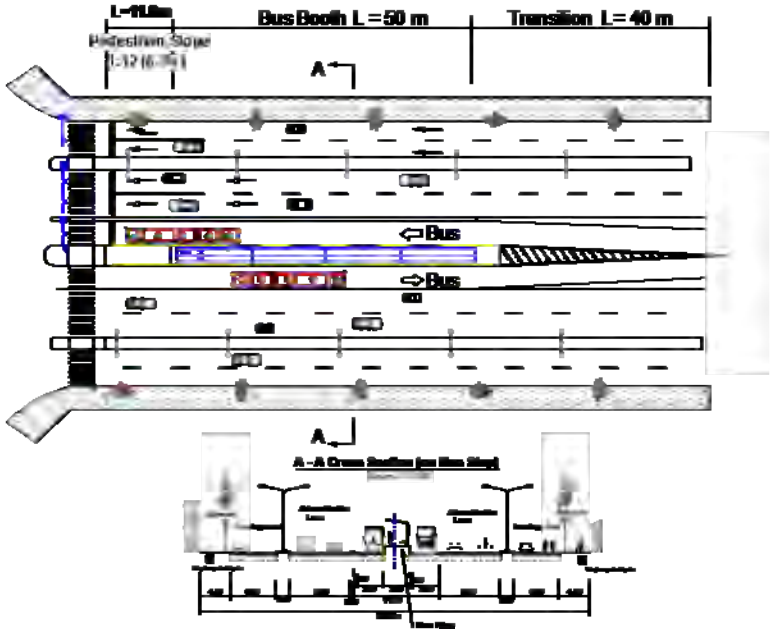


Figure 41 Image of Interchange Bus Stop for BRT and Feeder Bus

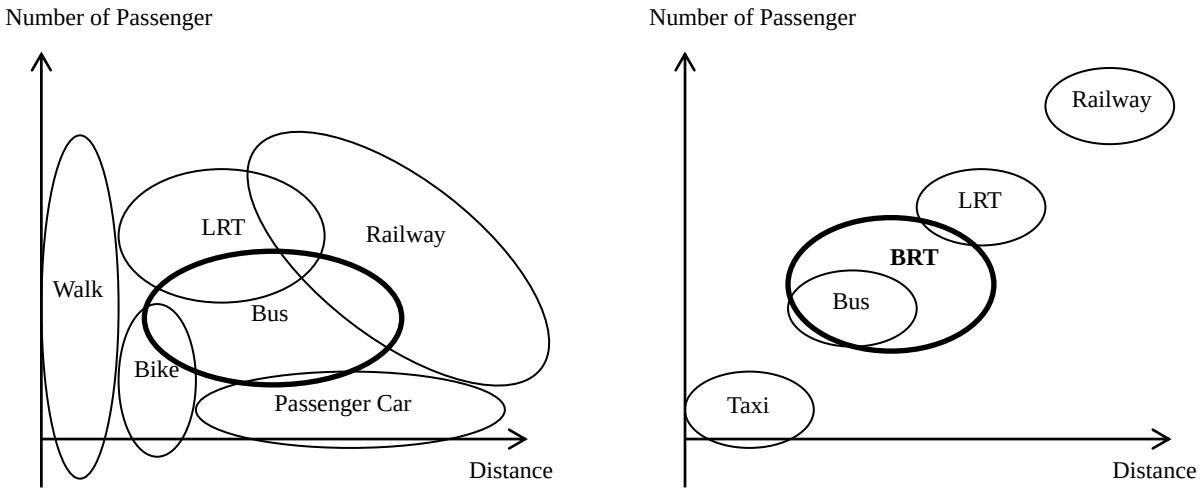


Figure 42 Service Scope of Various Public Transport Means

The maximum capacity for the BRT is generally considered to be 7,000 trips/hour. Therefore, the introduction of the rail-based transport may become necessary between the new city and the existing Kabul city, and also between the eastern and the western areas of the city to the city center by 2025. The proposed exclusive bus lanes may be converted to the tracks of the LRT relatively easily.

As the proposed BRT serves mainly peripheries of the existing urbanized areas, however, the access to the central area should be strengthened to facilitate the use of the LRT by passengers. Therefore, additional exclusive tracks are proposed. The strengthened access should be combined with the control of private vehicles entering the city center. This would require the provision of parking facilities in the peripheries to encourage the use of the mass transit.

Development plan

Conversion of the BRT to the LRT by section is planned towards 2025 and beyond. The LRT may be introduced first to the BRT sections linking the peripheries to the city center, and the feeder services in these sections would be converted to the LRT. The access between the new city and the existing urbanized areas of the Kabul city would be strengthened by the LRT by 2025. Subsequently, the sub-centers in the new city would be linked by the LRT so that the entire Dehsabz area is integrated within itself and with the Kabul city.

The LRT may cover 76.3km initially. The peak demand of 10,500passengers/hour in 2025 may be met by round trip services of four routes, each by a train of four cars, and a total of 80 cars may be required. Proposed routes of the LRT are shown in Figure 43. Typical cross-sections of the LRT tracks installed on major roads are shown in Figure 44.

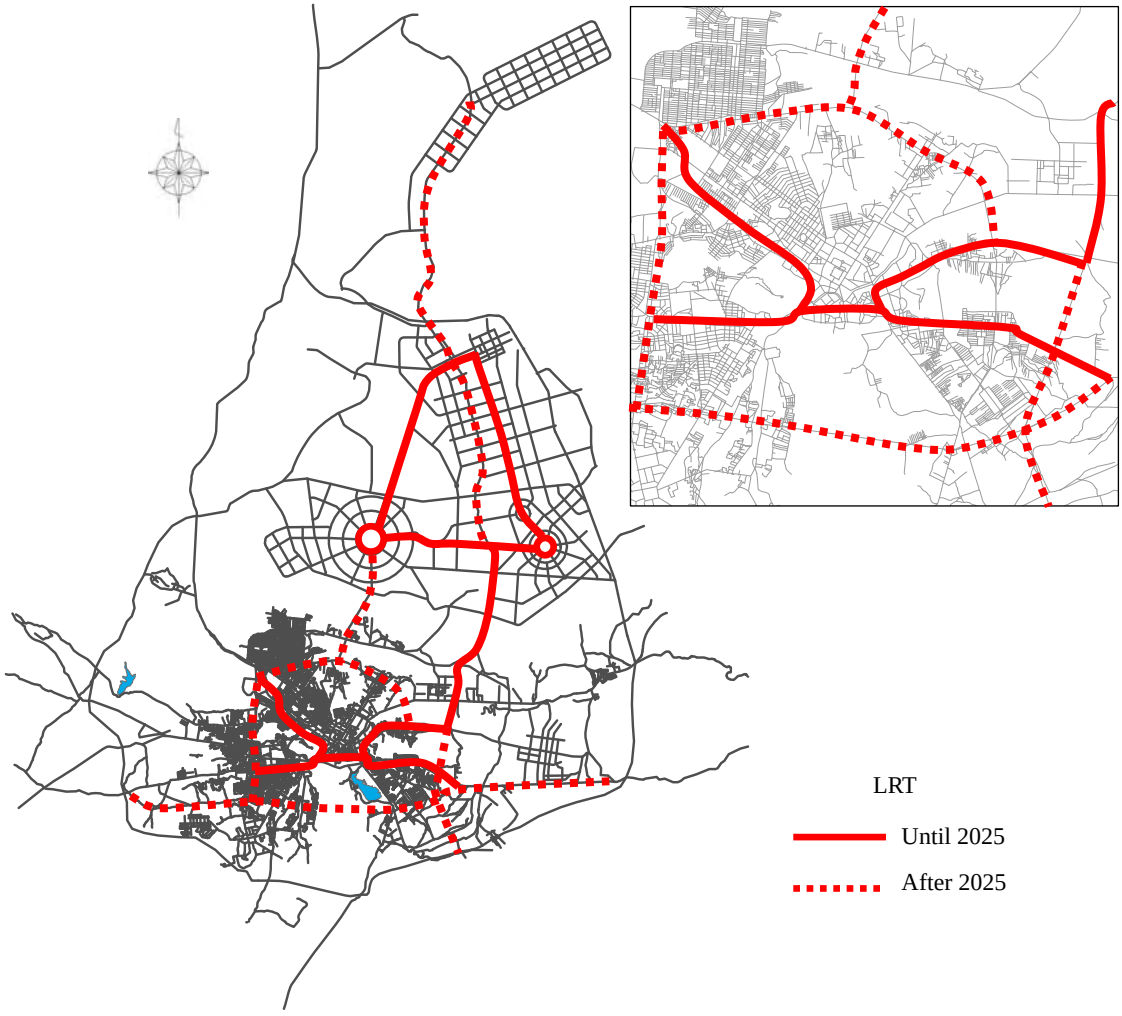


Figure 43 Proposed Routes of LRT

3) Truck terminals

It is desirable that a public truck terminal be located along each radial artery road extending from the Kabul city center to the east, west, south and north. The terminals may be located near the intersections between the KCORR and the radial arteries in consideration of the boundaries of the KMA and accessibility. Along the north-south axis of the Bagram road, the location of the terminal would be justified also in view of the future development of rail transport system and introduction of cargo transport by rail. These locational considerations are common to the establishment of an inter-city bus terminal described earlier, and the public truck terminal may indeed be located near the bus terminal.

Facilities to be required at a public truck terminal include truck berths for cargo transfer and sorting, temporary storage facilities, management and disaster prevention center, parking space, container yard, repair workshop, fuel station and others. Initially, logistic functions should be emphasized with cargo handling and temporary storage facilities, but sufficiently large land should be secured from the beginning to accommodate the expansion of logistic functions and the establishment of simple import/export processing functions in the future.

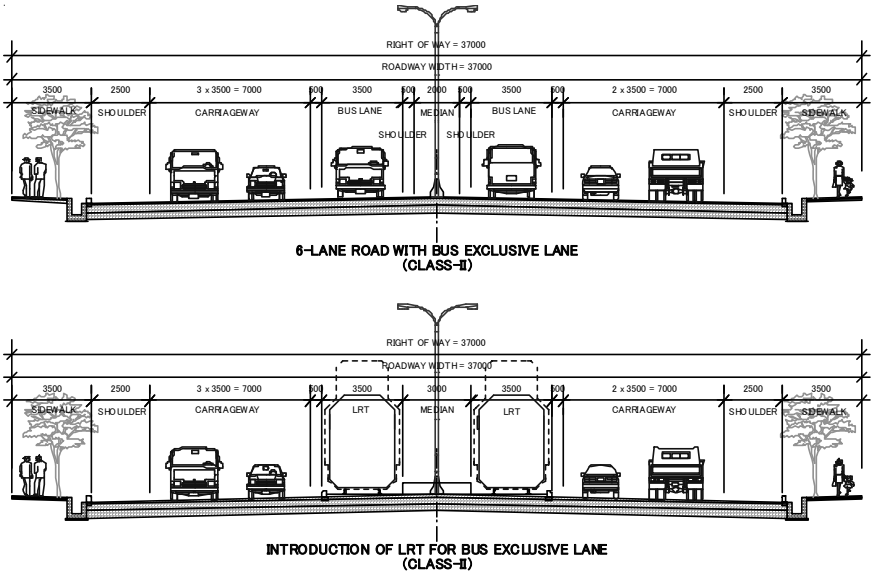


Figure 44 Typical Cross Section with LRT Lanes (BRT or LRT)

According to the traffic survey, the number of trucks coming from the outer areas into the Kabul city was about 3,500 vehicles/day. This is projected to increase by 2.9 times to become 10,150 vehicles/day by 2025. Each of the four planned truck terminal would have to accommodate an average of 2,540 vehicles/day at most. Assuming each truck carries 10t on average, the ratio of trucks utilizing any terminal at 50%, and the unit land area required at $15m^2/t$, the total land area required for each terminal is estimated to be 19ha.

The proposed cargo transport system with the public truck terminals for the KMA is illustrated in Figure 45. Each terminal's functions and specific facilities are summarized in Table 20.

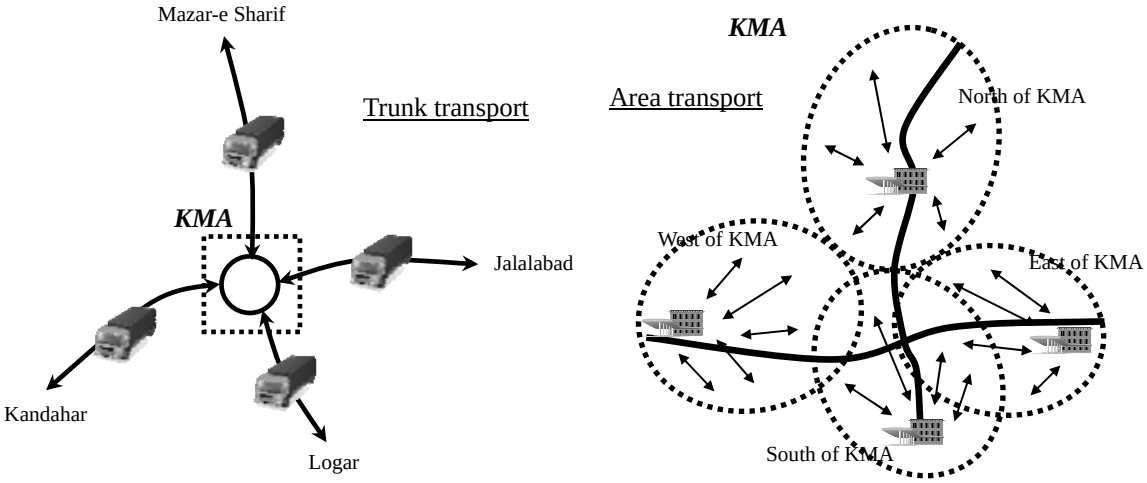


Figure 45 Cargo Transport Hierarchy around KMA

Table 20 Functions and facilities of Truck Terminal in Suburban Area

Functions	Specific facilities
Loading	Truck berth with platform for dividing and reloading
Warehouse	Temporary storage for cargo
Administrative office	Administrative center, disaster control center, restroom
Office building for transport companies	Office spaces for forwarders and other private companies
Parking lot	For trucks and passenger cars of staff and customers
Container spaces	Temporary stock yards for containers
Gas station	Gas and diesel station (CNG in future)
Repair workshop	Inspection, easy maintenance factory
Pathway	Road for trucks and passenger cars
Green spaces	Pocket park, planting, reserve area for future expansion

7.2 Water Resources Development

7.2.1 Assessment of urban water supply sources

(1) Panjshir fan aquifer

The aquifer is located at about 60-80km north of the Kabul city in the alluvial fan along the Panjshir and the Ghorband rivers. The abundant surface water and widely extended alluvial fan promise the groundwater potential at least to some extent. However, there are no data and information available on this aquifer. The potential that may be developed in a sustainable manner is not clear, although it is tentatively estimated at 210.0MCM/year.

This aquifer is the possible candidate for early development. Therefore, investigation of the aquifer and current water use conditions should be conducted immediately to estimate the potential more accurately.

Disadvantage of the development of this aquifer is that it requires pumps with about 400m head and energy for transfer of water to either the Kabul city or the new city. The O&M cost would be higher.

(2) Surface water without storages

Stable water volume to be taken directly from rivers without storage under drought conditions is possible only at around the Shukhi hydrological station in the Panjshir sub-basin when environmental flow and existing agricultural water use are taken into account. The Shukhi hydrological station is located at a downstream point of the confluence between the Panjshir and the Ghorband rivers, where stable water extraction would be possible. This option, however, requires pumps with about 400m head and energy for transfer of water to either the Kabul city or the new city, like the case for the Panjshir fan aquifer. In addition, most costly treatment would be required for urban use compared to

the other sources.

This option can be implemented with a shorter period compared to the options with storage. It should be considered only if the Panjshir fan aquifer cannot developed.

(3) Available urban water supply with storage

There are number of candidate storage sites in the Panjshir sub-basin. Of these, the most promising site is for the Gulbahar dam located at around the Gulbahar-Panjshir hydrological station. Based on the water balance analysis as discussed in Section 1.1, a total of 240MCM/year can be supplied with a 140m high dam, which can avoid significant influence of inundation by the dam. In the Integrated Water Resources Mamagement (IWRM) of study of 2006, 133MCM/year is allocated to urban water use for the Kabul city. The disadvantage of the Gulbahar dam in terms of urban water supply for the Kabul city and the new city is the necessity of pumps and energy to transfer water from the dam site to the urban areas, which will require higher O&M cost. A feasibility study on the Gulbahar dam is currently undertaken for completion by the beginning of 2010.

Two alternative sites have been identified by the present Study on the Salang and the Shutl rivers, which could transfer the water basically by gravity over almost the same distance by pipelines. Based on the water balance analysis, the Salang dam can supply 98MCM/year with a 110m-high dam, which has comparable hydrological efficiency with the Gulbahar dam.

7.2.2 Preliminary cost estimates for water resources development schemes

For the purpose of the alternative study, preliminary design and cost estimation on the water resources development for candidate sites have been conducted. The cost for the intake structure including storage, the transmission line and the pump station with its operation cost (electricity) are estimated for several different scales for each candidate site.

The estimated costs have been converted to the total annual cost and corresponding cost curves are prepared. The following are assumed.

a) The cost estimate covers abstraction (with storage), transmission and treatment.

b) The cost does not include distribution cost.

c) The loss in the transmission for a pipeline is assumed to be 5%.

d) The capacity of the intake structure and transmission line is set at 1.4 times as large as the annual average discharge required.

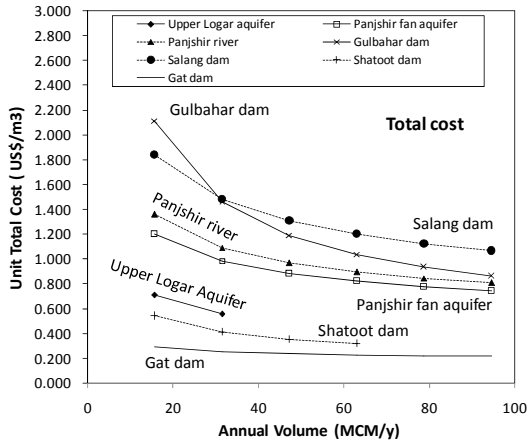
e) It is assumed that the water sources in the Panjshir sub-basin are transferred to Paymonar in the new city area and the water sources in the upper Kabul basin are transferred to Kabul.

f) The Gulbahar dam is planned as a multi-purpose dam, and the dam height is assumed to be 140m; the “separable cost remaining benefit method” is employed to allocate the cost to urban water use.

g) All costs are annualized cost, which includes construction cost, replacement cost and O&M cost, with 10% discount rate and the project life time of 50 years; replacement of pump is considered for every 10 years.

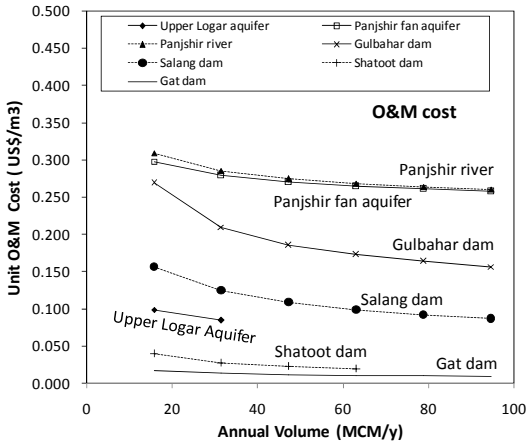
h) Assumed cost parameters are: US$0.10/kWh for electricity for pumping, US$0.10/$m^3$ for treatment cost for surface water, US$0.03/$m^3$ for treatment cost for groundwater, and O&M cost excluding electricity is assumed to be 1% of construction cost.

The total cost and O&M cost for each candidate site are presented in Figure 46 and Figure 47, respectively.



Source: JICA Study Team

Figure 46 Unit Total Cost for Each Candidate Site

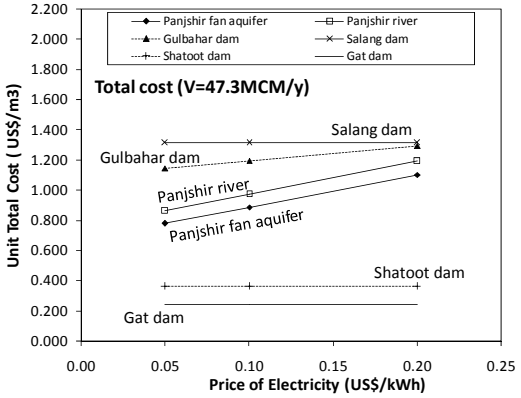


Source: ibid.

Figure 47 Unit O&M Cost for Each Candidate Site

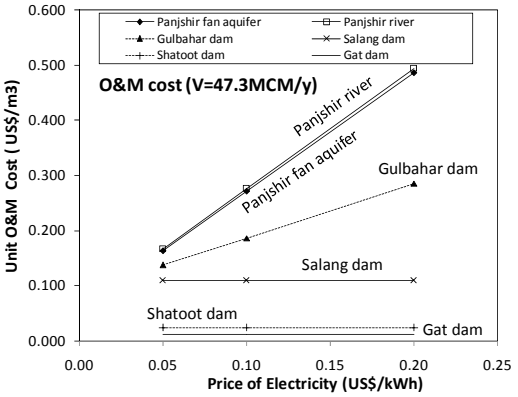
It should be emphasized that the expected unit water cost from the Panjshir sub-basin is much higher than that from the upper Kabul basin. The order of the total cost is more than US$1.00/m^3 excluding the cost for distribution network. The O&M cost is mainly for electricity for pumping. Except the option of the Salang dam, the O&M cost for the options from the Panjshir sub-basin is considerably high.

The price of electricity is assumed at US$0.10/kWh as a base case in the present study. The price, however, is currently US$0.20/kWh in the Kabul city for government purchase. It is also said that the price could become US$0.05/kWh after purchased electricity from neighbor countries would be available. The sensitivity of the price of electricity against the total cost and O&M cost is thereby demonstrated in Figure 48 and Figure 49.



Source: ibid.

Figure 48 Sensitivity of Price of Electricity against Unit Total Cost



Source: ibid.

Figure 49 Sensitivity of Price of Electricity against Unit O&M Cost

7.2.3 Initial assessment of social and environmental impact

For the storage sites in the Panjshir basin, expected inundation area, numbers of affected settlements and people, and affected irrigation area are roughly examined. The following data and information are used for the analysis.

- Topography: SRTM3 and 1/50,000 topographic map
- Irrigation area and settlements: AIMS GIS data

- Building area: SPOT image (2008) and Google Earth image

Table 21 summarizes the results of the analysis.

Table 21 Initial Evaluation of Socio-Environmental Impact for Storage Sites

Dam	Available Water Supply (MCM/y)	Water Level (m)	Total Volume (MCM)	Effective Volume (MCM)	Inundated Area (ha)	Irrigation Area (ha)	Building Area (ha)	Number of Affected Settlements	Estimated Order of Resettlement *	Affected Length of Main Road (km)	Impact
Gat	122	1,857	203	140	2,619	1,476	201	35	15,000-25,000	1.0	Significant
Shatoot	54**	1,991	185	170	602	140	14	8	1,000-2,000	0.0	Moderate
Gulbahar	240	1,760	156	121	429	114	14	8	1,000-2,000	12.0	Moderate
Salang	100	2,005	45	40	118	37	7	6	500-1,000	3.6	Moderate

* The population density is assumed at about 100 persons/ha for building area.
** 52MCM/year is for domestic use supplied directly from the dam and 2MCM/y is for industrial use taken after the confluence with Logar river.

Source: JICA Study Team

It is seen from Table 21 that both the Gulbahar and the Salang dams would not bring about significant socio-environmental impact.

7.2.4 Water resources development plan for the new city

(1) Water demand

The domestic water demand for the new city is determined by applying the unit water consumption of 120LCD and the physical loss ratio of 20%. The industrial water demand is estimated separately. The results are summarized in Table 22.

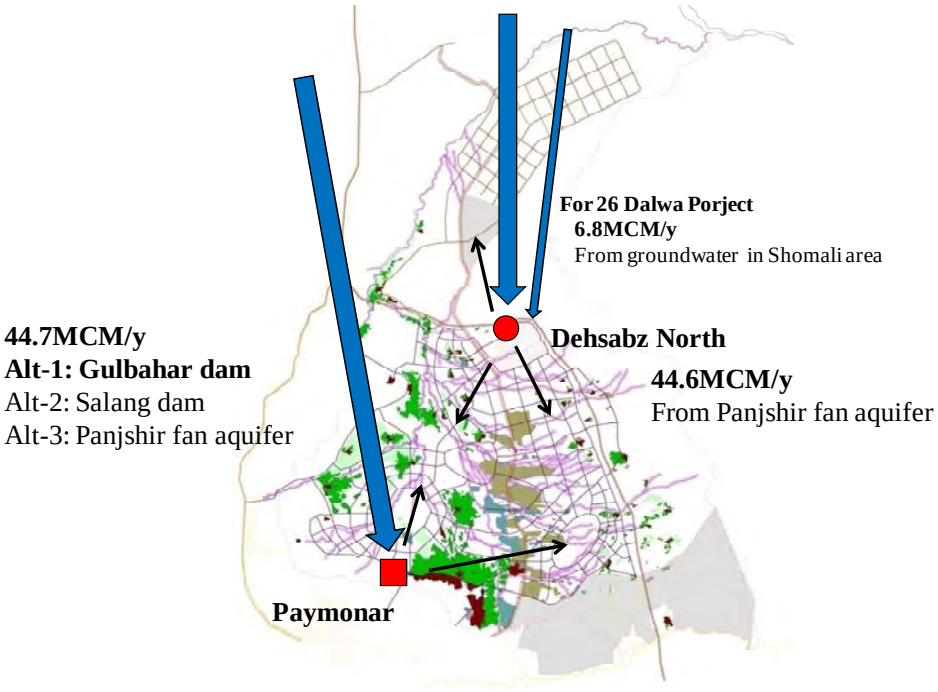
Table 22 Water Demand in New City

		2008	2015	2020	2025
Population (10^6)	Total	0.11	0.48	0.99	1.50
	Piped water supply system	0.00	0.15	0.99	1.50
	Shallow well	0.11	0.33	0.00	0.00
Demand for domestic use (MCM/y)		1.0	9.8	37.7	82.1
Demand for industrial use (MCM/y)		0.0	0.0	5.0	14.0
Total demand (MCM/y)		1.0	9.8	42.7	96.1

Source: ibid.

(2) Water resources development plan

According to the water supply plan for the KMA, the water supply for the new city in the target year of 2025 will be supported mainly by two water treatment plants and reservoirs. One will be located in Dehsabz north, and the other in Paymonar. In line with this water supply system, the following water resources development is recommended (Figure 50).



Source: ibid.

Figure 50 Recommended Water Resources Development for New City

1) Dehsabz north

The water resources of the Panjshir fan aquifer is developed at 44.6MCM/year for domestic and industrial uses. Although this does not represent self-dependent water resources development due to large energy costs, the total cost is much smaller compared to other options. Early implementation is also possible.

2) Paymonar

The Gulbahar dam would allow allocation of 44.7MCM/year for domestic and industrial uses. There are three alternative water sources; 1) Gulbahar dam, 2) Salang dam, and 3) Panjshir fan aquifer. Of these, self-dependent water sources are preferable for sustainable water supply system. Also a different water source than the Panjshir fan aquifer is preferable from the viewpoint of reliability with multiple water sources. The Gulbahar dam requires smaller cost than the Salang dam. It represents a self-dependent water source by using the electricity produced by itself for pumping water.

The expected urban water demand for distant future of the new city is about 200MCM/year, assuming that the population will eventually reach about 3 million. It is recommended to consider the water allocation of the Gulbahar dam with additional 100MCM/year more or less for the total of about 150MCM/year including the water necessary up to 2025 from the Gulbahar dam. The one of ideas is that the storage for additional supply could be rented to other water users until the demand will reach the maximum.

Alternatively, if the option for the least O&M cost is judged more suitable, the Salang dam could be considered.

3) 26 Dalwa project

The groundwater in the Shomali area will be extracted at 6.8MCM/year for domestic use. The ongoing 26 Dalwa project by MoUD plans to utilize groundwater in the Shomali area. It could be used for sustainable manner. However, mitigation or compensation may be considered against existing water users in the Shomali area. The monitoring of groundwater is recommended. If the significant degradation of the groundwater level would appear, the alternate water sources such as the Panjshir fan aquifer should be utilized.

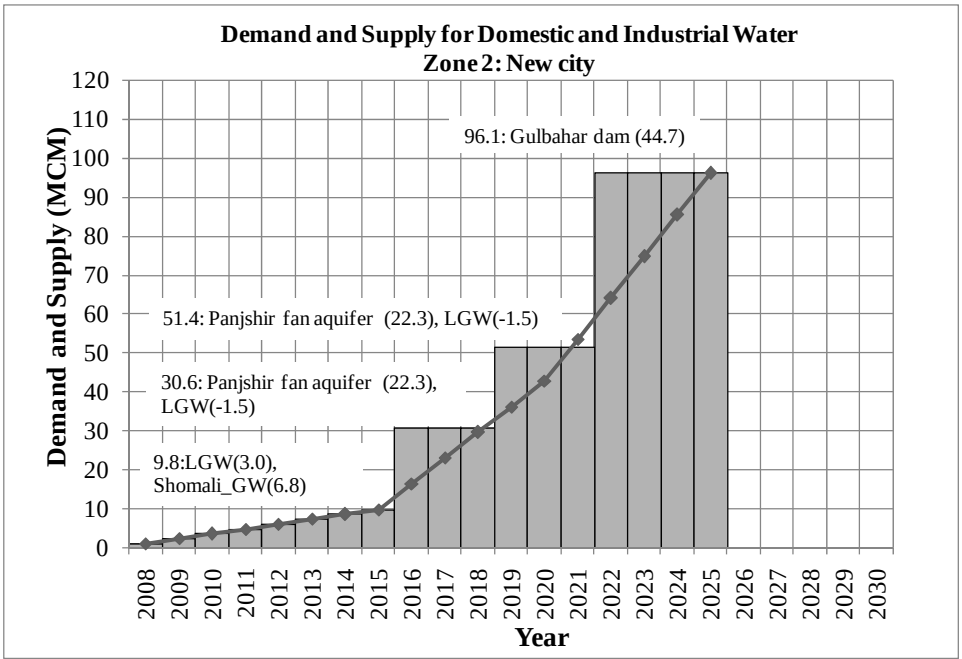
4) Use of local groundwater

In the new city area, there is no additional local groundwater potential than the currently used water. The following are noted for the use of local groundwater in the new city area.

- The new comers basically have to rely on foreign water sources.
- However, no foreign water sources would be available before 2015, except the possible groundwater around the Shomali area that is under investigation by MoUD for the 26 Dalwa project.
- Minimal amount of local groundwater could be used tentatively before the foreign water would be made available with great care against the existing water users. The monitoring of the groundwater is strongly recommended as this use is not sustainable.
- The use of the local groundwater should be converted to foreign water sources when they become available.
- Unless the sufficient foreign water sources are promised to be prepared, new comers should not start to live in the Dehsabz and the Barikab areas.
- Mitigation or compensation against potential conflicts for water use with existing users is necessary.

5) Stage-wise development

The stepwise water resources development considering the possible completion year is shown in Figure 51.



Note: LGW=Local Groundwater

Source: ibid.

Figure 51 Stepwise Water Resources Development for New City

7.2.5 Implementation schedule

To prepare the realistic implementation plan, the annual investment is limited to about US$100million for the water resources development for the urban water use in the KMA. The proposed implementation plan with disbursement schedule is shown in Figure 52.

(6) Recommendations

Immediate studies for early development

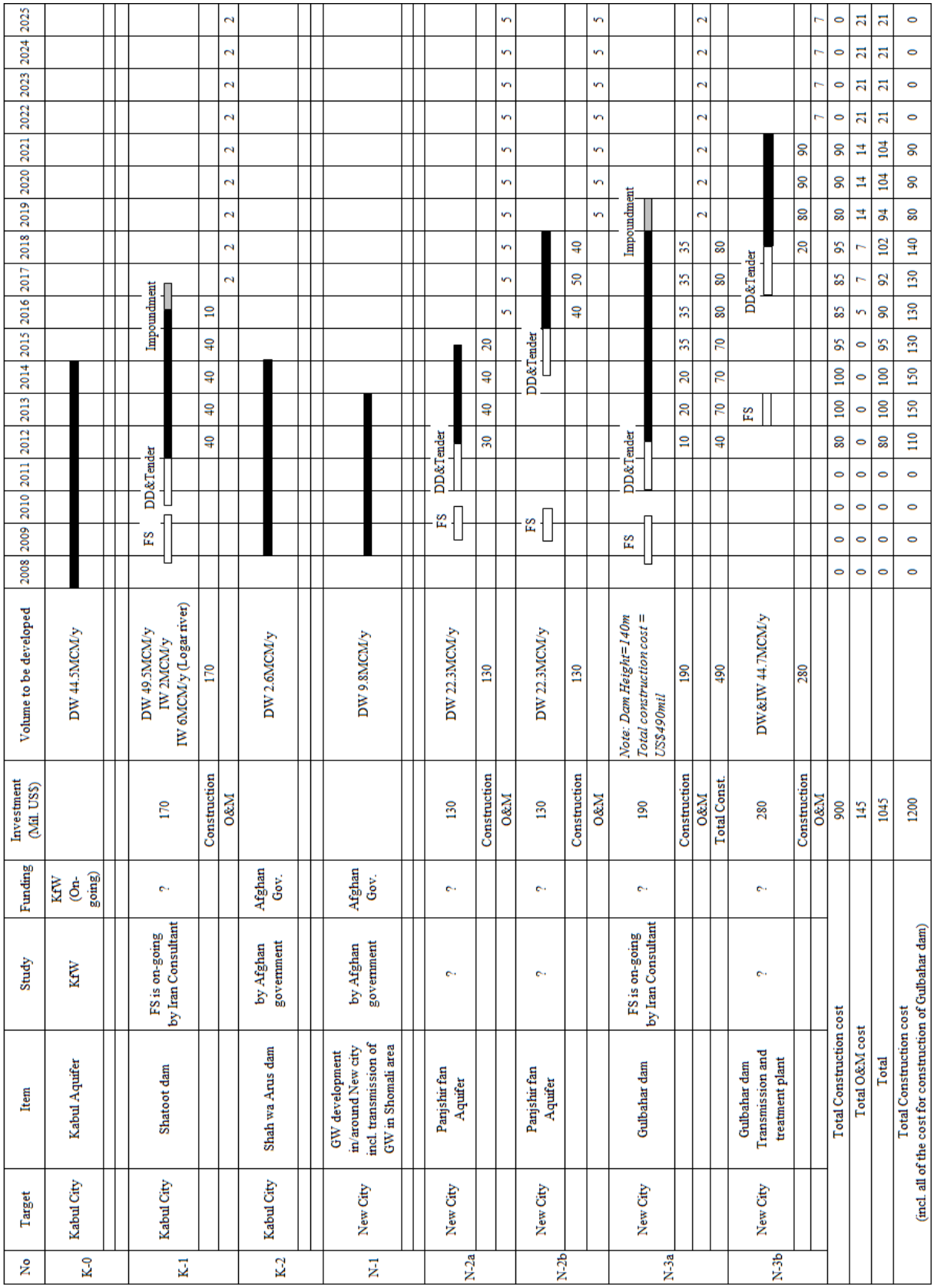
Based on the results of the water resources study conducted so far, the following are recommended to proceed with the water resources development plan for the KMA.

1) For the new city development, the cost of water is very high (order of US$1.0/$m^3$ excluding the distribution cost). Almost all of this cost, which includes construction and O&M costs, should be borne by the Government in order to provide water at affordable prices for the people. The recommended schemes should be examined in more details at the next stage to expedite their implementation after the completion of the present Study.

2) A feasibility study for the development of the Panjshir fan aquifer, which includes abstraction, transmission, treatment and distribution, is recommended for the realization of an early implementation.

3) Before implementing the above-mentioned feasibility study, the potential extraction volume of the Panjshir fan aquifer should be confirmed through field investigation (e.g., electric prospecting and test wells drilling). Existing groundwater use should also be examined in order to determine the future use for urban water. Based on the results of the field investigation, the appropriate method of extraction of water from the aquifer should be examined.

4) The implementation of the Shatoot dam for the Kabul city water supply, which is currently under a feasibility study by MoEW, should be realized as soon as possible unless significant disadvantages are found in the feasibility study.



No	Target	Item	Study	Funding	Investment (Mil. US$)	Volume to be developed	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
K-0	Kabul City	Kabul Aquifer	KfW	KfW (On-going)		DW 44.5MCM/y																		
K-1	Kabul City	Shatoot dam	FS is on-going by Iran Consultant	?	170	DW 49.5MCM/y IW 2MCM/y IW 6MCM/y (Logar river)		FS	DD&Tender						Impoundment									
					Construction	170					40	40	40	40	10									
					O&M											2	2	2	2	2	2	2	2	2
K-2	Kabul City	Shah wa Arus dam	by Afghan government	Afghan Gov.		DW 2.6MCM/y																		
N-1	New City	GW development in/around New city incl. transmission of GW in Shomali area	by Afghan government	Afghan Gov.		DW 9.8MCM/y																		
N-2a	New City	Panjshir fan Aquifer	?	?	130	DW 22.3MCM/y		FS	DD&Tender															
					Construction	130					30	40	40	20	5	5	5	5	5	5	5	5	5	5
					O&M																			
N-2b	New City	Panjshir fan Aquifer	?	?	130	DW 22.3MCM/y		FS					DD&Tender											
					Construction	130									40	50	40							
					O&M													5	5	5	5	5	5	5
N-3a	New City	Gulbahar dam	FS is on-going by Iran Consultant	?	190	*Note: Dam Height=140m Total construction cost = US$490mil*		FS		DD&Tender							Impoundment							
					Construction	190					10	20	20	35	35	35	35							
					O&M													2	2	2	2	2	2	2
					Total Const.	490					40	70	70	70	80	80	80							
N-3b	New City	Gulbahar dam Transmission and treatment plant	?	?	280	DW&IW 44.7MCM/y						FS				DD&Tender								
					Construction	280											20	80	90	90	7	7	7	7
					O&M																			
		Total Construction cost			900		0	0	0	0	80	100	100	95	85	85	95	80	90	90	0	0	0	0
		Total O&M cost			145		0	0	0	0	0	0	0	0	5	7	7	14	14	14	21	21	21	21
		Total			1045		0	0	0	0	80	100	100	95	90	92	102	94	104	104	21	21	21	21
		Total Construction cost (incl. all of the cost for construction of Gulbahar dam)			1200		0	0	0	0	110	150	150	130	130	130	140	80	90	90	0	0	0	0

Source: JICA Study Team

Figure 52 Proposed Implementation Plan and Disbursement Schedule

5) The Gulbahar dam is the most promising candidate scheme in the Panjshir sub-basin for the urban water supply for the KMA. The feasibility study of the Gulbahar dam, which is ongoing, should carefully study the water allocation to the urban water use for the KMA. Furthermore, the expected urban water demand for distant future of the new city is about 200MCM/year, assuming that the population will reach about 3 million. It is recommended to study the water allocation of the Gulbahar dam with additional 100MCM/year more or less for the total of about 150MCM/year. The one of ideas is that the storage for additional supply could be rented to other water users until the demand will reach to the maximum.

6) The feasibility study on the transmission and treatment plant for the urban water supply from the Gulbahar dam, not included in the feasibility study of the Gulbahar dam, should also be conducted as soon as possible, if the current feasibility study would not find significant disadvantages for the urban water supply.

7) A preliminary study for the Salang dam is recommended to be conducted as soon as possible in order to investigate the possible alternative water sources in addition to the Gulbahar dam.

Water management

1) Management of water by basin approach

A single basin management body for both the upper Kabul basin and the Panjshir sub-basin should be established to manage the water related to the KMA in accordance with the new water law. This may serve as a model for similar bodies to be established for other basins in steps

2) Monitoring of water quantity and quality

For effective water management, it is essential to monitor how much water is used for different purposes, and how the groundwater tables and water quality change. It is necessary to strengthen the monitoring system and capacity in terms of human resources, organizations and institutions.

7.3 Water Supply and Sewerage

(1) Conditions for water supply development for the new city

1) Water resources availability

The availability of water from the Panjshir fan aquifer is estimated to be 70MCM/year on the firm and safe basis. The water may be delivered to the new city by 2016. The development of surface water by the Salang dam would make 90MCM/year available as assessed by the Study. Thus, the total of some 160MCM/year would be available. In addition, the Gulbahar multi-purpose dam would make additional urban water available. The water from either dam would be available only after 2020 or so.

The 26 Dalwa project is in progress in the Dehsabz north area as the initial development of the new city. This project will take the water from groundwater aquifer outside the new city.

2) Unit water consumption

The total amount of water to be made available by groundwater of the Panjshir fan aquifer and surface water to be developed by a dam is estimated to be 160MCM/year. If the target unit water use of 120LCD is applied to the planned population of 1.5million in 2025, the total water requirement would be 225,000m^3/day or 82MCM/year, assuming the effective water delivery is 80% of the water production (i.e. loss ratio of 20%). Taking account of additional water demand for industrial uses estimated at 30MCM/year, the total water demand is 112million MCM/year, smaller than the estimated water availability. Thus, the water supply for the new city can satisfy the recommended unit consumption of 120LCD for house connections and 50LCD for public taps.

(2) Water supply development plan

1) Piped water supply

The entire new city area will be covered by a piped water supply system as no local groundwater is available in a sustainable manner (Figure 53). To ensure the unit water consumption at 120LCD, the average water supply should be 150LCD. The service population will evolve as shown in Table 24. At the initial stage of development, house connections will be slow to develop as the connections are made by residents under their responsibility and the construction of distribution facilities may not keep up with the population growth.

The total water requirement is 82.5MCM/year in 2025 for domestic purposes (Table 23) and additional 30MCM/year for industrial purposes. The total of 112MCM/year can be provided by the Panjshir sub-basin. Moreover, the 26 Dalwa project would supply additional water for 150,000 people.

Table 23 Service Population for Water Supply in New City

Supply Zone	Planned Population			2015 Before Panjishir fan development						2015 After Panjishir fan development								
	2015	2020	2025	House connection 125			Shallow well 25			House connection 125			Public tap 62.5			Shallow well 25		
				Share	Population	m3/d	Share	Population	m3/d	Share	Population	m3/d	Share	Population	m3/d	Share	Population	m3/d
Total	482,502	991,114	1,499,721		150,000	18,750		332,502	8,312		180,069	22,508		127,346	7,960		175,087	4,377
1 Barikab	15,877	105,360	194,842	0%	0	0	100%	15,877	397	20%	3,175	397	80%	12,702	794	0%	0	0
2 Dehsabz North E	157,067	259,196	361,324	96%	150,000	18,750	4%	7,067	177	96%	150,000	18,750	4%	7,067	442	0%	0	0
3 Dehsabz North W	21,187	80,619	140,051	0%	0	0	100%	21,187	530	0%	0	0	0%	0	0	100%	21,187	530
4 Dehsabz South E	8,898	74,639	140,379	0%	0	0	100%	8,898	222	0%	0	0	0%	0	0	100%	8,898	222
5 Dehsabz South SE	28,174	116,504	204,834	0%	0	0	100%	28,174	704	20%	5,635	704	80%	22,539	1,409	0%	0	0
6 Dehsabz South S	106,297	132,231	158,164	0%	0	0	100%	106,297	2,657	20%	21,259	2,657	80%	85,038	5,315	0%	0	0
7 Paymonar	145,002	222,565	300,127	0%	0	0	100%	145,002	3,625	0%	0	0	0%	0	0	100%	145,002	3,625
Average Supply: million m3/y				6.8			3.0			8.2			2.9			1.6		
				9.8						12.7								

Supply Zone	Planned Population			2020						2025					
	2015	2020	2025	House connection 138			Public tap 62.5			House connection 150			Public tap 62.5		
				Share	Population	m3/d	Share	Population	m3/d	Share	Population	m3/d	Share	Population	m3/d
Total	482502	991114	1499721		547,398	75,541		443,716	27,732		1,499,721	224,959		0	0
1 Barikab	15877	105360	194842	50%	52,680	7,270	50%	52,680	3,293	100%	194,842	29,226	0%	0	0
2 Dehsabz North E	157067	259196	361324	70%	181,437	25,038	30%	77,759	4,860	100%	361,324	54,199	0%	0	0
3 Dehsabz North W	21187	80619	140051	50%	40,310	5,563	50%	40,309	2,519	100%	140,051	21,008	0%	0	0
4 Dehsabz South E	8898	74639	140379	50%	37,320	5,150	50%	37,319	2,332	100%	140,379	21,057	0%	0	0
5 Dehsabz South SE	28174	116504	204834	50%	58,252	8,039	50%	58,252	3,641	100%	204,834	30,725	0%	0	0
6 Dehsabz South S	106297	132231	158164	50%	66,116	9,124	50%	66,115	4,132	100%	158,164	23,725	0%	0	0
7 Paymonar	145002	222565	300127	50%	111,283	15,357	50%	111,282	6,955	100%	300,127	45,019	0%	0	0
Average Supply: million m3/y				27.6			10.1			82.1			0.0		
				37.7						82.1					

Source: JICA Study Team

2) Industrial water supply

In accordance with the economic development plan presented in Section 5.1, industrial water demand is projected as shown in Table 24. The industrial water use may start only after the delivery of water from the Panjshir fan aquifer. After the surface water is developed, the demand for the Dehsabz First and Third industrial estates can be supplied water from both surface and sub-surface sources of water.

Table 24 Industrial Water Demand Projection for New City

	Av. demand (Mm^3/y)		
Industrial park	2016*	2020	2025
Dehsabz 1 (North)	0.6	1.4	3.9
Dehsabz 2 (South)	0.4	0.9	2.5
Dehsabz 3 (Paymonar)	0.4	0.9	2.5
Barikab	0.7	1.8	5.1
Total	2.1	5.0	14.0

*[2] Adjusted to the possible year of bringing the water from Panjshir river

Source: ibid.

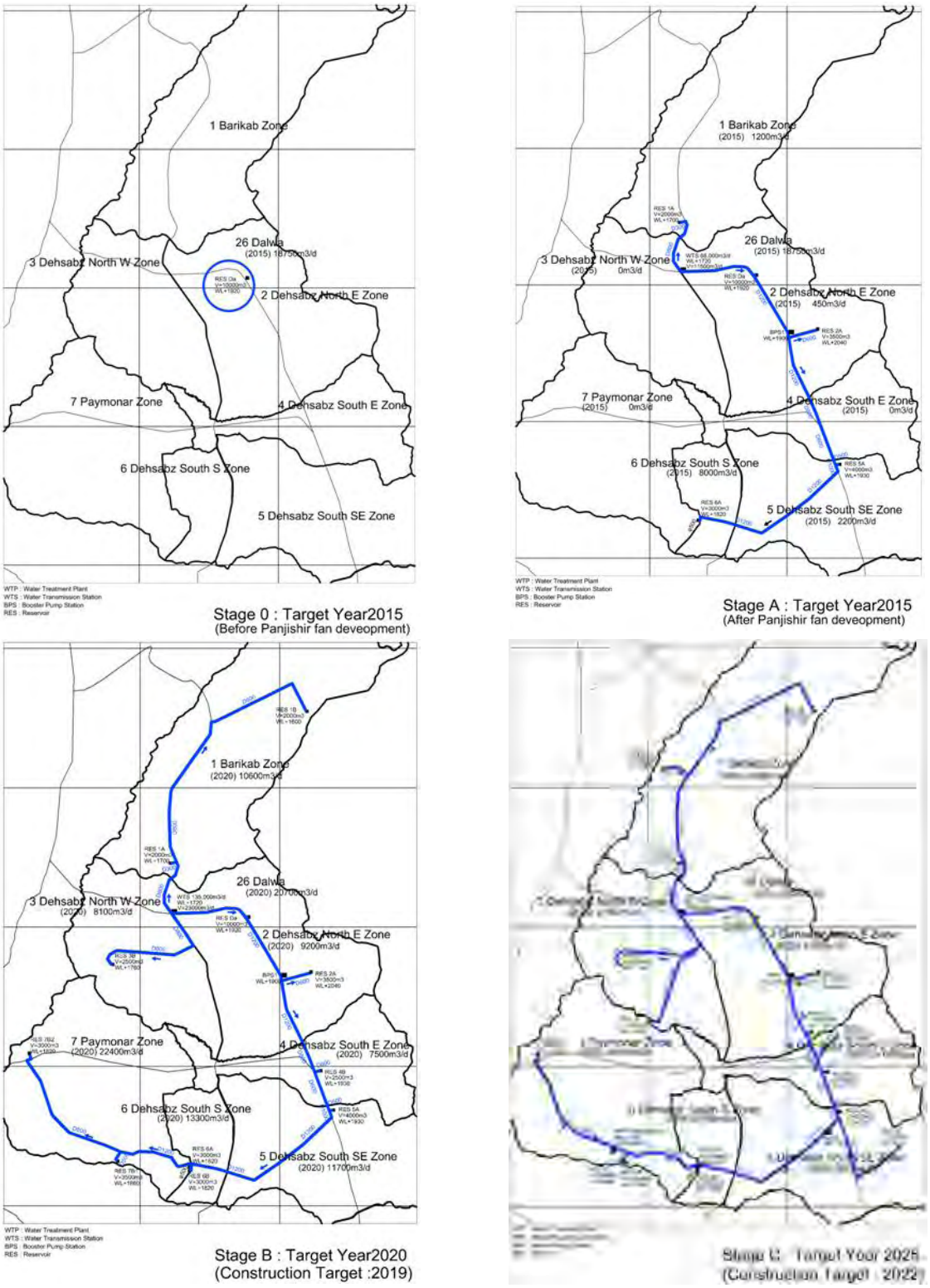


Figure 53 Water Supply Development Plan for New City

3) Implementation schedule

In accordance with the planned population distribution and the urbanization patterns, the water supply development for the new city is planned with zones and sub-zones as illustrated in Figure 48. Following the urbanization schedule, the water supply development should be undertaken first along the Bagram road from Barikab to Dehsabz south S. The water supply for Dehsabz north W and

Paymonar on the western side of the Bagram road will be developed later. The entire new city area will be covered by the piped water supply system by 2020. House connections will develop in steps to complete by 2025. The unit water supply by public taps should be maintained at 62.5LCD (including 20% loss), but the unit water supply for house connections should increase gradually from 120LCD to 150LCD.

i) Short term up to 2015

It is difficult to construct facilities necessary to bring water from the Panjshir river until 2015. With or without water from the Panjshir river, the following two cases planned.

(a) Without water from the Panjshir
The only secure water is the one to be developed by the 26 Dalwa project for 150,000 people in Dehsabz north E with 6.8MCM/year at 120LCD for house connections. This level of groundwater extraction would be within the capacity of the source groundwater. Other people would continue to rely on shallow wells, and the unit use should be managed within 25LCD.

(b) With water from the Panjshir
The population and areas that may be urbanized by 2015 are: 12,000 people in Barikab, 150,000 in Dehsabz north E (26 Dalwa), 22,500 in Dehsabz south SE, and 77,500 in Dehsabz south S. House connections will be extended to cover 50% by 2020 at 125LCD, except the 26 Dalwa area, where 100% coverage is expected and under progress. Surrounding rural areas should be covered by public taps.

The total water requirement would be 12.7MCM/year, of which 5.9MCM/year would be conveyed from the Panjshir river. Including the industrial water demand of 2.1MCM/year, a total of 8.0MCM/year water may have to be delivered from the Panjshir river. This is still within the capacity of Panjshir fan aquifer development Phase 1. This water should be received in Dehsabz north, and water distribution system should be constructed to serve other areas as well, which may call for organizational re-structuring of CAWSS.

ii) Medium term up to 2020

The entire new city area should be covered by the piped water supply system by 2020 so that the local groundwater is conserved. Additional water will be secured by the Panjshir fan aquifer development Phase 2 to increase the supply capacity to 44.6MCM/year. House connections in surrounding rural areas will proceed only slowly. The target of house connection coverage is 50% at 138LCD, except Dehsabz north E, where 70% coverage at 138LCD is aimed at. The total water supply will be 30.9MCM/year from the Panjshir river, and 6.8MCM/year from the 26 Dalwa project. If the industrial water demand increases to 5MCM/year, 35.9MCM/year would be delivered from the Panjshir river.

iii) Long term up to 2025

The surface water can be developed with a dam by 2023. All the new city residents will benefit from house connections. The total water requirement would be 82.1MCM/year for domestic purposes. Including the industrial water demand of 14MCM/year, a total requirement may be 96.1MCM/year, of which 89.3MCM/year would be supplied by the Panjshir river. The surface water of the Panjshir river, constituting a half of the total water developed in the Panjshir basin, should be conveyed to Paymonar for distribution to the new city after treatment. The supply from the north and the south would ensure distribution stability.

4) Contingency plan

As planned, the new city would have sufficient water for domestic purposes. The water extraction by the 26 Dalwa project should be managed under careful groundwater monitoring. Once any adverse effects are observed, the main distribution system for Dehsabz north should be connected to the 26 Dalwa system.

5) Key facilities for water supply

Key facilities required for water supply development plan presented are summarized in Table 25.

Table 25 Key Facilities Required for Water Supply Development Plan

No.	Facility	Operated by	Purpose
1.	New wells, transmission mains, reservoirs and distribution network for 26 Dalwa of Dehsabz North E. Capacity: 18,750m^3/d on average	2015	To cover 150,000 of population with piped water supply system at 125LCD for 2015; to distribute the water to 150,000 of population at 150LCD for 2025
2.	Dehsabz North Water Transmission Station Reservoir capacity: 11,500m^3/d x 2 units for drinking water and 2,000 m^3/d x 2 units for industry	2016 PH1 2019 PH2	To receive water from Panjshir fan aquifer: to distribute water to new city area for 22.3 million m^3/y by 2016 and 44.6 million m^3/y by 2019
3.	Key water reservoir, transmission main and distribution network for Barikab	2016 PH1 2019 PH2 2022 PH3	To distribute water to Barikab for 2025
4.	Key water reservoir, transmission main and distribution network for Dehsabz North E	2016 PH1 2019 PH2 2022 PH3	To distribute water to Dehsabz North E for 2025
5.	Key water reservoir, transmission main and distribution network for Dehsabz North W	2019 PH1 2022 PH2	To distribute water to Dehsabz North W for 2025
6.	Key water reservoir, transmission main and distribution network for Dehsabz South E	2019 PH1 2022 PH2	To distribute water to Dehsabz South E for 2025
7.	Key water reservoir, transmission main and distribution network for Dehsabz South SE	2016 PH1 2019 PH2 2022 PH3	To distribute water to Dehsabz South SE for 2025
8.	Key water reservoir, transmission main and distribution network for Dehsabz South S	2016 PH1 2019 PH2 2022 PH3	To distribute water to Dehsabz South S for 2025
9.	Key water reservoir, transmission main and distribution network for Paymonar	2019 PH1 2022 PH2	To distribute water to Paymonar for 2025
10.	Industrial Water Supply Network for New city	2016	To supply industrial water to industrial parks for 2025
11.	Paymonar Water Treatment Plant (WTP) Capacity: 135,000m^3/d	2022	To receive the surface water of Panjshir river; to treat and add the water production capacity for 2025
12.	Paymonar Industrial Water Treatment Plant (WTP) Capacity: 25,000m^3/d	2022	To receive the surface water of Panjshir river; to treat and add the water production capacity for 2025

Source: ibid.

(3) Sewerage development plan

1) Amount of sewage generation

The new city will be fully covered by the piped water supply in 2025, and therefore, the entire area may be covered also by the sewerage system. In low-density areas, however, on-site sanitation should be applied. It is planned that the sewerage will cover urbanized areas with high population density. The service population and wastewater flow would be as shown in Table 26. The wastewater flow would increase dramatically as the new city develops as shown.

2) Development plan for sewerage

The sewerage for the new city is planned separately for Dehsabz and Barikab. In Barikab, the land inclines generally from southwest to northeast so that a sewage treatment plant should be located at the northeastern edge of the area. In Dehsabz, all the sewage flows are directed to the northwest.

The 26 Dalwa project is planned with its own sewage treatment plant located between Dehsabz north E and Dehsabz north W. This plant, to be operational earlier, should be designed to serve the whole Dehsabz north E for future development.

Dehsabz south E and Dehsabz south SE are located further from the northwest edge of Dehsabz. To avoid long conveyance of sewage and large treatment plant in the northwest edge of Dehsabz, Dehsabz south E and Dehsabz south SE should have a separate treatment plant.

Table 26 Average Wastewater Flow for Sewerage in New City

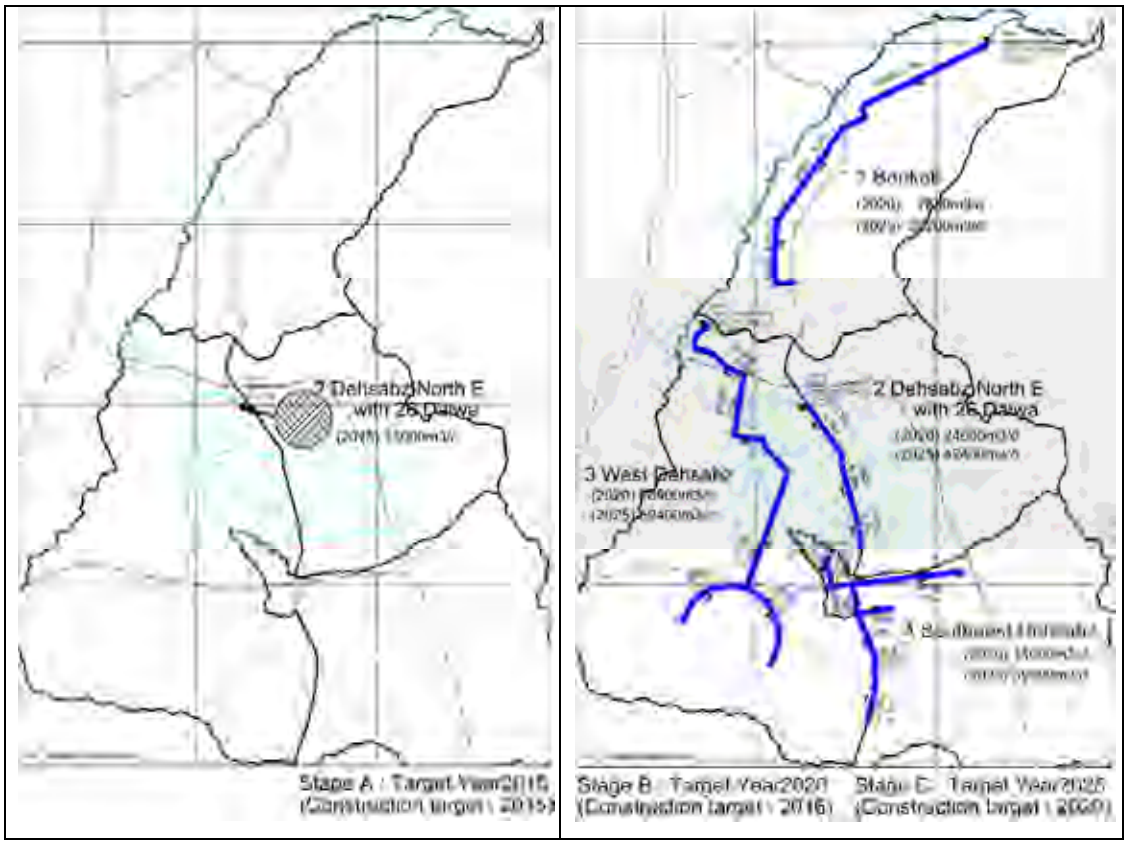
Water supply zone	Planned population			2015		2020		2025	
	2015	2020	2025	Service pop.	Ave. flow (m^3/d)	Service pop.	Ave. flow (m^3/d)	Service pop.	Ave. flow (m^3/d)
Total	482,502	991,114	1,499,721	150,000	15,000	860,859	73,368	1,359,721	163,167
1 Barikab	15,877	105,360	194,842	0	0	98,500	7,880	185,001	22,200
2 Dehsabz North E	157,067	259,196	361,324	150,000	15,000	251,521	24,622	353,043	42,365
3 Dehsabz North W	21,187	80,619	140,051	0	0	58,478	4,678	116,956	14,035
4 Dehsabz South E	8,898	74,639	140,379	0	0	65,412	5,233	130,825	15,699
5 Dehsabz South SE	28,174	116,504	204,834	0	0	109,280	8,742	196,060	23,527
6 Dehsabz South S	106,297	132,231	158,164	0	0	102,103	8,168	126,706	15,205
7 Paymonar	145,002	222,565	300,127	0	0	175,565	14,045	251,130	30,136

Note: 100LCD is applied for 2015. 80LCD is applied for 2025 except 26 Dalwa since 50% is covered by public tap. 110LCD is applied for 26 Dalwa in 2020. 120LCD is applied for 2025.

Source: ibid.

Considering these conditions, the following sub-zones are defined for sewerage development planning (Figure 54).

- Barikab: the same as the water supply zone of “Barikab”
- Dehsabz north E: the same as the water supply zone of “Dehsabz north E”
- West Dehsabz: water supply sub-zones of “Dehsabz north W”, “Paymonar” and “Dehsabz south S”
- Southeast Dehsabz: water supply sub-zones of “Dehsabz south E” and “Dehsabz south SE”



Source: ibid.

Figure 54 Sewerage Development for New City

i) Plan for 2015

The sewerage system for the 26 Dalwa project should be completed by 2015 for the population of 150,000. Its treatment plant should be designed to serve Dehsabz north E in 2020, and thus with the

capacity of 23,000m^3/day. It should be located in the west of the 26 Dalwa project site.

ii) Plan for 2020

The first step of sewerage services for the new city should be started in 2016 for the service population in 2020. The sewerage system should be operational in the whole area of the new city in 2020. In the Barikab sub-zone, the capacity requires for its treatment plant is 11,000m^3/day in 2020, but it should be constructed with the capacity of 14,500m^3/day, accommodating half of the additional capacity required in 2025. The plant should be located at the northeast edge of Barikab. The sewer lines should be installed in the first stage development area for the target population of 99,000 in 2020.

In Dehsabz north E, a sewage treatment plant would require the capacity of 33,000m^3/day. The additional capacity of 10,000m^3/day is required in the 26 Dalwa plant. The sewer lines should be installed in the first stage development area for the target population of 252,000 in 2020.

In Southwest Dehsabz, a sewage treatment plant would require the capacity of 19,000m^3/day. To accommodate half of the additional capacity required in 2025, the plant should be constructed with the capacity of 25,500m^3/day. The plant should be located at the northwest of the area, around the center of Dehsabz. The sewer lines should be installed in the first stage development area for the target population of 175,000 in 2020.

In West Dehsabz, a sewage treatment would require the capacity of 35,000m^3/day. To accommodate half of the additional capacity required in 2025, the plant should be constructed with the capacity of 39,00m^3/day. The plant should be located at the northwest edge of Dehsabz. The sewer lines should be installed in the first stage development area for the target population of 337,000 in 2020.

iii) Plan for 2025

All the planned sewerage facilities should be completed by 2020 to allow complete services in 2025. The total service population would be 1,360,000 in 2025, corresponding to 90% of the planned total population in the new city.

In Barikab, the sewage treatment plant should be expanded to the capacity of 29,000m^3/day. The sewer system should cover the whole urbanized area to benefit urban population of 185,000.

The 26 Dalwa sewage treatment plant should expand its capacity to 56,000m^3/day in 2025 to serve the entire Dehsabz north E. The sewer system would cover the whole urbanized area with 353,000 population.

In Southwest Dehsabz, the sewage treatment plant should expand to 56,000m^3/day, and the sewer system would cover the whole urbanized area with 175,000 population. In West Dehsabz, the sewage treatment plant should expand to 78,000m^3/day, and the sewer system would cover the whole urbanized area with 336,000 population.

iv) Discharge of treated sewage.

The treated sewage should be discharged into the nearest streams respectively from the treatment plants. All the streams discharge into the Barikab river, which drains further into the Panjshir river. In Barikab, the river water would be utilized for agriculture.

v) On-site sanitation

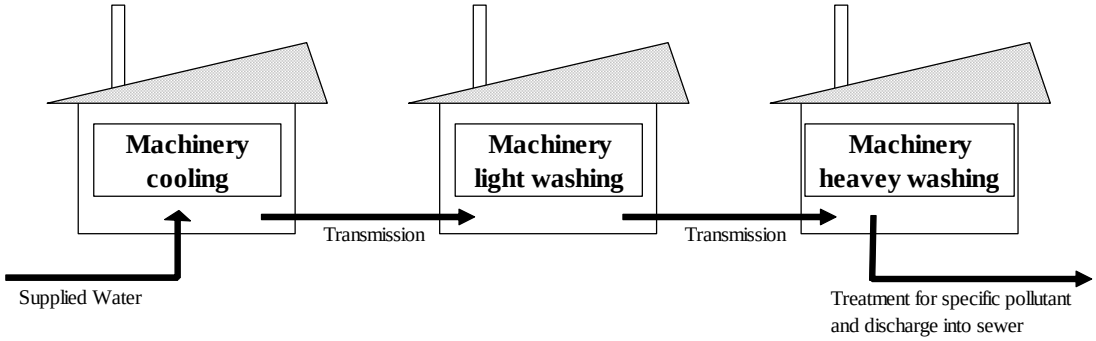
In the areas not covered by sewerage, on-site sanitation should develop. Pit latrines would be appropriate for traditional dwellings. For houses having flush toilets, however, septic tanks should be installed.

3) Industrial wastewater treatment

Industrial wastewater should be treated by each factory under the responsibility of respective enterprises. Since the industrial wastewater may contain toxic substances, a regulation and monitoring system should be established, and guidelines should be promulgated to all the enterprises fro wastewater treatment and discharge. Considering the landlocked conditions of the new city area, sewer lines should be established as part of public and basic infrastructure. This sewer system should

receive only treated wastewater and be separated from the domestic sewers and connected directly to rivers. The trunk sewers should be constructed first, and branch sewers should not be provided until the development of industrial estates. The latter should be designed and constricted by enterprises.

As each industrial estate develops, a water reuse system should be introduced within the estate to reduce raw water utilization. An example of the reuse system is illustrated in Figure 55.



Source: JICA Study Team

Figure 55 Example of Industrial Water Reuse

4) Contingency plan for sewerage

If sufficient fund is made available, the sewerage system may be expanded into the surrounding rural areas. The treatment plants should be expanded accordingly.

If the wastewater treatment by factories is insufficient, reuse of treated sewage by agriculture may be affected. Monitoring of discharge of industrial effluents should be undertaken, and once adverse effects are observed, operation of factories should be suspended. To cope with emergency cases, introduction of a trunk sewer linked directly to the Panjshir river should be considered.

5) Key facilities for sewerage development plan

Key facilities for sewerage development plan presented are summarized in Table 27.

Table 27 Key Facilities for Sewerage

No.	Facility	Operated by	Purpose
1.	Sewage treatment plant (STP) for 26 Dalwa and Dehsabz North E Capacity: 22,000m^3/d PH1 Capacity: 11,000m^3/d to be 33,000m^3/d PH2 Capacity: 23,000m^3/d to be 56,000m^3/d PH3	2015 PH1 2016 PH2 2020 Ph3	PH1: To treat sewage of 26 Dalwa for 2020; PH2: To treat sewage of Dehsabz North E for 2020; PH3: To treat sewage of Dehsabz North E for 2025
2.	Sewer network for 26 Dalwa	2015	To transport sewage in 26 Dalwa to STP for 2025
3.	Sewer network for Zone Dehsabz North E	2016 PH1 2020 PH2	To transport sewage of Zone Dehsabz North E to STP for 2025
4.	Sewage treatment plant (STP) for Zone Barikab Capacity: 14,500m^3/d PH1 Capacity: 14,500m^3/d to be 29,000m^3/d PH2	2016 PH1 2020 PH2	To treat sewage of Zone Barikab for 2025
5.	Sewer network for Zone Barikab	2016 PH1 2020 PH2	To transport sewage of Zone Barikab to STP for 2025
6.	Sewage treatment plant (STP) for Zone Southeast Dehsabz Capacity: 25,500m^3/d PH1 Capacity: 25,500m^3/d to be 51,000m^3/d PH2	2016 PH1 2020 PH2	To treat sewage of Zone Southeast Dehsabz for 2025
7.	Sewer network for Zone Southeast Dehsabz	2016 PH1 2020 PH2	To transport sewage of Zone Southeast Dehsabz to STP for 2025
8.	Sewage treatment plant (STP) for Zone West Dehsabz Capacity: 39,000m^3/d PH1 Capacity: 39,000m^3/d to be 78,000m^3/d PH2	2016 PH1 2020 PH2	To treat sewage of Zone West Dehsabz for 2025

No.	Facility	Operated by	Purpose
9.	Sewer network for Zone West Dehsabz	2016 PH1 2020 PH2	To transport sewage of Zone West Dehsabz to STP for 2025
10.	Sewer network for industrial parks	2016	To conduct treated sewage to rivers

Source: ibid.

(4) Rain water drainage

Major existing rivers/gullies should be utilized as main drains as current situations. There is the Barikab river running generally from the south to the north to join the Panjshir river. This should be the key drain. Other several gullies running from the east to the west to the Barikab river would assist the drainage of the new city. As those main gullies originate mainly in the eastern mountainous area, they are categorized effectively as rivers. The storm water will be finally drained into these rivers through some sub-gullies and/or associating ditches/pipelines.

Urbanization will accelerate the erosion of the gullies due to increase of water flow. The gullies' water flow will be much larger than the present level as a result of road pavement, building construction and decrease of rainwater permeability. To prevent further erosion, the KMA master plan recommends the control of the out-flowing water to the gullies by means of temporally retention and/or permeation facilities. Facilities related to rainwater control should be established earlier than road pavement and building construction, and should be managed by developers of the new city. Regulations should be established and promulgated to the developers and/or landowners to control the drainage from the land to be developed. The following are example of the facilities to be provided;

1) Facilities at houses

Rainwater tanks should be provided by developers/land owners for residential areas. The rainwater on roofs should be collected and stored in the tank at each house. The stored water would be utilized as supplemental water for domestic purposes such as car wash and tree plantation at each house.

2) Facilities on roads and at public facilities

In the new city, rainfall is first collected in the roadside ditches. After the collection, the water should be temporarily stored in flow-retarding facilities such as ponds or ditches. If permeable ditch is considered, higher efficiency will be expected. After certain retention periods, the stored water would be guided to existing gullies by natural gravity and it would be finally guided to rivers. Particular locations being far from existing gullies would require some semi- open channels or pipelines between the roadside ditches and the existing gullies. Those facilities should be examined in next stages as part of detail district planning.

7.4 Power and Energy Supply

7.4.1 Frameworks for power supply plan for KMA

(1) Key parameters and conditions

1) Unit power demand

The unit power demand is expected to increase as the income levels increase. The unit power demand for domestic consumers is taken as 100W per capita at present by MoEW. This may increase to 150W per capita at least by 2025.

2) Peak demand

The peak demand will increase as the unit demand per capita increases, the economy develops, and the population grows. The distribution of peak demand will change as the economy develops, and industrial and commercial demand mainly during the day will dominate the peak demand rather than the residential demand mainly during the night.

3) Power supply points

The power supply for the existing Kabul city will be through the existing supply network configurations already established. Only the supply capacities for transmission and distribution with substations as well as power sources need to be increased.

The power supply to the new city should be newly established as the new city area is currently underdeveloped. Therefore, new facilities will have to be installed to ensure high reliability and low energy losses. To satisfy these conditions, following five power supply points are recommendable:

a) Tarakhil 110kV substation about 12 km from the Dehsabz South substation (Dehsabz South area),

b) Chimtala 220kV substation about 10 km from the Paymonar substation (Paymonar area),

c) Charikhar 220kV substation about 20km from the Barikab substation (Barikab area),

d) Pul-e-Khumri 220kV substation about 210 km from the Bagram substation (Barikab area), and

e) Baghdara 220kVhydropower station about 65km from the Bagram substation (Barikab area).

4) Transmission lines and distribution systems

The power transmission from the power supply points to demand centers is either by overhead or under ground transmission and distribution lines. In general, overhead transmission is adopted for high voltage lines. Part of transmission/distribution within urbanized areas may adopt underground lines, but for household distribution, overhead lines are common. It is recommendable to install gas insulated substations (GIS), considering heavy dust and elevation of the supply areas.

5) Sub-station facilities

Transformers shall be of low loss type and all electrical facilities shall be of energy saving types such as lighting facilities, etc. Heat pump shall be applied for the substation buildings. Communication systems shall adopt minimum three methods such as OPGW on 110/220 kV transmission lines, telephone and micro-wave system

The power supply system for the KMA consists of a transmission system with double transmission lines and dual bus-bar with back-up (50 %) power supply feeders to neighboring sub-stations, and a distribution system with junction stations having area ring connections.

(2) Ongoing and planned projects

1) Ongoing projects

Ongoing power projects are shown in Table 28 for power generation projects and in Table 29 for substation and transmission projects.

2) Planned international transmission line projects

The following international transmission line routes will be established.

a) Uzbekistan-Afghanistan: 220 kV (2×150 MW)

b) Turkmenistan-Afghanistan: 500 kV (300 MW)

c) Tajikistan-Afghanistan: 220 kV (2×150 MW, from March to September)

d) Kyrgyzstan (after 2016, from April to September)-Tajikistan (117km)-Afghanistan (562km)-Pakistan (71km): 500 kV (1×1,300 MW)
The Tajikistan-Afghanistan line shall be DC 500 kV because of the elevation along the route.

e) Iran-Afghanistan-Tajikistan

Table 28 Ongoing Power Projects

Project name	Specification	Total capacity (MW)	Expected completion
Tarakhil PS (I)	Diesel (6 units)	36	May 2009
Tarakhil PS (II)	Diesel (12 units)	72	End of 2009
Baghdara	Hydro	180 - 210	2014, Parwan province
Surobi-II	Hydro	180 - 280	2015
Aynak TPP	Thermal (coal)	200	2015 by MOM

Source: MoEW.

Table 29 Ongoing Substation and Transmission Projects

Description	Specification	Expected completion
Kabul NW SS:	110/20-15kV, 2×40MVA	End of 2008
Kabul North SS	110/20/15kV, 2×40MVA	End of 2008
Kabul East SS	110/20/15kV, 1×40MVA	March 2008
Botkhak SS	110/20kV, 2×40MVA	July 2009
220kV T/L	Pul-e-Khumiri - Chimtala	End of 2008
110kV T/L	Kabul NW S/S - Chimtala	End of 2008
110kV T/L	Kabul NW S/S - Kabul North	End of 2008

Source: ibid.

(3) Power demand projection

1) Recorded peak demand

The maximum peak demand recorded was 167 MW recorded from 18:00 to 21:00 on 10th February 2008. The peak demand composition on the same day can be estimated considering annual energy consumption, working hours and other conditions. Table 30 shows the outline of peak demand composition.

Table 30 Outline of Peak Demand Composition

Category	1:00	9:00	16:00	19:00
Residential	81	81.0	81.0	165.9
Commercial	0	1.1	2.0	1.1
Government	0	16.7	29.6	0
Holy place	0	5.6	9.9	0
Industrial	0	2.6	4.5	0
Total	81	107	127	167

Source: JICA Study Team.

2) Latent demand

There exists latent demand as load shedding is routinely practiced, and some waiting customers exist. Also, many power consumers, especially industrial ones, have their own generating facilities. They would rely exclusively on the grid power once the supply conditions are improved such as supply reliability and stable voltage. Thus, these also constitute the latent demand.

The total demand of waiting consumers was assumed of 30 MW based on load shedding schedule at the end of July 2008. The total capacity of private DEG sets is estimated as 30 MW.

3) Unit residential demand

The number of residential customers including commercial users having access to power supply is estimated to be about 200,000. The electrification ratio is estimated at 41% as of the end of March, 2008. The total number of people served by power supply is 160,000 more or less. With the peak demand of domestic use at 166MW as shown in Table 30, the unit domestic demand is calculated to be 104W. This corresponds well with the standard of 100W per capita taken by MoEW.

4) Demand projection

The unit domestic demand will increase as the income levels increase and also as the supply reliability improves. Therefore, the unit domestic demand is assumed at 150W per capita in 2025. The service coverage by the grid power should increase to 65% in accordance with the ANDS in several years and further to 80% by 2025 in the Kabul city. For the new city, 100% service coverage is planned to be realized by 2025. By applying the planned population of the Kabul city and the new city, the total domestic demand is projected to reach 825MW by 2025, consisting of 600MW in the Kabul city within the upper Kabul basin and 225MW in the new city.

Power demand for industrial, commercial and public uses is roughly estimated based on the economic structure and planned distribution of various economic activities in the Kabul city and the new city. The total industrial land in the KMA will be about 2,600ha in 2025. The unit power demand is at least 1MVA/km2 of the land area even for light industries. The total power demand for industrial use may be 30-50MW in 2025. The total floor area for service activities will be about 1,800ha. The unit power demand for service use is typically 10-30VA/m2 of the floor area. The total power demand for services use may be 150-400MW in 2025.

The combined demand for industrial, commercial and public uses is projected to become 300MW, consisting of 180MW in the Kabul city and 120MW in the new city. However, the peak demand is due to residential use during the evening, while the industrial and commercial uses occur during the day. Therefore, the total power demand in the KMA is projected to be the same as the residential demand.

The total power demand would increase from 250MW in 2008, including latent demand, to 825MW in 2025 at the average annual rate of 7.3%. In terms of energy, the average increase would be much larger due to the industrial and services demand. This rate of increase is necessary to support the high economic growth expected to be at 9.7% per annum in the Kabul province, which should be supported mostly by the economic development of the KMA. In fact, the power demand has been increasing rapidly in recent years at 9.6% per annum during 2005-07 in terms of energy.

7.4.2 Power and energy supply plan

(1) Power supply plan for KMA

The power demand in the Kabul city and the new city projected above for 2025 will be realized in steps. The power demand in 2015 and 2020 is determined reflecting the planned population increase and economic development in stages in the Kabul city and the new city. The development of power supply capacity is determined following the implementation schedule of the ongoing and planned projects presented above. Of the power generated by new plants and transmitted by planned international connections of transmission lines, it is assumed that only 70% will be used in the KMA. Based on these, the power balance is worked out as shown in Table 31.

Table 31 Power Balance for KMA

Description	2008 (MW)	2015 (MW)	2020 (MW)	2025 (MW)
1. Peak demand				
a) Kabul city	213	350	450	600
b) New city	-	100	150	225
Subtotal	213	450	600	825
2. Power supply				
a) Power plants	210	250	250	380
b) Transmission lines	N/A	630	630	630
Subtotal	210	880	880	1,010
Power balance	-3	430	280	185

Source: JICA Study Team.

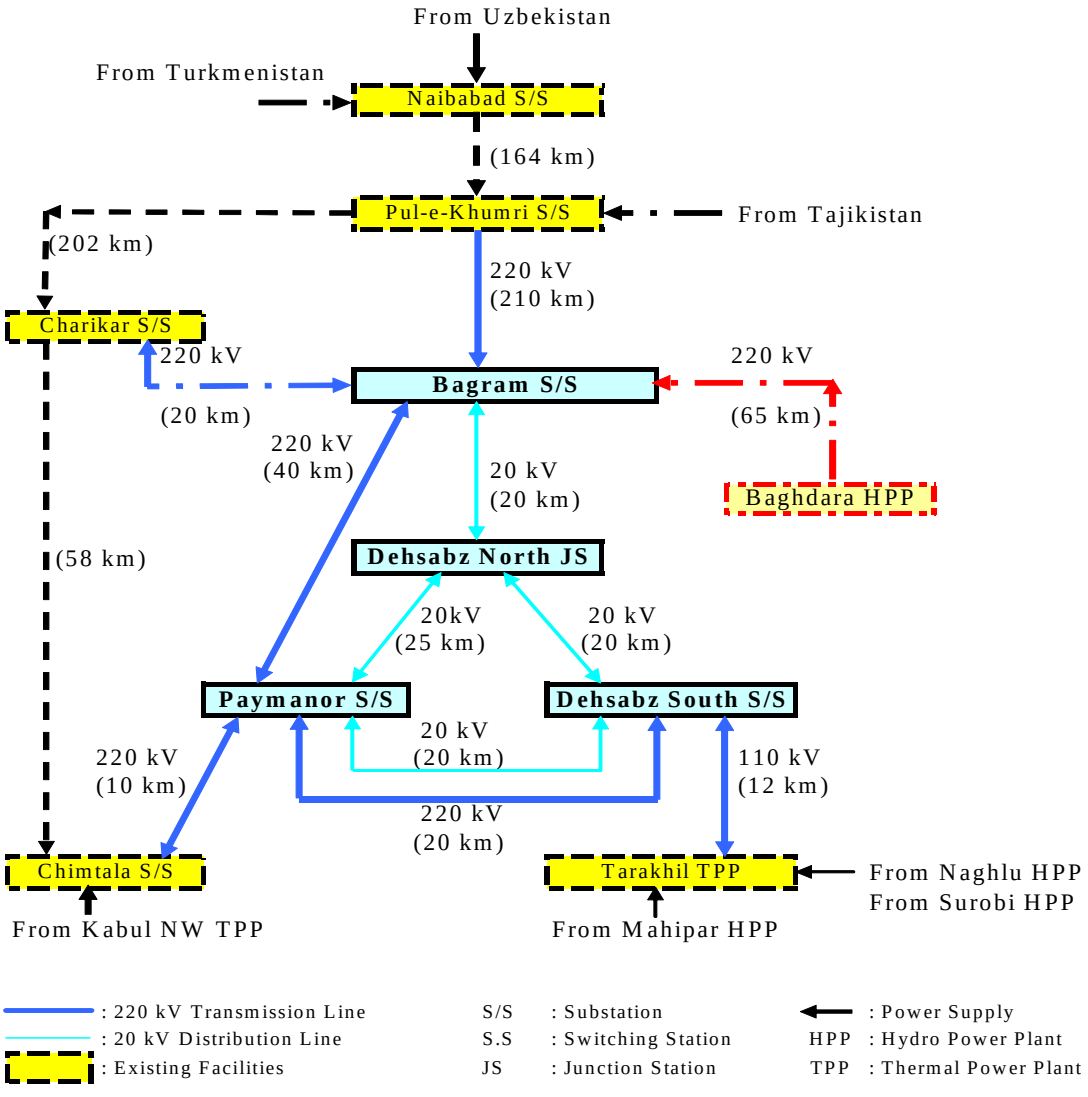
As seen from Table 31, no power shortage will develop once the power transmission lines from neighboring countries are connected to the system. Even if additional hydropower plants are not

introduced by 2025, the domestic supply capacity will be 273MW to make the total supply capacity 903MW, sufficient to balance with the projected demand. To ensure the supply reliability and stability, however, early introduction of another hydropower is desirable.

(2) Power supply plan for new city

A conceptual power supply system for new city having high reliability is illustrated in Figure 56. Figure 57 shows the coverage area by 20 kV distribution network corresponding to the bulk power supply. Major components to be implemented in each phase are as follows.

1) Phase-I (by 2015): Construction of the Dehsabz south substation with 20/0.4kV distribution network, and initiation of construction of the Bagram substations with 20/0.4kV distribution network
2) Phase-II (by 2020): Construction of the Paymonar substation and 20/0.4kV distribution network
3) Phase-III (by 2025): Completion of the Bagram substation and 20/04 kV distribution network



Remarks:
(1) 220 kV lines from Baghdara to Charikar S/S shall be planned to pass the future Barikab S/S area.
(2) ◄- — shows future projects to be completed by 2014.

Figure 56 Conceptual Power Supply System for New City

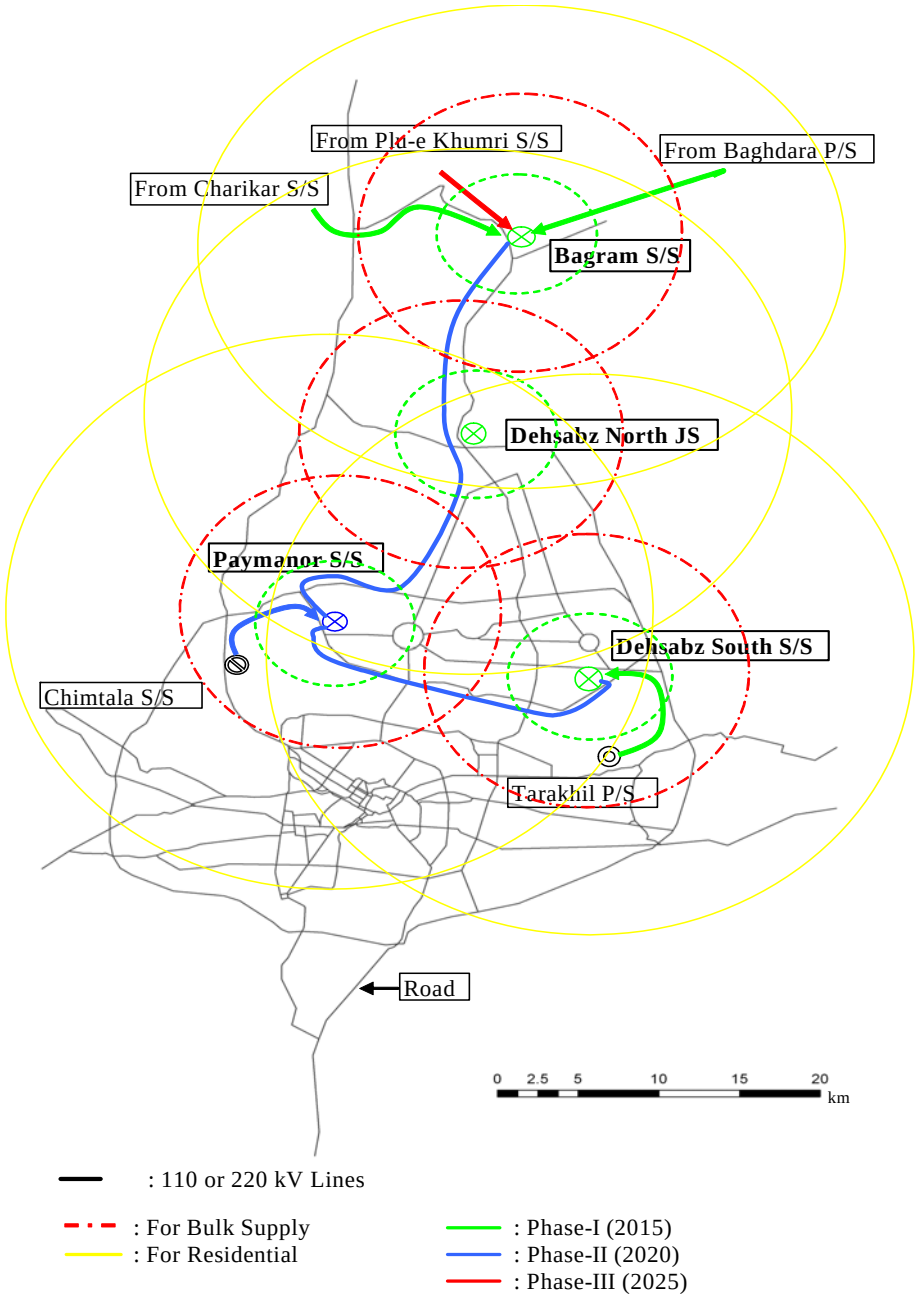


Figure 57 Service Coverage Area by 20 kV Network in New City

(3) Development of other energy sources

1) Renewable energy

Hydropower potentials in Afghanistan are estimated to total about 18GW, and wind power potentials about 158GW. Generating costs of some of them are estimated to be around US¢9/kWh. Wind power generation may not be suitable for installation near residential areas because of noise pollution, unless the latest technology of facilities with little noise is introduced. An average radiation of solar energy is estimated to be 700W/m^2 in the Kabul region, which may be tapped for rural electrification and supplemental bulk power supply as well. Typical generating costs by various conventional types of power generation in Afghanistan are summarized for comparison in Table 32.

Solar energy and biomass can be used also for heating purposes. These energy sources can be used for heating purposes of residential customers.

Table 32 Comparison of Generating Costs in 2007 (1386)

No.	Generating method	Est. av. unit price (US¢/kWh)	Note
1	Hydro	2.29	
2	Thermal	27.12	Kabul NW power station
3	Imported	2.62	
4	Diesel	29.53	All provinces
5	Hydro and diesel	5.19	
6	Hydro, thermal and diesel	6.47	
7	Natural gas	2.8-3.5	Based on Sheberghan
8	Coal	N/A	

Source: Energy Sector Strategy, January 2008, MoEW

2) Natural gas

Reserves in Afghanistan are estimated to be about 3,530 billions cubic feet in 2005. This source of energy may be used for heating purposes in the KMA once it is developed and transported by pipelines.

3) Crude oil and natural gas

The total oil reserves in Afghanistan could be as much as 270 billion barrels as estimated by the US government, and gas reserves may be between 1 trillion cubic feet (tcf) and 15-20 tcf. No immediate prospect exists to utilize these sources of energy in the KMA.

4) Geothermal

Some geothermal reserves are located in the Hindu Kush mountains and along the northern Heart-Panjshir fault line, at approximately 50km from the Kabul city. These reserves may be tapped for heating systems in the KMA if further exploration proves to be promising..

5) Coal mines

These sources of energy are considered the last option for heating and power generation due to environmental impact, unless clean coal technology is developed and introduced.

6) Power generation by solid wastes

This system may be applicable to urban areas, where large amount of solid wastes are regularly generated. The power generation may be combined with a heating system. A prerequisite for this application would be the establishment of proper collection and separation system for solid wastes. A possible scheme is shown in the Box on below.

Box: **Energy Generation from Wastes**

1. System outline

A waste to energy generation is a kind of thermal power generation by utilizing solid wastes as fuels. The steam to be generated by solid wastes combustion is converted by turbine into electricity. The type of incinerator with a boiler should be selected according to the composition of the wastes. The environmental conditions should be satisfies for the following:
(1) Exhaust gas contents with fly ash such as toxic gas, dioxin, etc.
(2) Bottom ash such as heavy metals, dioxin, etc.

2. Main components

The waste to energy system consists mainly of the following components:

1) Waste receiving facilities
2) Incineration facilities

3) Flue gas cooling facilities including waste heat boiler and ancillary equipment
4) Flue gas cleaning facilities
5) Draft facilities
6) Heat utilization facilities such as steam turbine and generator
7) Ash treatment facilities
8) Waste treatment facilities
9) Mechanical and electrical auxiliary systems

3. Basic conditions for implementation

In order to operate this system smoothly, an adequate solid waste separation system should be established. The success and failure of this separation system depends on the understanding and cooperation of residents. Treatment of possible adverse environmental effects is another essential condition for the successful introduction of the system. Recently, a gasification-melting furnace system is applied to realize proper treatment of dioxin.

4. Outline of gasification system

The system component as shown in Figure 58 consists of the following major facilities.

(1) Refuse reception and storage
(2) Gasification
(3) Ash melting
(4) Waste heat recovery boiler
(5) Flue gas cleaning

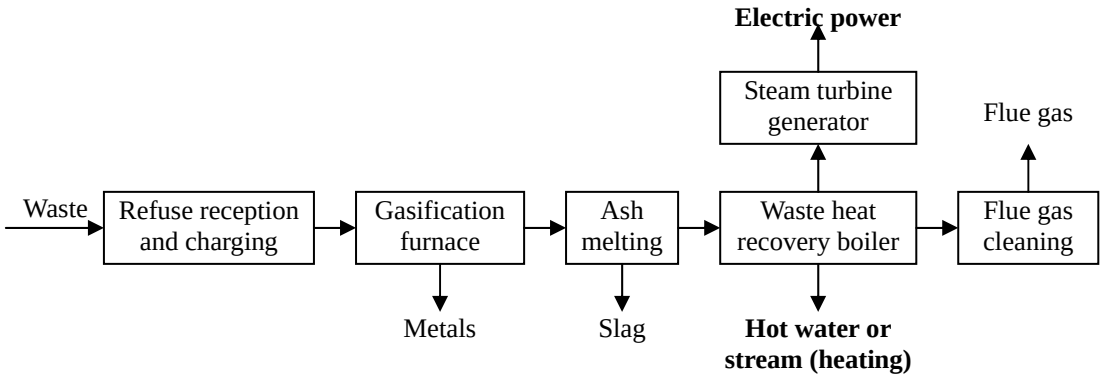


Figure 58 Generating and Heating System Components

Refuse is automatically charged into the gasification furnace and changed to combustible gas. The gas and carbon powder from the gasification furnace are fed to ash melting furnace and are burned at high temperature of around 1,300°C.

Ash in the refuse is melted by high temperature combustion gas and is recovered as molten slag in the ash-melting furnace. Waste heat of the flue gas is recovered as steam by the waste heat recovery boiler (WHRB) and electric power is generated by the steam turbine generator.

The flue gas after the WHRB is clarified by the gas cleaning facility and is emitted to atmosphere. Most dust collected by the gas cleaning facility is fed back to ash melting furnace and is re-melted.

This system, for which preferable combustion temperature is over 900°C, should be operated continuously to minimize the emission of dioxin and other toxins, and periodical monitoring to fly and bottom ashes should be conducted.

(4) Recommendation

1) Review of electricity tariffs

As the power is imported from neighboring countries, the unit cost of power supply will decrease, although the degree of reduction will depend on the combination of power from different sources.

Consequently, the power tariffs would be revised from the present tariffs in view also of the following factors:

- Reduction of tariffs for the independent supply systems in the south and the west by cross-subsidization,
- Costs for interlinking the supply systems throughout the Country,
- Promotion of rural electrification, and
- Costs involved in fuel storage for standby generators in case of power failures from the international lines.

2) Study of best mix of power sources

Power from different sources should be combined to ensure supply stability and reliability as well as peak power and energy. Such a best mix is usually different depending on the load distribution. The power supply system for the KMA at present consists of hydropower, gas turbine and diesel, and external power will be introduced soon followed by additional hydropower. As it is desirable to operate the domestic hydropower continuously for maintenance and management purposes as well, it should provide the base power at 30MW or larger. The remaining demand should be satisfied by the external power to be supplied from multiple sources. In principle, such sources that will deliver the respective power at the least cost to the receiving points of Chamtala and Bagram should be selected

3) Establishment of a load dispatching center for KMA

Since Kabul is supplied electricity from a relatively small independent network, no load dispatching center is located to monitor the power flows through the network to realize efficient overall operation of the system. As the power supply system becomes more complicated with additional generating plants and inter-connections with international networks, it will become necessary to cope with failures in the system such as disruption of supply lines or mal-function of sub-stations. Therefore, a load dispatching center should be established in the system to supply the KMA.

4) Comprehensive design and construction standards for distribution network

Comprehensive design and construction standards are not available for the power sector in Afghanistan. It is strongly recommended that related documents should be standardized not only for easy operation and maintenance but also for smooth execution of related works including design. In establishing such standards, variable power supply conditions such as limitation to high harmonic wave, power factor, etc. should also be considered.

5) Capacity buildings

Technical and experience levels related to planning, design, operation and maintenance of power supply system, facilities and equipment should be much improved as the supply system becomes more and more complicated and sophisticated. It is recommended to conduct capacity building step by step to each section of related organizations with adequate and sufficient facilities to promote information and communication technology.

6) Privatization of power sector

In order to establish more secure and improved power supply system, it is recommended to promote privatization of the power sector in steps. It may be implemented first for power distribution, followed by generation and transmission systems.

7) Reduction of energy losses

Energy losses are presently about 430 GWh per year, corresponding to 34% of the supplied energy. This is equivalent to the consumption of 160,000 residential users. If energy losses can be reduced to below 15%, more than 80,000 residential users will be able to receive energy without any additional generating facilities. It is preferable to reduce distribution losses to less than 10%.

7.5 Solid Waste Management

7.5.1 Frameworks for solid waste management in the KMA

(1) Population framework

The present population of 4.01 million in the Kabul city is projected to increase to 7.5 million more or less in 2025 according to the socio-economic framework for the KMA development. Of this projected population, some 5million should be accommodated in the Kabul city area within the upper Kabul basin, and 1.5 million in the new city area in 2025. The rest would be accommodated mostly in the northern part of the National Capital Region of Kabul.

(2) Amount of waste generation and disposal

The unit amount of solid waste generation in the new city is assumed to be 0.4kg/capita/day up to 2015, the same as the present level in the Kabul city, to increase gradually to 0.5kg/capita/day in 2020, and 0.6kg/capita/day. The total amount of solid waste in the new city is projected as shown in Table 33. As seen from the table, the amount of solid waste in the new city would be 900tons/day in 2025, corresponding to about20% of the amount in the Kabul city.

Table 33 Projection of Solid Waste Generation in New City

Amount (t/day)	2008	2010	2015	2020	2025
Dehsabz South	1	15	49	146	277
Dehsabz North	1	21	71	170	301
Paymonar	3	21	66	127	206
Barikab	0	2	6	53	117
Total	4	58	193	496	900

Source: JICA Study Team

(3) Disposal sites

Three final disposal sites are required by 2025 to serve the four areas planned in the new city: Dehsabz south, Dehsabz north, Paymonar and Barikab. One site in Dehsabz will serve both Dehsabz south and Dehsabz north. The approximate area required at each site is 20ha in Dehsabz, 15ha in Paymonar and 10ha in Barikab (Table 34). Their locations are shown in Figure 59. No transfer station is planned as each site is within a short distance from the respective service area.

Table 34 Disposal Sites for Solid Wastes in New City

LF site	Waste in 2025 (t/d)	Area (ha)	Ready to use	Note
Dehsabz	385	20	2015	About 20km from both centers
Paymonar	180	15	2017	About 15km from center
Barikab	117	10	2020	About 15km from center

Source: ibid.

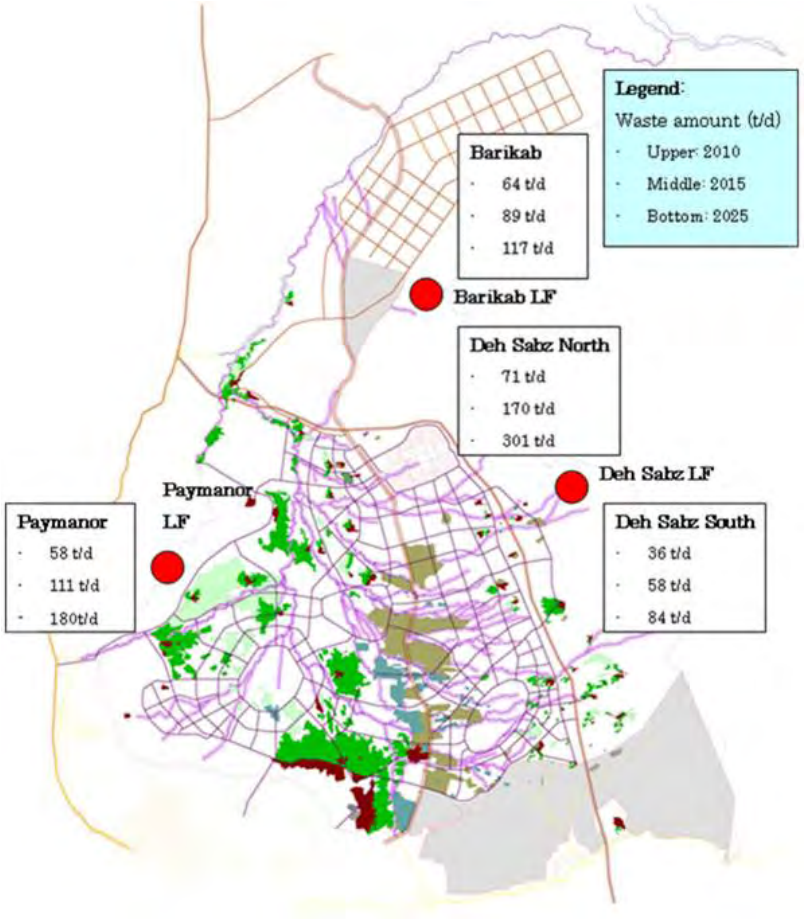
(4) Administration and finance

A new administration should be established for solid waste management for the new city. It may be a new section in DCDA or the Kabul municipality, or a separate municipality, depending on the overall structure of urban governance for the KMA discussed in Section 8.1. It should have the following functions at least:

1) Planning section: medium term and annual planning, and annual reporting of performance,
2) Operation section: collection and transportation of wastes, including management of containers and a workshop,
3) Financial section: budgeting and account settlement, and

4) Administration section: overall management including other functions not covered by other sections.

Since the solid waste management involved high costs without generating revenues, efficiency in operation is of utmost importance. The administration should manage all the costs related to solid waste management, and conduct a full analysis on the amount and quality of wastes, personnel and other input, and service levels at collection, transport and disposal.



Source: ibid.

Figure 59 Candidate Sites for Sanitary Landfill in New City

7.5.2 Solid waste management plan

(1) Storage and discharge to container

Currently the in Kabul city, residents discharge their wastes to the collection points, which are located in the neighborhood and open to the public. Widely spread wastes are observed commonly there. The residents dispose wastes in those places without considering the consequences. The collection points are often scavenged by animals and humans as well. They should be abandoned in the new city from viewpoints of public health and environment.

For the purpose, residents should be informed and educated through community-based participation to avoid the traditional way of discharge and to introduce a new system with waste storage and/or separation and discharging into containers. Even though a small number of residents discharge their waste out of the containers, the whole system would be damaged. The recovery would be labor-intensive and costly. The cooperation of all the residents in a community should be realized.

(2) Collection and transportation

In the Kabul city, there is presently no transfer station, where the wastes are unloaded from small

vehicles to large ones. A very costly system is employed to collect the wastes and transport them to the dumping site with small vehicles. At the collection points, workers are collecting the wastes with shovels into a dump truck, which is not equipped with a compaction system. The small trucks are transporting the wastes directly to the dumping site. This is why so many workers constituting 43% of the municipal staff are required for solid waste management.

There are two kinds of collection methods by truck type:

i) Dump truck, which is commonly used in the Kabul city

ii) Compactor truck, which is used with containers by hydraulic mechanism

The recent World Bank project provided 500 containers to the Kabul city a few years ago. They are not used properly because the residents are accustomed to the old system of waste disposal to collection points. The reason for this should be examined to learn a lesson, and a new collection system with containers should be introduced with the cooperation of residents in the new city.

There are three kinds of transportation of the wastes to the disposal site:

i) Direct transportation to disposal site for a short distance

ii) Transportation by a transfer station for a long distance

iii) Indirect transportation to a transfer station

If the distance of transportation is longer than a critical distance, a transfer station should be used for unloading from a small vehicle and loading to a large compaction vehicle. The critical distance is estimated to be about 20 km. Figure 60 illustrates the collection and transportation system.

In case where the source of waste generation is far from the disposal site, the collected wastes should be unloaded and loaded into a large compact truck to bring the wastes to the final landfill. In case where the generation source and collection point is rather close to the landfill site, the wastes could better be directly transported to the site.

Table 35 presents the criteria to evaluate whether or not a transfer station is used. The critical distance to the final landfill is about 20 km. The wastes collected within 5 km of a transfer station should better be brought there. In other cases, direct transportation or transportation by a transfer station should be examined by try and error in terms of efficiency. This is a part of management.

Table 35 Criteria for Selection of Transportation Mode

Criteria		Distance to LF from collection area	
		Less than 20 km	More than 20 km
Distance from collection area to TS	Less than 5 km	Direct transportation	Direct or TS transportation
	More than 5 km	Direct or TS transportation	TS transportation

Source: ibid.

The function of transfer stations is to increase the efficiency of solid waste management by increasing the overall transportation capacity. Dump trucks and compactor trucks are used for collection, while container trucks are used for transportation to the final disposal site.

Three locations of transfer stations are identified as follows (Figure 61):

i) TS1 to cover Paymonar, located in the south of Paymonar

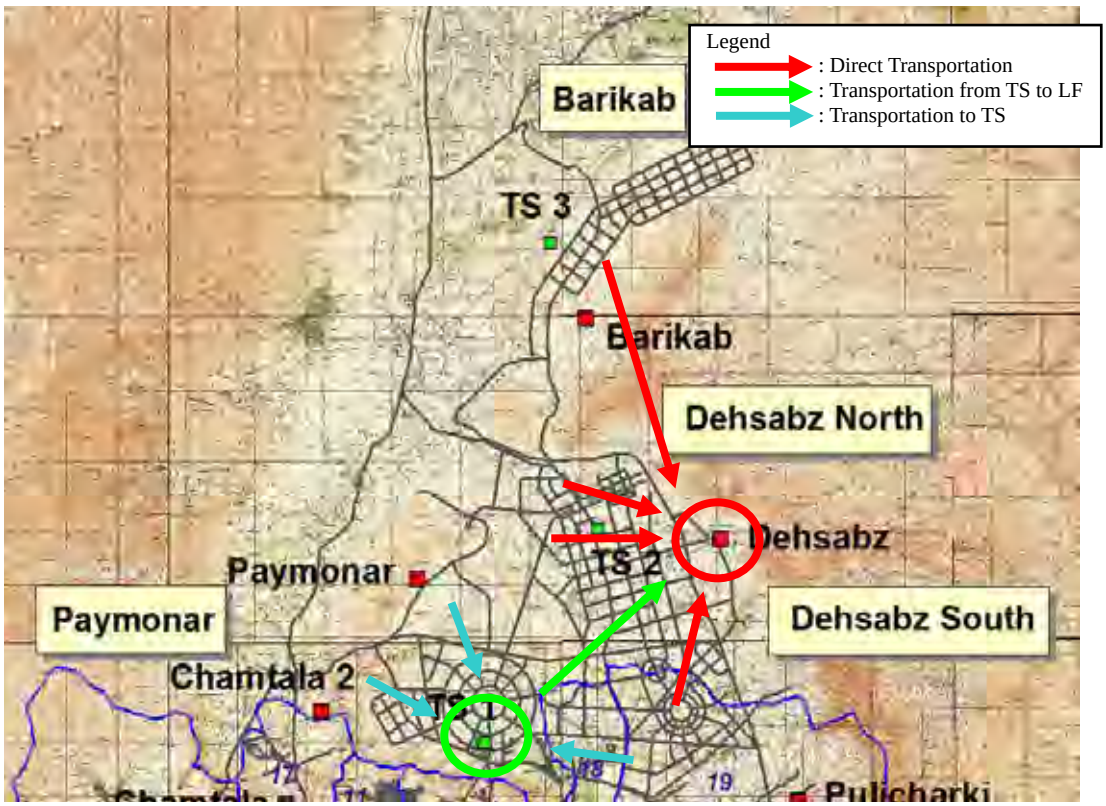
ii) TS2 to cover both Dehsabz South and North, located in between

iii) TS3 to cover Barikab, located in the east of Barikab

(3) Road sweeping and transportation

Currently in the Kabul city, dusts are accumulated on roads and in drains due to lack of pavement, and discharged wastes are also observed. DoS is responsible also to collect these wastes. Many drains in the Kabul city are not properly designed to drain rainwater into natural streams or rivers since they

are mostly closed. In road sections, drains should be designed to allow smooth drainage of water with the gradient of 0.2% or larger, and connected to natural flows. It is commonly observed in the Kabul city that workers dig dust and wastes from drains with shovels. This kind of work is wasteful.



Source: ibid.

Figure 60 Transportation via Transfer Stations

Source: ibid.

Figure 61 Locations of Transfer Stations and Disposal Sites in New City, 2025

(4) Final disposal as sanitary landfill

Scavenging activities should be abandoned in the final disposal sites of the new city, and basic management shall be introduced at each disposal site. The three proposed landfill sites are i) Dehsabz LF (landfill) to cover both Dehsabz South and Dehsabz North, ii) Paymonar LF to cover Paymonar, and iii) Barikab LF to cover Barikab, which are summarized in Table 36. Since there is currently no final disposal site in the new city, the construction of Dehsabz LF will be a high priority, which should be completed as soon as possible.

Table 36 Projection of Solid Wastes Disposed of at Three Sites in New City

LF site	Waste in 2025 (t/d)	Area (ha)	Year ready	Note
Dehsabz	385	20	2015	About 20 km from both centers
Paymonar	180	15	2017	About 15 km from center
Barikab	117	10	2020	About 15 km from center

Source: ibid.

(5) Recycling and energy recovery

Solid wastes provide a source of materials to be recycled and a source of energy to be recovered. However, the methods to be used for the purposes should be carefully considered through pilot implementation to ensure the success.

If a recycling center is to be established, final landfill sites may be used with careful consideration of economic value of respective sites. Likewise, a composting plant should be studied first at the same site, covering also market aspects. A German survey showed the technical feasibility of a composting plant, but economic feasibility should be studied carefully with a pilot project.

Wastes may be burned to generate energy or electric power, but level of technology used would be a key for success. Otherwise, the smoke will contaminate the air, and may pollute the groundwater. This kind of experiment should be conducted first in the final landfill site in a scientific manner. At a large hospital in the Kabul city has an incinerator, but it is stopped due to improper operation, causing smoke around it and facing residents' oppositions.

7.5.3 Implementation plan for solid waste management in the new city

(1) Project components

The solid waste management project for the new city should be implemented over the planning period up to 2025 with the following components:

1) Purchase of 2,000 containers
2) Procurement of 111 vehicles
3) Final selection and construction of three landfill sites including offices and garages,
4) Construction of treatment plants for leachate
5) Purchase of three landfill operation vehicles

(2) Project costs

The total cost of the project is estimated to be US$52.7million. The cost by phase is US$33.5million in Phase 1 up to 2015, US$11.0millin in Phase 2 up to 2020, and US$8.2million in Phase 3 up to 2025.

(3) Recommendations

i) A new administration should be established to specialize in solid waste management in the new city in line with the overall administrative structure for urban management in the KMA.

ii) The selection of the first landfill site in Dehsabz and land acquisition should be expedited.

iii) Initial procurement of collection vehicles should be undertaken as planned.

iv) Construction of a workshop and procurement of equipment should be undertaken as planned.

v) A program to enhance the awareness of future residents in the new city should be prepared for solid waste at home and scheduled discharge, and maintenance of collection sites.

vi) Training of specialists for solid waste management and skilled workers for workshops should be conducted.

7.6 Social Infrastructure

7.6.1 Health and education facilities

(1) Health facilities

Given the present health and education conditions of Afghan people as a whole, the provision of health and education facilities and services is considered a fundamental role of the Government. This position is clearly presented in the ANDS, and to be naturally reflected in the new city development.

The required numbers of various health facilities are determined by applying the standards established by the Ministry of Health to the estimated and projected population in the new city. The health facilities and corresponding standards are 1) basic health center (BHC) to cover a population of 15,000 to 30,000, and 2) comprehensive health center (CHC) to cover population of 30,000 to 60,000. Considering that each facility can cover a larger population due to good transportation in urban areas, the coverage by BHC and CHC is set at 30,000 and 60,000, respectively.

Considering the future size of the new city, a hospital complex should be established in the new city, including all the different departments in an area of about 8ha. A few health centers should be located some 10-15km from the hospital complex.

(2) Education facilities

The required numbers of education facilities in the new city should be determined by applying the standards established by the Ministry of Education. The standards applicable to the new city are: 1) new primary school to cover 100 or more households in an urban area, and 2) new secondary school to cover three primary school areas in an urban area.

A high school is assumed to cover three secondary school areas. For secondary schools, the original standard is adopted that a secondary school covers three primary school areas. In addition, institutes for higher education and research should be established in the new city by association with international class institutes in developed countries.

7.6.2 Other facilities

(1) Social and cultural facilities

A major mosque should be established in the new city to be located in the central park area possibly with associated cultural facilities. A new cultural creation center should be located in Dehsabz to develop enabling environment for creating new culture to enrich the Afghan culture. A sport park should be established also in Dehsabz to promote various sporting activities by both professional athletes and ordinary citizens.

(2) Military and related facilities

The provision should be made to reconcile the use of the existing military compound in Pule Charkhi for allowing the proposed Kabul city ring road, which is considered vitally important for the new city development. An area of some 60ha should be allocated for various military facilities such as a military college, and military offices for security as well as supplemental facilities related to the Pule Charkhi compound. Also, housing for martyrs, war handicaps and families of military personnel

should be accommodated in the new city.

8 IMPLEMENTING ARRANGEMENTS FOR NEW CITY DEVELOPMENT

8.1 Possible Administrative Structure for KMA

8.1.1 Need for better administrative structure

The implementation of the KMA development master plan will face difficulties due to the present administrative structure to govern the Kabul urbanization. Specifically, the following points are noted as possible causes of administrative difficulties.

1) The KMA jurisdiction has not been defined physically nor legally; the KMA is defined for the planning purpose by combining the present jurisdiction of the Kabul municipality and the new city area in Dehsabz and Barikab determined tentatively.
2) The jurisdiction of the Kabul municipality overlaps partly with the new city area in Districts 18 and 19 of the Kabul city.
3) The planning for the new city is administered by DCDA under its Board, which includes as member organizations the MoUD and the Kabul municipality, creating a nested structure; in this way, the involvement of the Kabul municipality in the KMA development is confined to matters related to the new city.
4) There is no institutional mechanism to ensure coordinated implementation of the KMA master plan between DCDA and the Kabul municipality, while DCDA without any track record for implementation would have to cooperate closely with the Kabul municipality and other related implementing agencies from the day 1 of the new city.

These administrative difficulties are compounded by the paucity of capable human resources for urban development and management in Afghanistan in general, and inefficiency and the lack of transparency and accountability for urban management in existing administrations. The Kabul municipality, having the status of ministry, has the strongest administrative authority to manage the Kabul urbanization, and the largest staff capacity covering a wide range of implementation and governance for the Kabul urbanization. These administrative and human capacities have not been effectively utilized for the improvement of urban life and spaces of the Kabul city.

Major re-structuring of urban administration would be necessary to ensure effective implementation of the KMA development master plan. Such re-structuring should be realistic, politically and otherwise, to be implemented in steps, and effective in attaining the long-term goal of the KMA development. Also, specific measures to be taken in steps should be accountable in the sense that their performance can be measured to a reasonable extent. In short, the administrative re-structuring would have to satisfy the following requirements expressed in acronym commonly as SMART (specific, measurable, attainable, realistic, and time-bound).

8.1.2 Possible options for administrative structure for KMA

In order to clarify the administrative requirements for the KMA urban development in the immediate and long-tem future, possible options for region-wide governance are first examined. The four distinct alternatives are:

1) Kabul Metropolitan Authority,
2) Expansion of the Kabul municipality jurisdiction,
3) Greater Kabul council or commission, and
4) Kabul regional association.

The characteristics, advantages and disadvantages of each option are summarized in Table 37. The

following are noted.

The Kabul Metropolitan Authority represents an ideal solution. It may be established with sufficient authority to facilitate coordination, and staff and financial capacity. It is expected to have stability against changes in political regimes. This, however, may take time to establish. Thus, it is considered as a long-tem option that would deserve further examination.

A particular form of the Kabul governance is to have two municipalities of the Kabul city and the new Kabul city under the Kabul Metropolitan Government. An example elsewhere is the case of the Tokyo Metropolitan Government. Within its jurisdiction, there are 23 special wards, two city status municipalities, and many other town and village status municipalities. The head of the Metropolitan Government is the Governor of Tokyo Metropolis, and the head of each local government of municipality status is a mayor.

Table 37 Alternative Institutional Arrangements for KMA Urban Development

Alternative	Basic features	Advantages	Disadvantages
Kabul Regional Association	- Established as an umbrella organization of all the related administrations - Legal status needs to be defined	- Powerful enough if placed under the Office of the President - More stable than council/commission	- Difficult in ensuring balance between member agencies - Dependence on the executing arms of existing agencies
Greater Kabul Council (or Commission)	- Established as a statutory entity with office and full-time employees, but not so strong as KMG - Funding from member organizations - Mainly for coordination and project/investment promotion	- Easier and faster to establish - No changes in municipalities' role and responsibilities	- Unstable and likely to be threatened by leadership turnover - Difficulty in securing funds for operation and maintenance
Kabul Metropolitan Government	- Created by legislative measure as a legal entity - Autonomous with minimal supervision - Mandates, power and functions defined as created	- Most stable organization - Full authority to ensure coordinated development - Allowing municipalities to concentrate on services delivery	- Need for tedious and meticulous process to establish - Danger of being politicized
Kabul Municipality	- Established by expanding the Kabul Municipality with additional districts - Same administrative status as the existing one	- Minimal organizational restructuring involved - No need to establish another municipal institution	- Against ongoing administrative reform with DCDA - Difficult to provide efficient municipal services, - Risk of leaving the current problems as they are

Source: JICA Study Team

The expansion of the Kabul municipality jurisdiction to cover the new city area as a whole is conceptually simple, but may not be a realistic option as it may be politically unacceptable. A simple fact is that this option goes against the ongoing efforts by DCDA established by the relevant Presidential decree.

The Kabul regional association is relatively easy to establish, and will be powerful enough if it is placed under the Office of the President. It may be reduced to a mere forum without any executive power, and the execution would have to depend on existing agencies. The Greater Kabul council or committee is easiest to establish. Initially, it may have only coordination and project/investment promotion functions.

There are many cases of regional governance in the form of a council, commission or association. In Japan and USA, an association of plural municipalities is often established as an initial form of region-wide governance, which is not an autonomous or unitary organization.

A case of autonomous regional governance is provided by the Greater London Council. It was first established as a coordinating body, but strengthened into a powerful implementing organization to govern the conurbation region of London. It was once abolished under the Thatcher administration

in 1986, but re-established in 2000 as the greater London Authority. It is currently functional, and the municipal head of the Greater London Authority is called the London mayor.

8.1.3 Recommendations for administrative restructuring for KMA

Most large cities have changed their administrative structure as they develop in order to meet the changing administrative needs for their respective citizens. Very often, such administrative restructuring is associated with expansion of area under jurisdiction along with the rapid population growth and expansion of urbanized area. It is also observed that the urban administration of large cities in developed countries takes the form of multi-layer structure. A typical case is London with the Greater London Council (GLC) and associated administrative tiers.

The four-layer structure of the GLC consists of 1) Metropolitan London, 2) Greater London, 3) Inner London, and 4) Central London. The correspondence with Kabul may be 1) National Capital Region of Kabul, 2) Kabul Metropolitan Area, 3) Kabul municipality, and 4) central districts of Kabul city such as Districts 1 through 16 except District 14. This structure may be applicable to the Kabul region, except the central districts that cannot be a separate administration.

GLC is not merely a forum for discussion on common urban and regional matters among related entities, but it is an executing body having a permanent full-time staff and an office. In many countries, such institutions for regional governance have been established in recent years.

The administrative restructuring for the KMA should be undertaken in steps. Of the four alternatives examined above, the Kabul regional association and the Greater Kabul council are two realistic options that may be established in the nearest future. Difference between the two alternatives is mainly in the level of power and authority related to their legislative status.

The association may be created as a legal entity and placed under the Office of the President, but then it would become in effect equivalent to the first alternative. The establishment of such an authority in the immediate future does not seem to be realistic since it would contradict the status of DCDA. If, on the other hand, such an authority is not vested, the association may become a mere forum or it may be dominated by the most powerful member organization.

The Greater Kabul council would be easy to establish and its functions may be expanded as it demonstrates its track records. First, the council may have only coordinating and limited management functions. Its functions may expand in steps to include planning, project and investment promotion, and monitoring and evaluation. Eventually, it may evolve into an executing agency for the implementation of some types of projects as well. Then, it would become effectively the regional development authority.

The council should better have a project management office with fulltime staff from the beginning to ensure accountability for the master plan implementation through coordination between related agencies. It may be seen as a step to establishing the authority, but it is most important to establish it in the nearest future with the very fundamental functions.

Alternatively, DCDA may be transformed into the Kabul Metropolitan Authority by expanding its territorial and administrative jurisdictions. This appears simple and straightforward, but in fact, is even more unrealistic in the immediate future than the expansion of the Kabul municipality jurisdiction until DCDA accumulates sufficient track record for implementation of development. A stepwise approach as described above is the only realistic option.

8.2 Implementing Arrangements for New City Development

8.2.1 Alternative setups

Public-private partnership is expected in the implementation of the Kabul new city development. Depending on the balance between the public and private initiatives, three alternative setups are conceived. One is for DCDA as the government agency to undertake the implementation as the master developer just like the Kabul municipality undertakes large-scale residential developments

from planning to construction. The second alternative is to establish a public corporation by capital contribution from the Government though DCDA and private investors/developers. The third setup is a combination of a government authority and a master developer company.

The first alternative is unrealistic not only because DCDA lacks track record for implementing any development, but more fundamentally because any large-scale development directly by the government entity has proved to be inefficient. The establishment of a public corporation, which is owned wholly or partly by the Government, is a method commonly adopted for new city development in developed countries such as Japan, France and UK.

Under the third setup, the two organizations work together with division of responsibilities. The government authority would be responsible for: 1) inter-governmental coordination, 2) project authorization, 3) utilization of budget allocated by the Government, 4) utilization of funds from donors, 5) utilization of government land, 6) land expropriation, and 7) preparation of necessary laws and bylaws. The private master developer would be responsible for: i) funding from the private sector, ii) utilization of efficient management skills and expertise of the private sector, iii) establishment of joint venture companies for development of individual land lots, and iv) coordination between individual developers. This setup has been successfully utilized for the development of two new cities, Putrajaya and Cyberjaya, in Malaysia.

Under any setup, the master developer will undertake the development of main infrastructure including artery roads, water supply and sewerage, electricity supply and communication network as well as land sub-division into large blocks. Thereafter, the master developer will select individual developers to undertake the development by sub-divided large block. The master developer may conduct bulk sale of large land blocks, or form a joint venture to develop some land blocks directly. Individual developers would undertake detailed design of sub-divided blocks following the master plan and design guidelines prepared by the master developer, and sales promotion of individual land lots.

8.2.2 Implementing arrangements with DCDA

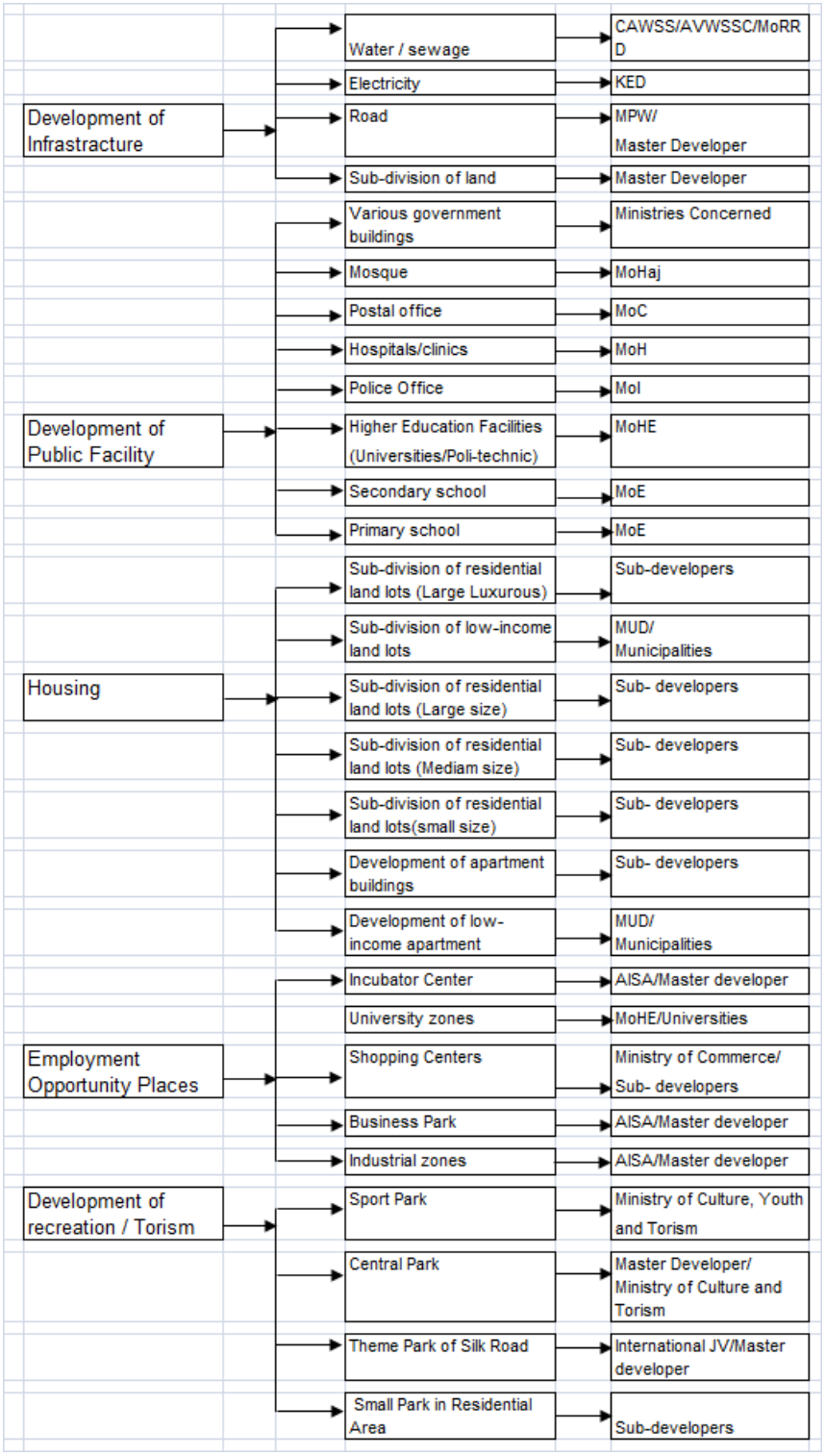
For efficiency and transparency of the implementation process, it is desirable that a government authority and a master developer should be separated clearly. At present, DCDA appears to assume double roles not only in planning but also in implementation of the new city development. This may work for the planning and initial implementation of relatively small projects.

For full-scale development of the new city, DCDA may be developed into two separate entities. One is made into the master developer company, and the other a formal government administration. The former may be a holding company capitalized mainly by private companies with small equity share by the Government. The latter may take responsibilities either for the new city area in Dehsabz and Barikab or the entire KMA, depending on how DCDA will develop its track record.

The characteristics of the two organizations are completely different in terms of financial base and legal requirements. The master developer would have to conduct capitalization from the private sector, foreign as well as local, which cannot be undertaken by the government administration.

To ensure the provision of various urban services to increasing number of new city residents effectively, the municipal status would be required sooner or later. The present status of DCDA would become irrelevant in this essential aspect, unless the Kabul Metropolitan Authority is established, encompassing all the municipal functions or the multiple municipalities assuming responsibilities separately for the Kabul city and the new city. In either case, the municipality or municipalities in charge of the new city should pioneer autonomous entities to realize full decentralization and provide comprehensive urban services including education and health as well as other social functions.

Construction of a new city would involve many entities in the private and public sectors. Functions and facilities involved in the new city development and specific entities in the public and private sectors to take charge of them are shown in Figure 62.



Source: JICA Study Team

Figure 62 Functions and Facilities Involved in New City Development and Responsible Entities

8.2.3 Strategic considerations for new city development

(1) Sub-division of new city area

The Kabul new city is planned in a very large area. Its population is planned to reach 1.5million by 2025, and eventually 3million. To realize the new city in a relatively short period of time, the new city area should be divided into several areas or towns, and the development should take place

simultaneously in different areas under the coordination of the master developer. In Japan, the size of new towns is typically 200,000-400,000 of planned population and 2,000-4,000ha of the land area. The similar development scale is observed in other developed countries as well.

The Kabul new city is planned with four sub-centers: Dehsabz south, Dehsabz north, Paymonar and Barikab. In view of the planned population and land area, the Dehsabz south area may be further divided into two. The Dehsabz north area may also be divided into the 26 Dalwa project area with its peripheries and the remaining area. This division will create six sub-divisions having population in the range of 220,000-250,000. The land area will be 2,000-3,400ha, except the Barikab area (4,500ha) to be developed partly for commercial agriculture.

(2) Nomination of multiple joint developers

Under this sub-division, four to six joint developers may be nominated to undertake the new city development by area. In the case of the Tama new town development in Tokyo, two master developers were appointed to develop the entire land of some 3,000ha: the National Public Corporation of Housing and Urban Development (64% land share) and the Tokyo Metropolitan Government (36%).

The sub-division and simultaneous development of different areas by multiple joint developers would help to cultivate confidence among the developers. Any real estate developments involve inevitably risk of various sorts. Especially under the current world wide economic turmoil, it would be extremely difficult to mobilize private sector resources for risky investments. In the past, many large-scale urban developments were suspended, cancelled or liquidated at throw-away prices.

It is vitally important to make the initial development successful in order to gain momentum for the full-scale development of the new city in a short time. Mobilization of multiple joint developers would be a necessary condition to realize this. In view of the immature construction industry, however, initial development should be kept at manageable scale. Probably, a pilot project should be implemented by the public-private partnership with DCDA and developers to showcase a successful development.

(3) Investment guarantee fund

Irrespective of the reality, the risk of the new city development as perceived by ordinary investors is high. Most serious investors may not commit themselves to the new city initiative unless there is some guarantee that their investments would not be in vain. The establishment of an investment guarantee fund specific to the new city development is recommended.

The fund may be established by contributions of donors as well as private companies. Private companies making investments into the new city development may provide a fixed portion of their investments to the fund as insurance. When any investment faces a failure due to force majeure including destruction of facilities by terror attacks, the original amount of investment would be reimbursed from the fund on the condition that new investment would be made in principle for the same cause. This would work as a deterrent against any sabotage or destruction.

Also, the fund would function as a mutual guarantee mechanism for all the participating investors. This may help to cultivate a sense of collaboration among them in contributing to the realization of the new city as the symbol of national unity. Support of donors in establishing the fund would be justified as the fund would in fact contribute to improving the security of the society and integrating the peoples

(4) Flagship projects to create distinct characteristics of new city

For the success of any new city, the establishment of strong economic and employment base is critically important. Such a base should be established with the view to creating distinct characteristics of the new city. For this purposes, flagship projects should be implemented such as the following:

1) Establishment of international class universities by re-locating existing universities from the Kabul city and inviting foreign based universities
2) Agro-business park development with marketing center, exhibition hall for agro-products, industrial park for food processing, advanced agricultural technology laboratory and other related functions
3) Establishment of office park to accommodate Central Asia headquarters of logistics and other companies
4) Establishment of a software park inviting IT companies and research institutes
5) Technology center development for research on new materials and mineral processing technology, testing of construction and other materials, assessment of reserves and demand of natural resources, and other related functions
6) Re-location of some government functions from the Kabul city such as all the construction and development related functions
7) Establishment of a "Silk Road" theme park featuring rich heritage for tourism and education.

(5) Legislation of the New Kabul City Development Act

To strengthen the legal base for the new city development as the national project, a basic law called the New City Development Act should be legislated. The Act would include the following provisions:

1) Objectives of the Kabul new city development
2) Definitions of the project and the project area
3) Outlines of the master development plan
4) Approval and revision procedure of structural and detailed plans
5) Implementing organizations
6) Coordination among government agencies and related municipalities and implementing organizations
7) Land acquisition
8) Monitoring and reporting of implementation

9 IMPLEMENTATION PLAN FOR NEW CITY DEVELOPMENT

9.1 Market Survey and Analysis

To examine the market conditions for housing and commercial spaces in the Kabul area, a market survey was conducted jointly by DCDA and the Afghanistan Investment Support Agency (AISA). A workshop was organized on January 21 2009 to provide the first hand information on the JICA Study and the new city development and to discuss on issues involved in the KMA development with the new city. Over 100 real estate agents participated in the workshop, and a questionnaire survey was conducted for all the participants.

9.1.1 Survey and its results

(1) Real estate agents

The participating real estate agents cover 13 districts in the Kabul city with their properties, except District 1 or the old city, Districts 12 and 16 where formal housing is dominant, District 14 in Paghman, and outer Districts of 18, 19, 20, 21 and 22. The total number of residential properties for sales and lease being dealt with by all the participating agents is close to 2,000 housing units, accounting for some 1% of the existing housing stock in the Kabul city.

(2) Perception for the new city

Practically all the participating agents expressed positive view for the new city with 72 responding positively to the rationale of the new city, and only one responding negatively. Of the respondents, 86% perceived larger housing units in the new city, consisting of 57% for 500m^2 units and 29% for 300m^2 units. Only 14% of the respondents were in favor of 100m^2 units. Out of 82 respondents, 77 expressed their intention to live in the new city. Preference for detached housing and apartments as expressed by the participating agents was 59% for detached housing and 41% for apartments.

Most participating agents assessed the average price of housing units in the new city at 30-100% of the average housing price in the existing city. Excluding a few who assessed the prices inordinately low, the average housing price in the new city was assessed to be 51% of the average price in the existing city. Almost all the responding agents expressed positive view on the likelihood of city residents to decide to live in the new city despite the distance from the existing city with 77 positive and only two negative views.

(3) Sales prices and rents

The average sales prices for properties in the new city assessed by the participating agents were US$275.5/m^2 for residential units, US$2,061.9/m^2 for commercial spaces, US$261.3/m^2 for industrial space, and US$40.0/m^2 for agricultural space. The average monthly rents were US$25.3/m^2 for residential, US$69.5/m^2 for commercial, US$20.0/m^2 for industrial, and US$58.3/m^2 for agricultural properties.

The average prices of detached housing units of various sizes range from US$53,996/unit for 5-room houses to US$243,000/unit for 8-room houses. The average prices of apartments range from US$38,558/unit for 2-room apartments to US$122,059/unit for 6-room apartments. The average monthly rents for apartments range from US$183/unit for 2-room apartments to US$626/unit for 6-room apartments.

(4) Clientele

The majority of property buyers for the participating agents were private entities, accounting for 54%, followed by returnees from other countries with a 28% share. Public entities and others account for 19% of the clients. Of the respondents, 16 agents reported increase in their property dealings from the previous year, and 47 agents reported decrease in their business in the past year. The average increase was reported to be 29%, and the average decrease 44%.

9.1.2 Determination of housing composition, sales prices and rents for the new city

(1) Housing composition

The planned population in the new city is 1,500,000 people in 2025. Some may acquire land and construct houses by themselves. The total number of housing units to be provided may be 200,000 in 2025. Additional 50,000 units may be sold as land.

Of the total housing units, 60,000 may be allocated to social housing. Of the remaining 190,000 housing units, about 60% may be detached houses and the rest apartment units, following the survey results. That is, 70,000 apartment units may be provided. Including 50,000 units to be sold as land, the total number of detached housing may be 120,000 units. The 70,000 detached housing units may consist of 25,000 units for low density detached housing for high-income people and 45,000 units for medium density housing for high or medium income people.

(2) Sales prices of housing

According to the real estate survey, most luxurious housing units in the Kabul city fetch prices as high as US$400,000/unit with eight rooms. As housing units in the new city is assessed by the participating real estate agencies at 51% of the comparable units in the Kabul city on the average, the average sales price of low density detached housing for high-income people in the new city is set at

US$200,000/unit. The average sales price of eight room housing units in the Kabul city is US$240,000/unit as described above, and US$120,000/unit is assumed for similar housing in the new city.

The prices of six room apartments in the Kabul city range in US$65,000/unit to US$200,000/unit with the average of US$122,000/unit. It is assumed that the medium density housing for high to medium income people would sell at US$80,000/unit on average. The average price of 2-room apartments is US$39,000/unit according to the survey, and US$20,000/unit is taken to be the average price of social housing. Finally, the average price of housing lots for low-income people is set at US$8,000/unit.

(3) Rents for commercial spaces

The monthly rents for commercial spaces vary widely, depending on locations, quality of buildings and facilities, and other factors. They range from US$2/m^2 to US$50/m^2. The average rent is calculated to be US$69.5/m^2 but, excluding extreme values, is US$12.2/m^2. Based on this, the average annual rent for commercial spaces is assumed to be US$150/m^2. The same average rent is applied to the new city as the demand for commercial spaces can be cultivated by proper marketing.

9.2 Phased Development and Investment Schedule

9.2.1 Phased development

The KMA development with the new city will be implemented to realize the levels of development specified by the socio-economic framework presented in Section 3.1, generally following the process described by the development scenario presented in Section 4.2. The proposed projects and programs are phased for implementation to realize the planned development. Some of the infrastructure projects for the new city should be implemented in advance to prepare for residential and other developments and also to generate fund for renewal of the Kabul city.

All the proposed projects and programs are phased first broadly into three phases: Phase 1 up to 2015, Phase 2 for 2016-20 and Phase 3 for 2021-25. Projects costs are estimated and allocated to different phases. Lead time required to implement large projects such as dams and trans-basin water diversion is taken into account. The project costs are disbursed to different years in consideration of implementation schedule and reality of fund mobilization and budget allocation by sector.

9.2.2 Investment schedule

By the process outlined above, all the proposed projects and programs are phased as shown in Figure 63. The investment costs for them are allocated to different years according to the investment schedule.

Sector	Project	Investment cost (US$M)	2009-2015	2016-2020	2021-2025
Transport	Bagram Road Upgrading	51.2			
	Kabul City Outer Ring Road	602.6			
	Dehsabz Peripheral Road	88.7			
	Bagram and Barikab Road	32.8			
	Dehsabz Tunnel Road	84.8			
	New City Arterial Roads	549.9			
	RH04 (Mazar-e Sharif Road) Upgrading				
	LRT (Tram)				
	Other Transport Facilities	25.0			
Water resources	Panjishir Fan Aquifer 1 (22.3MCM/y)	110.1			
	Panjishir Fan Aquifer 2 (22.3MCM/y)	110.1			
	Gulbahar Dam (urban consumption only: 44.7MCM/y)	174.2			
	Gulbahar Transmission Line (44.7MCM/y)	256.8			
Water supply system	Water Supply for 26 Dalwa (well, transmission, reservoir, & distribution)	66.4			
	Dehsabz North Water Transmission Station	2.6			
	Barikab Water Supply	338.4			
	Dehsabz North-East Water Supply	181.5			
	Dehsabz South-Southeast Water Supply	143.8			
	Dehsabz South-South Water Supply	98.1			
	Paymonar Water Treatment Plant	154.1			
	Dehsabz North-West Water Supply	114.2			
	Dehsabz South-East Water Supply	88.4			
	Paymonar Water Supply	265.7			
	Paymonar Industrial Water Treatment Plant	48.1			
	Industrial Water Supply	18.7			
	House Connections	73.3			
Sewerage & drainage system	26 Dalwa Sewage Treatment Plant	125.9			
	Barikab Sewage Treatment Plant	75.9			
	Dehsabz Southeast Sewage Treatmant Plant	97.1			
	Dehsabz West Sewage Treatment Plant	123.1			
	26 Dalwa Sewerage Network	13.2			
	Barikab Sewerage Network	74.6			
	Dehsabz North-East Sewerage Network	34.3			
	Dehsabz Southeast Sewerage Network	51.1			
	Dehsabz West Sewerage Network	97.0			
	Industrial Parks Sewerage Network	0.6			
	Drainage System	481.9			
Energy	220kV Transmission System				
	* Transmission Lines and Sub-stations	137.3			
	* 220/20kV, 30/40MVA+transformers	9.8			
	* 220kV GIS	15.6			
	* Others	32.0			
	20kV Switchgear	26.5			
	20kV Distribution System	60.1			
	400-230V Distribution System	31.1			
	Substation Civil Works	1.6			
Solid waste management	Containers	4.6			
	Collection Trucks	26.5			
	Landfill Sites				
	Land Fill Vehicles				
Agricultural development	Dehsabz Cold Storage	5.0			
	Barikab Cold Storage	5.0			
	Barikab Research Station	0.8			
	Dehsabz On-farm Irrigation System	236.9			
	Barikab On-farm Irrigation System	142.1			
Industrial development	Dehsabz Industrial Park 1	68.8			
	Dehsabz Industrial Park 2	68.8			
	Dehsabz Industrial Park 3	68.8			
	Barikab Industrial Park	91.7			
	Relocation Support	14.3			
	Food Wholesale Market				
	Groceries Wholesale Market				
Land acquisition	Dehsabz North	545.8			
	Dehsabz South	397.0			
	Paymonar	601.3			
	Barikab	127.5			

Figure 63 Public Investment Schedule for New City Development

9.3 Cash Flow Analysis from Afghan Government's Viewpoint

For successful development of the new city, it is essential that basic infrastructure be developed ahead of its urban land development. The Master Developer would undertake the basic infrastructure development and also the initial land development possibly with private investors.

The Master Developer, therefore, would face difficult cash flow conditions during the initial years of the new city development. A simple cash flow analysis reveals that the net cash flow for the Master Developer would be negative for the first several years when large investments would be necessary while cash income from land sales would be limited. The key issue for cash flow management is how the Master Developer would procure sufficient fund for the initial investments to improve the cash flow during the lead-time of the first four to six years.

The Afghan Government is expected to support the new city development as the national project, but to overcome the cash flow problems, external finance needs to be introduced to cover part of the

investment costs, which will have serious implications to the economy and finance of Afghanistan. It is necessary to ensure that the new city development with the external financing would not undermine the debt sustainability of Afghanistan.

To obtain insights into the implication of the new city development with the external financing, a simple cash flow analysis is conducted under assumed conditions. The following assumptions are made for the cash flow analysis.

1) All the basic infrastructure projects necessary for the new city are implemented by the Afghan Government either by its own budget or borrowing from donors.
2) Donor contributions are utilized for all the transportation and water resources projects proposed by the Master Plan.
3) The donor contributions are 50% in a concessional loan form and 50% in a grant form.
4) The concessional loans have common interest rate of 2% per annum, the grace period of five years and the repayment period of 20 years not including the grace period.
5) The donor contributions are procured at the beginning of each phase for the amount necessary for the respective phase.
6) The principals of the loans are repaid in equal annual installment over the repayment period.

The cash flow analysis is conducted for three alternative prices of the land developed with basic infrastructure: US$50/m^2, US$55/m^2 and US$65/m^2. The operating cost is simply assumed to be 2% of the cumulative donor contribution in each year, as it is associated mainly with the construction and operation of basic infrastructure supported by the donor contributions. The cash flow under the three alternatives is summarized in Table 38.

Table 38 Cash Flow Analysis for the New City from the Afghan Government's Viewpoint

(1) Public investment for infrastructure by year

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Transport	0	15	36	51	51	53	53	67	67	70	72	70	64	64	60	60	60	913
Water resources	0	0	0	52	74	74	70	63	55	70	59	67	67	0	0	0	0	651
Water supply & sewerage	14	21	75	156	267	351	353	277	231	267	249	165	146	32	32	32	32	2,700
Energy	0	12	18	18	18	18	18	22	22	22	22	22	24	24	24	24	24	332
Solid wastes	0	1	8	0	2	0	1	8	1	2	0	1	6	0	1	0	0	31
Land development	77	101	181	181	181	181	181	260	260	262	263	264	334	337	337	337	336	4,073
Total	**91**	**150**	**318**	**458**	**593**	**677**	**676**	**697**	**636**	**693**	**665**	**589**	**641**	**457**	**454**	**453**	**452**	**8,700**

(2) Cash flow under alternative sales prices of land with basic infrastructure

Donor contributions-total		776						698					430					1,904
Grant portion		388						349					215					952
Debt outstanding		388	388	388	388	388	388	737	716	694	673	651	935	898	861	823	786	
Interest payment		8	8	8	8	8	8	15	14	14	13	13	19	18	17	16	16	
Repayment		0	0	0	0	0	21	21	21	21	21	21	37	37	37	37	37	
Operating cost		16	16	16	16	16	16	29	29	29	29	29	38	38	38	38	38	
Case 1																		
Land sales	358	358	358	358	358	358	358	667	667	667	667	667	500	500	500	500	500	8,341
Operating profit	267	961	17	-123	-258	-342	-362	602	-34	-91	-62	14	195	-50	-47	-45	-43	597
Cummulative profit	267	1,228	1,244	1,121	863	521	158	761	727	636	573	588	782	732	685	640	597	
Case 2																		
Land sales 2	394	394	394	394	394	394	394	734	734	734	734	734	550	550	550	550	550	9,175
Operating profit 2	303	997	53	-87	-222	-306	-326	669	33	-24	4	81	245	0	3	5	7	1,431
Cummulative profit 2	303	1,299	1,352	1,264	1,042	735	409	1,078	1,111	1,086	1,091	1,172	1,416	1,416	1,419	1,425	1,431	
Case 3																		
Land sales 3	465	465	465	465	465	465	465	867	867	867	867	867	650	650	650	650	650	10,843
Operating profit 3	374	1,068	124	-16	-151	-235	-255	802	166	109	138	214	345	100	103	105	107	3,100
Cummulative profit 3	374	1,443	1,567	1,551	1,400	1,165	910	1,713	1,879	1,988	2,126	2,340	2,685	2,784	2,888	2,993	3,100	

Source: JICA Study Team

Under the alternative of the land price at US$50/m^2, the cash flow is negative for most years except in those years when the grants are introduced. The cumulative profit is positive throughout the analysis period up to 2025 but it is US$597 million in 2025, smaller than the debt outstanding of US$786 million in the same year. This means that the loans cannot be fully paid back with the sales revenue alone.

The cash flow may be improved by increasing either the donor contributions particularly in the grant form or the sales prices of the developed land with basic infrastructure. Two cases are examined for

higher sales prices of the developed land. If the average sales price is increased to US$55/m^2, the cumulative profit is US$1,431 million in 2025, much larger than the debt outstanding as of 2025. The loans can be fully repaid, and the balance of up to US$645 million will be available for re-investment. This is equivalent to US$43 million annually over the 15-year period, which may be invested in the urban renewal of the Kabul city.

If the average sales price of the developed land is increased to US$65/m2, the cumulative profit becomes US$3,100 million as of 2025. This implies that up to US$150 million annually may be re-invested over the 15-year period. The operating profit is positive throughout the analysis period except in a few years before the donor contributions are introduced for Phase 2.

9.4 Risk Assessment and Management

The successful implementation of the new city development as planned and the realization of returns as expected would be subject to proper management of various risks involved in this major undertaking. The risks include country risk, market risk, institutional risk, government risk, property risk and technical risk as summarized in Table 39. Some risks may be reduced by proper management, while others may be largely beyond the control of DCDA as the implementing agency. Each type of risk is assessed and its management suggested.

9.4.1 Country risk

Two major sources of the country risk are the macro-economic and the security conditions. These are largely beyond the direct control of DCDA but constitute rather given conditions for the new city development. DCDA, however, may affect decisions by the Government to manage these risk factors.

(1) Macro-economy and debt sustainability

The macro-economic conditions affect particularly the debt sustainability of Afghanistan. Specifically, the new city development cannot be undertaken in such a way to increase the debt of the Country. DCDA should ensure that the basic infrastructure for the new city would be supported by either grants or concessional loans by donor agencies, and the latter would be within the debt sustainability of Afghanistan.

A staff member of ADB analyzed the debt sustainability of Afghanistan in 2003 based on assumptions on macro-economic growth, increases in government revenue and export value, and degree of debt forgiveness by donors and other lenders (ADB South Asia Department, Afghanistan Debt Sustainability Analysis, Working Paper, July 2003). It concludes that with generous restructuring of existing debts and strong-to-moderate growth, Afghanistan can sustain the level of borrowing planned by international financial institutes (IFIs) over the medium term of about US$325 million annually in 2002-10, US$313 million in 2011-15 and US$260 million a year thereafter.

The assumptions have proved to be partially met by the realization thereafter. The average macro-economic growth was 10.7% during 2002-06, intermediate between the strong and the moderate growth assumed. The increase in the government revenue up to 2008 (US$888 million in 2008) was slightly lower than assumed (US$952 million), and the increase in the nominal export value was significantly lower (US$416 million in 2006) than assumed (US$786 million) up to 2006. Under these conditions, Afghanistan may still borrow safely at levels planned by IFIs under the forgiveness of all bilateral debts.

(2) Security

The new city development should be seen as the opportunity to improve the security conditions in Afghanistan in general and the Kabul area in particular. The new city should be constructed as the symbol of national unity by concerted efforts of the Afghan people irrespective of ethnicity and other social, political and other affiliations. The investment guarantee fund as proposed in sub-section 7.1.4 would work as a deterrent against any sabotage or destruction.

9.4.2 Market risk

The new city development may be affected by the current world financial crisis. The investment climate may be far from ideal throughout the world for a few years or even longer. Practically, all the countries have been affected by the current financial crisis, including potential investor countries for the new city development such as UAE, India, Turkey and other Middle Eastern and Asian countries as well as developed countries. Under these conditions, DCDA should undertake more targeted marketing to identify private investors.

The market risk is involved also in Afghanistan. The demand for housing is certainly very high in the Kabul area, but affordability of people should be carefully assessed for the new city to offer housing units that respond to the needs of people. The demand for high-end housing units and business spaces may be developed to a good extent by proactive marketing, but the competition with other suppliers should be carefully assessed. This type of risk may be assessed and managed most effectively by those in the real estate business. DCDA should make sure to associate with most capable developers in undertaking its initial developments.

9.4.3 Institutional risk

The institutional risk is associated with government regulations related to urban development in general and the new city development in particular. This type of risk may be reduced by DCDA addressing to the Government to establish proper regulations to support the new city development. Most important would be the legislation of the New Kabul City Development Act as proposed in sub-section 7.1.4.

9.4.4 Government risk

The new city development may be affected by changes in the administration and the government policies. The ANDS endorses the Kabul new city development in Dehsabz and Barikab. It would be most essential that the initial developments of the new city would be realized successfully within the lifetime of the ANDS. As the first step, the new city development should be formally endorsed by the present administration to drive its initial developments.

9.4.5 Property risk

The property risk involved in the new city development is related mainly to land conditions, land disputes, conflicts on water uses and development in vicinities. The risk may be reduced by avoiding such land that is likely to involve these conditions for initial developments. Land conditions should involve no natural risks such as earthquake, flooding and land subsidence. The land that may be affected by deep gullies may also be avoided.

Land disputes should be managed along the ongoing efforts of land clearance and land transfer to DCDA. Conflicts on water uses may not be avoided for any initial development as the water shortages would be serious until the major water resources development is undertaken to bring water from the Panjshir basin. Continual consultation with existing village communities and monitoring of water use and groundwater tables would be indispensable to manage these conflicts and reduce the risk. Any development by DCDA may be affected by developments in neighboring areas. To avoid possible adverse effects, DCDA should control any development by private developers according to the master plan. At the same time, DCDA should select the land for its initial development to avoid conflicts with existing developments.

9.4.6 Technical risk

The technical risk is involved in the new city development with respect to the design, structure and other specifications of facilities and buildings. Developers commonly build in safety factors in the design of any facilities or buildings to minimize the risk within reasonable costs. DCDA would be in a position to ensure developers comply with safety standards and regulations.

Table 39 Risk Involved in New City Development and Responsibility for Risk Management

Risk type	Analysis and management	Responsibility
Country risk	Macro-economy and debt sustainability of Afghanistan; security conditions	DCDA
Market risk	Overall world financial situations; investment trends in potential investor countries; demand and affordability of local people and business; competitive environment on supply side	Developers, DCDA
Institutional risk	Related government regulations	DCDA
Government risk	Possible changes in the administration and policies	DCDA
Property risk	Land conditions; land disputes; conflicts on water use; development in vicinities	DCDA, developers, land owners
Technical risk	Design and structure of facilities and buildings	DCDA, developers

Source: JICA Study Team

9.5 Social and Environmental Considerations

9.5.1 Necessity of social and environmental considerations

It is widely recognized that the reflection of social and environmental considerations in development planning is a must in order to avoid adverse impact of the development on social and natural environment. JICA has prepared its guidelines for social and environmental considerations, which should be applied to any development to be supported by JICA technical and financial cooperation. Any recipient government is required to incorporate the outcome of studies for social and environmental considerations into their planning and decision-making as part of the authorization process for project implementation.

JICA plays a key role in contributing to sustainable development in developing countries. The inclusion of environmental and social costs in development costs, and the presence of social and institutional framework to allow the internalization are crucial for sustainable development. The internalization and the institutional framework are requirements for measures to reflect environmental and social considerations that should be observed by JICA.

Democratic decision-making is indispensable for effecting environmental and social considerations. The democratic governance calls for stakeholders' participation, information transparency, accountability and efficiency in addition to respect for human rights. In accordance with these principles of democratic governance, environmental and social considerations are effected through ensuring a wide range of meaningful stakeholders' participation and transparency of decision-making based on proper sharing of relevant information.

The following seven principles are considered by JICA to be very important in reflecting social and environmental considerations:

1) A wide range of impact in terms of geographic area of impact and types of effects should be considered from an early stage of development planning.
2) Environmental and social considerations are reflected in decision-making from an early stage of development planning and implementation.
3) Follow-up activities are carried out as necessary even after cooperation projects are terminated,
4) JICA shares the responsibility with recipient governments for accountability when implementing cooperation projects.
5) JICA asks stakeholders for their participation.
6) JICA encourages the disclosure of relevant information to be shared by all the stakeholders.

7) JICA cooperates for enhancing organizational capacity for social and environmental management.

9.5.2 Assessment of possible adverse effects

(1) Scoping

All the proposed projects and programs should be assessed at the preliminary level for possible adverse effects. Many of them, in fact, will have positive effects as they are formulated in line with the four planning concepts: socio-economic diversity, urban-rural complementarity, recycle-oriented eco-city and cultural city. Nevertheless, some of them may involve limited negative impacts on social and/or natural environment.

Scoping is a procedure to identify such environmental aspects that should be covered by an initial environmental examination (IEE) or an environmental impact assessment (EIA) in a subsequent stage. The scoping for the IEE is carried out for the preparation of the KMA master plan based on the present environmental conditions and the conceived development of the existing Kabul city and the new city, respectively. The assessment at this stage is only preliminary as specific projects and programs have not been formed yet. Possible environmental effects are assessed using four ratings as commonly used for any JICA projects: A for serious impact expected; B for some impact expected; C for extent of impact unknown; and D for no impact expected (Table 40). Only negative impacts are identified, although the proposed projects and programs would involve many and various positive impacts.

Assessment for respective projects and programs will be conducted after the formulation of specific projects and programs, together with suggestions of mitigation measures for possible negative impacts.

Table 40 Scoping of Environmental Impacts of New City Development

1) Economic development plan

No.	Impact	Kabul city		New city	
		*	Note	*	Note
Social environment					
1	Involuntary resettlement	C	Possible relocation of some people living in the proposed projects sites	C	Possible relocation of some nomads using the proposed project sites
2	Local economy	D		D	
3	Use of land and local resources	D		D	
4	Social institutions	D		D	
5	Social infra.	D		D	
6	Poor people, etc.	D		D	
7	Benefit/damage misdistribution	C	Possible misdistribution	C	Possible misdistribution
8	Cultural heritage	D		D	
9	Local conflict of interests	D		D	
10	Water rights, etc.	D		D	
11	Sanitation	D		D	
12	Hazards (risk)	D		D	
Natural environment					
13	Topography	D		D	
14	Soil erosion	D		D	
15	Groundwater	B	Possible changes if groundwater use increases	B	Possible changes if groundwater is used
16	Hydrological situation	D		D	
17	Coastal zone	D		D	
18	Flora and fauna	D		D	
19	Meteorology	D		D	

No.	Impact	Kabul city		New city	
		*	Note	*	Note
20	Landscape	D		D	
21	Global warming	D		D	
Pollution					
22	Air pollution	B	Possible during construction	B	Possible during construction
23	Water pollution	B	- Possible during construction - Wastewater from industrial activities to be generated	B	- Possible during construction - Wastewater from industrial activities to be generated
24	Soil contamination	B	Possible during construction	B	Possible during construction
25	Waste	B	- Much waste to be generated during construction - Solid wastes from industrial activities to be generated	B	- Much waste to be generated during construction - Solid wastes from industrial activities to be generated
26	Noise/vibration	B	Possible during construction	B	Possible during construction
27	Ground subsidence	D		D	
28	Offensive odor	D		D	
29	Bottom sediment	D		D	
30	Accidents	B	Possible during construction	B	Possible during construction

* Rating: A: Serious impact expected; B: Some impact expected; C: Impact unknown (examination needed); D: No impact expected (IEE/EIA not necessary)

2) Land use plan

No.	Impact	Kabul city		New city	
		*	Note	*	Note
Social environment					
1	Involuntary resettlement	B	Possible relocation of some informal housing in environmentally vulnerable areas	B	Possible relocation of temporarily settled nomads
2	Local economy	D		D	
3	Use of land and local resources	C	Possible land conflicts as projects progress	C	Possible land conflicts as projects progress
4	Social institutions	D		D	
5	Social infra.	D		D	
6	Poor people, etc.	D		D	
7	Benefit/damage misdistribution	C	Possible misdistribution especially between existing residents and those to be resettled	D	
8	Cultural heritage	C	Possible overlap of project sites with heritage sites	C	Possible overlap of project sites with heritage sites
9	Local conflict of interests	C	Possible conflicts between existing residents and those to be resettled	C	Possible conflicts between existing residents and those to be resettled
10	Water rights, etc.	D		D	
11	Sanitation	D		D	
12	Hazards (risk)	D		D	
Natural environment					
13	Topography	C	Possible minor local effects	C	Possible minor effects on local topography
14	Soil erosion	C	Possible minor local effects	C	Possible minor soil erosion
15	Groundwater	D		D	
16	Hydrological situation	D		D	
17	Coastal zone	D		D	
18	Flora and fauna	D		D	
19	Meteorology	D		D	
20	Landscape	C	Changes expected.	C	Changes expected.
21	Global warming	D		D	

No.	Impact	Kabul city		New city	
		*	Note	*	Note
Pollution					
22	Air pollution	B	Possible during construction	B	Possible during construction
23	Water pollution	B	Possible during construction	B	Possible during construction
24	Soil contamination	B	Possible during construction	B	Possible during construction
25	Waste	B	Much waste to be generated during construction	B	Much waste to be generated during construction
26	Noise/vibration	B	Possible during construction	B	Possible during construction
27	Ground subsidence	D		D	
28	Offensive odor	D		D	
29	Bottom sediment	D		D	
30	Accidents	B	Possible during construction	B	Possible during construction

* Rating: ibid.

3) Transportation plan

No.	Impact	Kabul city		New city	
		*	Note	*	Note
Social environment					
1	Involuntary resettlement	B	Possible resettlement of some people	D	
2	Local economy	D		D	
3	Use of land and local resources	D		D	
4	Social institutions	D		D	
5	Social infra.	D		D	
6	Poor people, etc.	D		D	
7	Benefit/damage misdistribution	C	Possible differences in benefits accruing to residents	C	Possible differences in benefits accruing to residents
8	Cultural heritage	C	Possible overlap of project sites with heritage sites	C	Possible overlap of project sites with heritage sites
9	Local conflict of interests	D		D	
10	Water rights, etc.	D		D	
11	Sanitation	D		D	
12	Hazards (risk)	D		D	
Natural environment					
13	Topography	B	Possible minor local effects	B	Possible minor effects on local topography
14	Soil erosion	B	Possible minor local effects	B	Possible minor soil erosion
15	Groundwater				
16	Hydrological situation	C	Possible minor local effects	C	Possible minor local effects
17	Coastal zone	D		D	
18	Flora and fauna	D		D	
19	Meteorology	D		D	
20	Landscape	D		D	
21	Global warming	D		D	
Pollution					
22	Air pollution	B	Possible during construction	B	Possible during construction
23	Water pollution	B	Possible during construction	B	Possible during construction
24	Soil contamination	B	Possible during construction	B	Possible during construction
25	Waste	B	Much waste to be generated during construction	B	Much waste to be generated during construction
26	Noise/vibration	B	Possible during construction	B	Possible during construction
27	Ground subsidence	D		D	
28	Offensive odor	D		D	
29	Bottom sediment	D		D	

No.	Impact	Kabul city		New city	
		*	Note	*	Note
30	Accidents	B	Possible during construction	B	Possible during construction

* Rating: ibid.

4) Water resources development plan

No.	Impact	Kabul city		New city	
		*	Note	*	Note
Social environment					
1	Involuntary resettlement	B	Possible resettlement of some people for dam construction	B	Possible resettlement of some people for dam construction.
2	Local economy	C	Possible restriction on accessibility to fishing or other activities	C	Possible restriction on accessibility to fishing or other activities
3	Use of land and local resources	B	Possible clearing or inundation of agricultural land/forests by dam construction	B	Possible clearing or inundation of agricultural land/forests by dam construction
4	Social institutions	D		D	
5	Social infra.	D		D	
6	Poor people, etc.	D		D	
7	Benefit/damage misdistribution	D		D	
8	Cultural heritage	D		D	
9	Local conflict of interests	D		D	
10	Water rights, etc.	B	Possible competition for the right to use groundwater with present users	B	Possible competition for the right to use groundwater with present users
11	Sanitation	D		D	
12	Hazards (risk)	D		D	
Natural environment					
13	Topography	B	Possible changes in local topography by dam construction	B	Changes in local topography by dam construction
14	Soil erosion	B	Possible soil erosion during construction and at quarry sites if blasting is unmanaged	B	Possible soil erosion during construction and at quarry sites if blasting is unmanaged
15	Groundwater	A	- Reduced availability of groundwater in/around Kabul city by dam construction. - Possible disruption of groundwater regime by introduction of water from another basin	A	Changes expected due to increase in groundwater use
16	Hydrological situation	A	Changes in distribution of river flow by dam construction.	B	Changes in hydrological conditions with transfer from Panjshir basin
17	Coastal zone	D		D	
18	Flora and fauna	B	- Possible clearing or inundation of agricultural land/forests by dam construction - Possible temporary shift in ecological balance of mobile species	B	- Possible clearing or inundation of agricultural land/forests by dam construction - Possible temporary shift in ecological balance of mobile species
19	Meteorology	D		D	
20	Landscape	C	Changes in local landscape expected	C	Changes in local landscape expected
21	Global warming	D		D	
Pollution					
22	Air pollution	B	Possible during construction	B	Possible during construction
23	Water pollution	B	Possible during construction	B	Possible during construction
24	Soil contamination	B	Possible during construction	B	Possible during construction
25	Waste	B	Much waste to be generated during construction	B	Much waste to be generated during construction
26	Noise/vibration	B	Possible during construction	B	Possible during construction

No.	Impact	Kabul city		New city	
		*	Note	*	Note
27	Ground subsidence	D		D	
28	Offensive odor	D		D	
29	Bottom sediment	C	Possible by dam construction	C	Possible by dam construction
30	Accidents	B	Possible during construction	B	Possible during construction

* Rating: ibid.

5) Water supply and sewerage development plan

No.	Impact	Kabul city		New city	
		*	Note	*	Note
Social environment					
1	Involuntary resettlement	D		D	
2	Local economy	D		D	
3	Use of land and local resources	D		D	
4	Social institutions	D		D	
5	Social infra.	D		D	
6	Poor people, etc.	D		D	
7	Benefit/damage misdistribution	D		D	
8	Cultural heritage	C	Possible overlap of project sites with heritage sites	C	Possible overlap of project sites with heritage sites
9	Local conflict of interests	B	Possible at sites of key facilities	D	
10	Water rights, etc.	D		D	
11	Sanitation	D		D	
12	Hazards (risk)	D		D	
Natural environment					
13	Topography	D		D	
14	Soil erosion	D		D	
15	Groundwater	B	Possible overuse at unsustainable level	B	Possible overuse at unsustainable level
16	Hydrological situation	B	To be affected by increased wastewater discharge and urban drainage	B	To be affected by increased wastewater discharge and urban drainage
17	Coastal zone	D		D	
18	Flora and fauna	D		D	
19	Meteorology	D		D	
20	Landscape	D		D	
21	Global warming	D		D	
Pollution					
22	Air pollution	B	Possible during construction	B	Possible during construction
23	Water pollution	B	- Possible increase in water pollution by increased wastewater generation - Possible effects on water quality by discharge from new wastewater treatment plant	B	- Possible increase in water pollution by increased wastewater generation - Possible effects on water quality by discharge from new wastewater treatment plant
24	Soil contamination	B	Possible during construction	B	Possible during construction
25	Waste	B	Much waste to be generated during construction	B	Much waste to be generated during construction
26	Noise/vibration	B	Possible during construction	B	Possible during construction
27	Ground subsidence	D		D	
28	Offensive odor	D		D	
29	Bottom sediment	D		D	

No.	Impact	Kabul city		New city	
		*	Note	*	Note
30	Accidents	B	Possible during construction	B	Possible during construction

* Rating: ibid.

6) Power and energy supply plan

No.	Impact	Kabul city		New city	
		*	Note	*	Note
Social environment					
1	Involuntary resettlement	D		D	
2	Local economy	D		D	
3	Use of land and local resources	D		D	
4	Social institutions	D		D	
5	Social infra.	D		D	
6	Poor people, etc.	D		D	
7	Benefit/damage misdistribution	D		D	
8	Cultural heritage	D		D	
9	Local conflict of interests	B	Possible land conflicts on the proposed sites for substations and transmission lines	D	
10	Water rights, etc.	D		D	
11	Sanitation	D		D	
12	Hazards (risk)	D		D	
Natural environment					
13	Topography	D		D	
14	Soil erosion	D		D	
15	Groundwater	D		D	
16	Hydrological situation	D		D	
17	Coastal zone	D		D	
18	Flora and fauna	D		D	
19	Meteorology	D		D	
20	Landscape	D		D	
21	Global warming	D		D	
Pollution					
22	Air pollution	B	Possible during construction	B	Possible during construction
23	Water pollution	B	Possible during construction	B	Possible during construction
24	Soil contamination	B	Possible during construction	B	Possible during construction
25	Waste	B	Much waste to be generated during construction	B	Much waste to be generated during construction
26	Noise/vibration	B	Possible during construction	B	Possible during construction
27	Ground subsidence	D		D	
28	Offensive odor	D		D	
29	Bottom sediment	D		D	
30	Accidents	B	Possible during construction	B	Possible during construction

* Rating: ibid.

7) Solid waste management plan

No.	Impact	Kabul city		New city	
		*	Note	*	Note
Social environment					
1	Involuntary resettlement	D		D	
2	Local economy	D		D	
3	Use of land and	D		D	

No.	Impact	Kabul city		New city	
		*	Note	*	Note
	local resources				
4	Social institutions	D		D	
5	Social infra.	D		D	
6	Poor people, etc.	D		D	
7	Benefit/damage misdistribution	D		D	
8	Cultural heritage	D		D	
9	Local conflict of interests	B	- Possible annoyance to residents by heavy traffic between the city and transfer stations (TS), and TSs and landfills - Possible annoyance to residents by odors and flies	D	
10	Water rights, etc.	D		D	
11	Sanitation	D		D	
12	Hazards (risk)	D		D	
Natural environment					
13	Topography	D			
14	Soil erosion	D			
15	Groundwater	B	Possible pollution by leachate from landfills	B	Possible pollution by leachate from landfills
16	Hydrological situation	D			
17	Coastal zone	D			
18	Flora and fauna	D			
19	Meteorology	D			
20	Landscape	D			
21	Global warming	D			
Pollution					
22	Air pollution	B	Possible during construction	B	Possible during construction
23	Water pollution	B	Possible during construction	B	Possible during construction
24	Soil contamination	B	Possible during construction	B	Possible during construction
25	Waste	B	Much waste will be generated during construction period.	B	Much waste will be generated during construction period.
26	Noise/vibration	B	Possible during construction	B	Possible during construction
27	Ground subsidence	D		D	
28	Offensive odor	D		D	
29	Bottom sediment	D		D	
30	Accidents	B	Possible during construction	B	Possible during construction

* Rating: ibid.

8) Social infrastructure plan

No.	Impact	Kabul city		New city	
		*	Note	*	Note
Social environment					
1	Involuntary resettlement	D		D	
2	Local economy	D		D	
3	Use of land and local resources	D		D	
4	Social institutions	D		D	
5	Social infra,	D		D	
6	Poor people, etc.	D		D	
7	Benefit/damage misdistribution	B	Improved access to new social infrastructure limited to some people	D	

No.	Impact	Kabul city		New city	
		*	Note	*	Note
8	Cultural heritage	D		D	
9	Local conflict of interests	D		D	
10	Water rights, etc.	D		D	
11	Sanitation	D		D	
12	Hazards (risk)	D		D	
Natural environment					
13	Topography	D		D	
14	Soil erosion	D		D	
15	Groundwater	D		D	
16	Hydrological situation	D		D	
17	Coastal zone	D		D	
18	Flora and fauna	D		D	
19	Meteorology	D		D	
20	Landscape	D		D	
21	Global warming	D		D	
Pollution					
22	Air pollution	B	Possible during construction	B	Possible during construction
23	Water pollution	B	Possible during construction	B	Possible during construction
24	Soil contamination	B	Possible during construction	B	Possible during construction
25	Waste	B	Much waste to be generated during construction	B	Much waste to be generated during construction
26	Noise/vibration	B	Possible during construction	B	Possible during construction
27	Ground subsidence	D		D	
28	Offensive odor	D		D	
29	Bottom sediment	D		D	
30	Accidents	B	Possible during construction	B	Possible during construction

* Rating: ibid.

(2) Expected impacts and mitigation measures

Possible impacts on natural and social environment are assessed by sector at a preliminary level, and the results are summarized in Table 41 together with possible mitigation measures for adverse effects.

Table 41 Possible Environmental Impacts and Mitigation Measures

1) Economic development plan

No.	Impact	Note	Mitigation measure
Social environment			
1	Involuntary resettlement	Possible relocation of some people living in the proposed projects sites	Proper compensations for losses to be incurred to those to be relocated
2	Local economy		
3	Use of land and local resources		
4	Social institutions		
5	Social infra.		
6	Poor people, etc.		
7	Benefit/damage misdistribution	Possible misdistribution of benefit and damage	Proper social survey and consultation
8	Cultural heritage		
9	Local conflict of interests		
10	Water rights, etc.		
11	Sanitation		
12	Hazards (risk)		

No.	Impact	Note	Mitigation measure
Natural environment			
13	Topography		
14	Soil erosion		
15	Groundwater	Possible changes if groundwater is used	Monitoring so that proper measures can be taken when necessary
16	Hydrological situation		
17	Coastal zone		
18	Flora and fauna		
19	Meteorology		
20	Landscape		
21	Global warming		
Pollution			
22	Air pollution		
23	Water pollution	Wastewater to be generated from industrial activities	Collection and treatment system for wastewater to be proposed at the design stage of the industrial park
24	Soil contamination		
25	Waste	Solid wastes to be generated from industrial activities	Collection and treatment system for solid waste to be proposed at the design stage of the industrial park
26	Noise/vibration		
27	Ground subsidence		
28	Offensive odor		
29	Bottom sediment		
30	Accidents		

2) Land use plan

No.	Impact	Note	Mitigation measure
Social environment			
1	Involuntary resettlement	- Possible relocation of some informal housing in environmentally vulnerable areas - Possible relocation of temporarily settled nomads	Proper compensations for losses to be incurred to those to be relocated.
2	Local economy		
3	Use of land and local resources	Possible land conflicts as projects progress	Proper survey and consultation
4	Social institutions		
5	Social infra.		
6	Poor people, etc.		
7	Benefit/damage misdistribution	Possible misdistribution especially between existing residents and those to be resettled	Proper survey and consultation
8	Cultural heritage	Possible overlap of projects sites with heritage sites	Proper survey and consultation
9	Local conflict of interests	Possible conflicts between existing residents and those to be resettled	Sites decision and land acquisition in proper, fair and transparent ways
10	Water rights, etc.		
11	Sanitation		
12	Hazards (risk)		
Natural environment			
13	Topography	Possible minor local effects	Sound engineering to reduce impact
14	Soil erosion	Possible minor local effects	Sound engineering to reduce impact
15	Groundwater		
16	Hydrological situation		

No.	Impact	Note	Mitigation measure
17	Coastal zone		
18	Flora and fauna		
19	Meteorology		
20	Landscape	Changes expected	Designing with aesthetic consideration
21	Global warming		

3) Transportation plan

No.	Impact	Note	Mitigation measure
Social environment			
1	Involuntary resettlement	Possible resettlement of some people	Proper compensations for losses to be incurred to those to be resettled
2	Local economy		
3	Use of land and local resources		
4	Social institutions		
5	Social infra.		
6	Poor people, etc.		
7	Benefit/damage misdistribution	Difference in benefits to residents	Proper survey and consultation
8	Cultural heritage	Possible overlap of projects sites with heritage sites	Proper survey and consultation
9	Local conflict of interests		
10	Water rights, etc.		
11	Sanitation		
12	Hazards (risk)		
Natural environment			
13	Topography	Possible minor local effects	Proper road alignments and designs
14	Soil erosion	Possible minor local effects	Sound engineering to reduce impact
15	Groundwater		
16	Hydrological situation	Some minor local effects may be caused.	Proper road alignments and design would be adopted.
17	Coastal zone		
18	Flora and fauna		
19	Meteorology		
20	Landscape	Changes in local landscape expected	Designing with aesthetic consideration
21	Global warming		

4) Water resources development plan

No.	Impact	Note	Mitigation measure
Social environment			
1	Involuntary resettlement	Possible resettlement of some people by dam construction.	Proper compensations for losses to be incurred to those to be relocated
2	Local economy	Possible restriction on accessibility to fishing or other activities	Secured environmental flow and proper compensations as necessary
3	Use of land and local resources	Possible clearing and inundation of agricultural land/forests by dam construction.	Efforts to minimize clearing and inundation and proper compensations as necessary.
4	Social institutions		
5	Social infra.		
6	Poor people, etc.		
7	Benefit/damage misdistribution		
8	Cultural heritage		
9	Local conflict of interests		
10	Water rights, etc.	Possible competition for the right to use	Proper use to be proposed based on survey

No.	Impact	Note	Mitigation measure
		groundwater with present users	and consultation
11	Sanitation		
12	Hazards (risk)		
Natural environment			
13	Topography	Changes in local topography by dam construction.	Adoption of proper control method as necessary
14	Soil erosion	Possible soil erosion during construction and at quarry sites especially if blasting is unmanaged	Adoption of proper control method (e.g., earth embankments, vegetation control, etc.)
15	Groundwater	- Reduced availability of groundwater in/around Kabul by dam construction - Possible disruption of local groundwater regime by introduction of water from another basin - Change expected due to increase in groundwater use	Monitoring so that proper measures can be taken when necessary
16	Hydrological situation	Possible changes in the distribution of river flow due to dam construction	Monitoring so that proper measures can be taken when necessary
17	Coastal zone		
18	Flora and fauna	- Possible clearing and inundation of agricultural land/forests by dam construction - Possible temporary shift in ecological balance of mobile species	- Efforts to minimize clearance and inundation and re-vegetation as necessary - Noise and vibration control
19	Meteorology		
20	Landscape	Changes in local landscape expected	Designing with aesthetic consideration
21	Global warming		

5) Water supply and sewerage development plan

No.	Impact	Note	Mitigation measure
Social environment			
1	Involuntary resettlement		
2	Local economy		
3	Use of land and local resources		
4	Social institutions		
5	Social infra.		
6	Poor people, etc.		
7	Benefit/damage misdistribution		
8	Cultural heritage	Possible overlap of projects sites with heritage sites	Survey and consultation
9	Local conflict of interests	Possible at sites of key facilities	Sites decision and land acquisition in proper, fair and transparent ways
10	Water rights, etc.		
11	Sanitation		
12	Hazards (risk)		
Natural environment			
13	Topography		
14	Soil erosion		
15	Groundwater	Overuse of groundwater at unsustainable level	Monitoring so that proper measures can be taken when necessary
16	Hydrological situation	Possible effects due to Increased discharge of wastewater and urban drainage	Monitoring so that proper measures can be taken when necessary
17	Coastal zone		
18	Flora and fauna		

No.	Impact	Note	Mitigation measure
19	Meteorology		
20	Landscape		
21	Global warming		
Pollution			
23	Water pollution	- Possible increase in water pollution by increased wastewater generation - Possible effects on water quality due to discharge from new wastewater treatment plant	- Promotion of on-site treatment in the uncovered areas by sewerage - Securing water quality of treatment plant discharge

6) Power and energy supply plan

No.	Impact	Note	Mitigation measure
Social environment			
1	Involuntary resettlement		
2	Local economy		
3	Use of land and local resources		
4	Social institutions		
5	Social infra.		
6	Poor people, etc.		
7	Benefit/damage misdistribution		
8	Cultural heritage		
9	Local conflict of interests	Possible land conflicts at proposed sites for substations and transmission lines	Sites decision and land acquisition in proper, fair and transparent ways
10	Water rights, etc.		
11	Sanitation		
12	Hazards (risk)		
Natural environment			
13	Topography		
14	Soil erosion		
15	Groundwater		
16	Hydrological situation		
17	Coastal zone		
18	Flora and fauna		
19	Meteorology		
20	Landscape		
21	Global warming		

7) Solid waste management plan

No.	Impact	Note	Mitigation measure
Social environment			
1	Involuntary resettlement		
2	Local economy		
3	Use of land and local resources		
4	Social institutions		
5	Social infra.		
6	Poor people, etc.		
7	Benefit/damage misdistribution		
8	Cultural heritage		
9	Local conflict of interests	- Possible annoyance to residents by heavy traffic between the city and	Measures to minimize negative effects and consultation

No.	Impact	Note	Mitigation measure
		TSs, and TSs and landfills - Possible annoyance to residents by odors and flies	
10	Water rights, etc.		
11	Sanitation		
12	Hazards (risk)		
Natural environment			
13	Topography		
14	Soil erosion		
15	Groundwater	Possible pollution by leachate from landfill	Properly equipped and operated leachate treatment facilities
16	Hydrological situation		
17	Coastal zone		
18	Flora and fauna		
19	Meteorology		
20	Landscape		
21	Global warming		

8) Social infrastructure plan

No.	Impact	Note	Mitigation measure
Social environment			
1	Involuntary resettlement		
2	Local economy		
3	Use of land and local resources		
4	Social institutions		
5	Social infra.		
6	Poor people, etc.		
7	Benefit/damage misdistribution	Improved access to new social infrastructure limited to some people	Social survey so that benefit will be equally distributed
8	Cultural heritage		
9	Local conflict of interests		
10	Water rights, etc.		
11	Sanitation		
12	Hazards (risk)		
Natural environment			
13	Topography		
14	Soil erosion		
15	Groundwater		
16	Hydrological situation		
17	Coastal zone		
18	Flora and fauna		
19	Meteorology		
20	Landscape		
21	Global warming		

(3) Participation process

There exists community structure such as Gozar in the Kabul city. In rural areas, every village has a village council with a director and some members, and the meets as necessary. The main roles of the village council are to coordinate development projects in the village; solve family conflicts, land conflicts and others; promote communications with other villages. There is also a district council,

consisting of the directors in respective villages. It is organized by the district office and the meetings are held weekly. The main roles of the district council are to coordinate development projects that cover more than two villages and to reconcile conflicts that cannot be solved at the village level. Stakeholders' participation is one of the most important factors for social and environmental considerations, and thus it is suggested that the existing community structure in the Kabul city and the councils in Dehsabz be fully utilized as a means of participation.

(4) Assessment of zero option

The Kabul city at present faces serious problems such as water shortage, insufficient and unstable power supply, inadequate infrastructure, un-orderly expansion of urban areas, traffic congestion, air pollution, and unsanitary conditions. These problems would only worsen unless proper measures are taken to change the urbanization pattern.

If the KMA development is not implemented, the new city will not be realized and the Kabul city will increase its population largely within the present city boundaries with some population spillover in the form of urban sprawl or un-orderly expansion of urban areas. Overall living conditions will not improve, and the average income will not increase.

In reality the living conditions will deteriorate in some areas, while better living conditions may be provided in newly urbanized areas. In both areas, however, water availability will become a critical constraint to the improvement. Even if the ongoing water supply expansion project formulated by the KfW study is fully implemented, serious water shortages will occur in areas not served by the piped water supply. Use of shallow groundwater by wells may become difficult in some areas, jeopardizing the livelihood of residents there.

The zero option or the without-project conditions may cause the following outcome.

1) Un-orderly expansion of urban areas in the form of urban sprawl would continue as well as further expansion of informal housing.
2) Conflicts on land use and land disputes would become more serious.
3) Cultural heritage would not be restored and utilized effectively, resulting in deterioration.
4) Water shortages in the Kabul city and the surrounding areas would become more serious, and water conflicts may occur.
5) Groundwater would be polluted due to ever increasing dumping of raw sewerage, and shallow groundwater tables will be degraded.
6) The remaining greenery in the Kabul city would largely disappear.
7) Conditions of traffic congestion and consequently air pollution would become worse.

It has been found that the environmental and social conditions would be much worse under the zero option conditions. The KMA master plan is formulated to avoid these unfavorable conditions.

9.6 Initial Actions

9.6.1 Master plan adoption and promotion

The master plan for the Kabul new city development has already been approved as a matter of principle by the Cabinet. It is properly positioned in the KMA Master Plan. It is desirable, therefore, that the KMA Master Plan itself be approved formally by the Cabinet.

Some projects and programs proposed by the KMA Master Plan may be implemented or further developed by relevant implementing agencies including sector agencies of the Afghan Government as well as the Kabul municipality and DCDA. Conflicts may be involved among different implementing agencies in implementing some projects and programs. Therefore, the KMA Master Plan should be first reviewed and possible conflicts resolved. The Working Group established to support the JICA Study may be re-structured and strengthened for these purposes, but the

representation of relevant organizations at higher levels would be required. Therefore, a high level committee may be established to review the KMA Master Plan and resolve conflicts between sectors.

For the purpose of implementation-oriented review of the KMA Master Plan, the following ministries should participate in the review committee as member organizations:

- Ministry of Finance
- Ministry of Urban Development
- Ministry of Energy and Water
- Ministry of Public Works
- Ministry of Agriculture, Irrigation and Livestock

The Kabul municipality and DCDA should be the members as a matter of course, and private sector representatives may be mobilized through DCDA. Other ministries may also be invited to participate in some meetings to discuss on specific issues such as the Ministry of Defense, Ministry of Commerce and Industry, and Ministry of Rural Rehabilitation and Development.

As a prerequisite to the formal adoption of the KMA Master Plan, the review committee should come up with its consolidated view on the following presented in the Master plan:

1) Development vision and scenario
2) Projects and programs and their implementation schedule
3) Implementing arrangements
4) Initial actions to be taken after the completion of the JICA Study

Based on the review, the chair of the committee should issue a policy paper recommending the adoption of the KMA Master Plan with addenda if necessary for submission to the Cabinet. Addenda may be prepared through the discussion at the review committee so that the Master Plan may be operated and revised in a flexible manner to make it fit to policies and strategies of sector agencies.

9.6.2 Legal and institutional arrangements

(1) Establishment of Greater Kabul Council

The Kabul municipality and sector implementing agencies will continue to implement proposed projects and programs under their respective jurisdictions. DCDA is expected to undertake initial implementation of the new city development as well as key infrastructure projects for the new city. For coordinated and timely development of these projects and programs, the Greater Kabul Council should be established as recommended in Section 8.1. Initially, the Council should be tasked to undertake only coordination and limited management functions for implementation. This is an interim arrangement until more permanent administration is established as recommended in Section 8.1.

If the Greater Kabul Council is established promptly after the JICA Study, it would perform the function of the review committee as suggested above. Otherwise, the Council may evolve from the review committee to have permanent staff and office.

(2) Enactment of the New Kabul City Development Act

For the new city development, the legal base should be strengthened to expedite and facilitate its implementation as the national project. For this purpose, a basic law called the New Kabul City Development Act should be enacted as a matter of urgency as proposed in Section 8.1.

(3) Introduction of zoning ordinance and building codes

The zoning ordinance and the national building code drafted by MoUD should be formally introduced. As their enforcement would take long time through trials and errors processes, it is essential for them to be introduced earlier. They should be inevitably revised as they are applied to actual cases over years. They should be first applied to cases in the Kabul city, and through the initial applications,

more specific building codes would be developed for the city.

The new city development should provide opportunities to develop more specific building codes reflecting local conditions. As a step for this, urban design guidelines should be prepared in the immediate future to establish design criteria and standards for the development of different blocks, and public infrastructure standards for urban infrastructure facilities, both based on the Master Plan.

9.6.3 Further planning and pilot implementation

(1) Preparation of detailed plans

Following the master plan for the Kabul new city development, detailed plans should be prepared for priority areas. The priority areas should be selected in relation with the planned infrastructure, especially artery roads and water supply, as well as land ownership and access from the existing urban areas. The first priority may be accorded to the area surrounded by the planned KCORR, the Dehsabz periphery artery road and the existing artery road. Other priority areas include areas along the KCORR including part of the Paymonar sub-center, and neighboring areas of the 26 Dalwa project having good access from the Bagram and the Dehsabz periphery artery roads.

Private sector interests should be invited to submit applications to DCDA first with conceptual plans. DCDA should evaluate them with respect to their compliance with the master plan, land ownership and other implementing conditions as well as the qualifications of applicants. Based on the evaluation, joint venture arrangements may be proposed to qualified applicants, and business plans should be prepared by them under the guidance of DCDA. Detailed plans should be prepared primarily by the selected private sector partners under the guidance of DCDA with the urban design guidelines. DCDA may undertake the development of the first priority area on its own as the pilot project to showcase the successful implementation in order to provide the driving force for the subsequent development.

(2) Pilot implementation

The KMA Master Plan recommends more substantive public-private partnership and private-sector led urban development. This applies particularly to the new city development. These new concepts and approaches cannot take root in a short period of time. They should be applied early and successfully as pilot projects. The initial success would provide momentum for the continued application of the new concepts and approaches to different areas.

Pilot projects should experiment various models of public-private partnership and other forms of implementing arrangements. At present, no legal base exists to support these models of urban development other than the public sector initiative with land expropriation. Through pilot projects implementation, legal bases necessary for full-scale application of any model would be clarified.

9.6.4 Capacity development to support the new city development

DCDA should enhance its capacity significantly to undertake the new city development as the Master Developer. While the efforts by DCDA to recruit individual staff members should be continued, more substantive measures should be taken to enhance its implementing capacity in a short period of time. One way is to mobilize a team of qualified international experts in the form of the Master Consultant. The terms of reference for the Master Consultant are proposed as follows.

(1) Overall responsibilities

The overall responsibilities of the Master Consultant are to undertake the following through close collaboration with DCDA staff under the supervision and guidance of the DCDA Board:

1) To ensure the implementation of the Kabul new city development in accordance with the Master Plan

2) To review and update the Master Plan as necessary to meet the changing conditions of the world economy, real estate market, fund availability, state-of-art technology, and political and other requirements

3) To effect the transfer of technology and know-how necessary for the new Kabul city development to the DCDA staff through all the works

(2) Tasks

To fulfill the responsibilities listed above, the Master Consultant should undertake the following tasks in collaboration with the DCDA staff:

1) To conduct proactive marketing to attract prospective investors, Afghan and foreign, into the new city development by all the conceivable means

2) To reach agreements with sufficient number of investors of high quality necessary for successful development of new city areas according to the Master Plan

3) To develop business models applicable to different areas of the new city in close collaboration with partner private investors as appropriate, depending on particular areas

4) To prepare business plans accordingly for the different areas identified for development by various entities

5) To develop urban design guidelines specific for the new city development in line with the zoning regulation and the national building code newly established

6) To supervise the implementation of the development of different areas in the new city, following the respective business plans and in accordance with the urban design guidelines

7) To undertake any related tasks as found necessary through all the tasks listed above with the view to fulfilling the overall responsibilities, including, but not limited to, the following:

- recruitment of additional DCDA staff or consultants as found necessary in carrying out some tasks, and preparation of TOR for each
- fund sourcing for international donors to support the infrastructure development and technical training, and preparation of aid proposals for it
- preparation for international conferences for various purposes related to the new city development

(3) Expertise

The following fields of expertise should be covered by the Master Consultant to undertake all the tasks listed above:

i) Real estate development
ii) Funding arrangements
iii) Financial analysis
iv) Urban design,
v) Civil engineering
vi) Architecture

(4) Qualifications

The qualifications of each member expert of the Master Consultant include the following:

1) Practical experiences in urban development in both developed and developing countries for at least 10 years

2) High English abilities comparable to senior management staff of international organizations for speaking, writing and comprehending

3) Such personal characteristics that would ensure good team works

4) High specialization in at least two fields of expertise listed above, preferably with broad coverage of other related fields

5) Dedication to the Kabul new city development to make it as important part of his/her career development

For each field of expertise, two to four experts may be mobilized. Of them, at least one expert of the Afghan national should be assigned in each field to work with foreign experts of the Master Consultant.

(5) Work schedule

The Master Consultant is to work with DCDA initially for five years. During this period, initial implementation of the new city development should cover the following:

1) Ongoing returned refugees resettlement project undertaken by MODRR

2) Ongoing 26 Dalwa Project undertaken by MoUD

3) Pilot implementation of urban complex development to be undertaken by the DCDA initiative through PPP arrangements

4) A few other development projects to be undertaken primarily by private investors in different areas of the new city, covering parts of Dehsabz north, Dehsabz south and Paymonar

The engagement period of the Master Consultant may be further extended beyond the initial five years, possibly with modified TOR.

9.7 Defining Pilot Implementation Area

9.7.1 Evaluation of three sub-centers

In the subsequent step, detailed plans should be prepared for priority areas, and the first priority area may be developed directly by DCDA as suggested above. To select the first priority area, the three sub-centers are compared first by several criteria to focus on one of them for priority implementation by DCDA. The three sub-centers are compared in Table 42.

The land ownership is a critical condition for selecting the priority areas. While the detailed and updated cadastre data are not readily available, the registered cadastre data of land claimed by existing villages are shown in Figure 64. These data are overlaid with the land use plan as shown in Figure 65 to indicate the planned areas not claimed by any villages. This information is reflected in the evaluation in Table 42.

As seen from the evaluation in Table 42, the Dehsabz south sub-center has the highest score of the three sub-centers. Specifically, the Dehsabz sub-center has the best access from the existing Kabul city and the major access road, highest development momentum, and is closest to a main sub-station for power supply. There exists sizable government land between the village land in Dehsabz south. A new residential development is planned by the Kabul Municipality in the land neighboring on Dehsabz, although the land belongs technically to the Paymonar sub-center. Only negative factor for Dehsabz south is that the land is dominated by silt clay, which is not considered suitable for constructing high-rise buildings.

9.7.2 Definition of alternative development areas in Dehsabz south

In Dehsabz south located in the east of the Bagram road, alternative areas are defined for possible pilot development. The main factors considered in the alternatives definition are the following:

- Access from the Bagram road,
- Relationships with the alignment of other roads as planned,
- Ongoing development, and
- Land ownership.

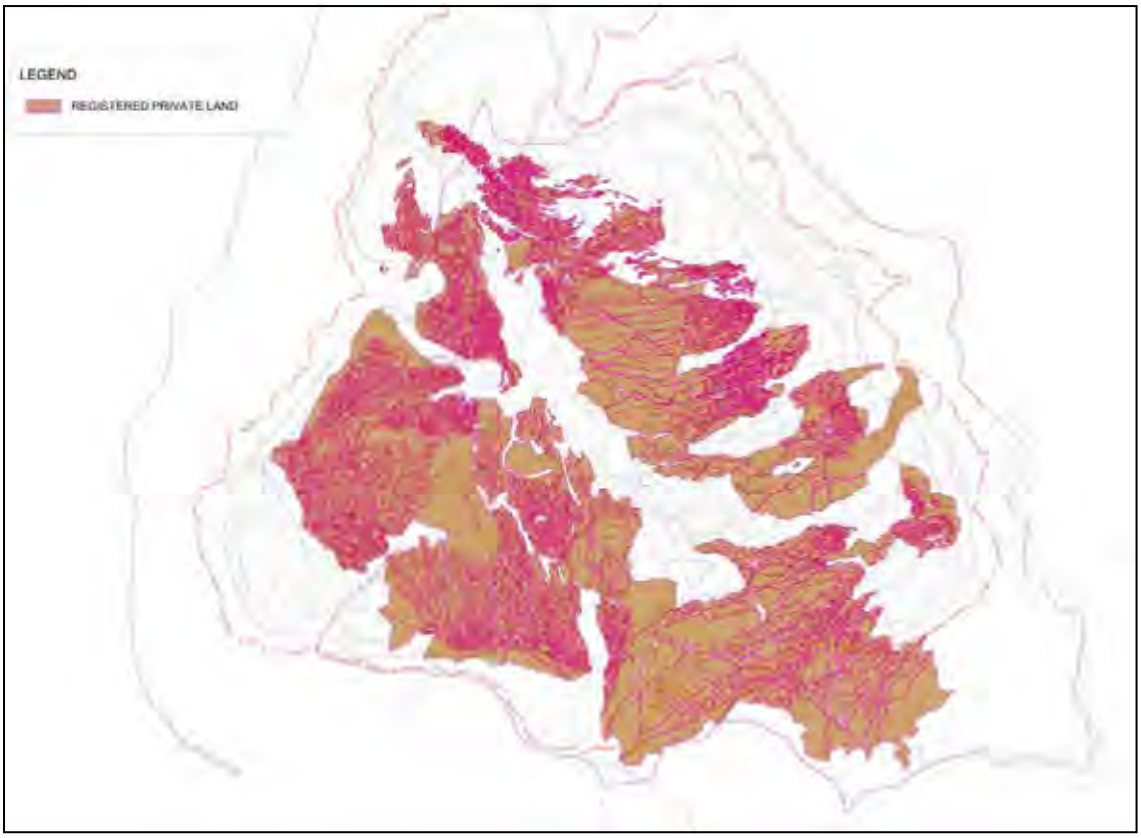


Figure 64 Land Ownership in Dehsabz Area

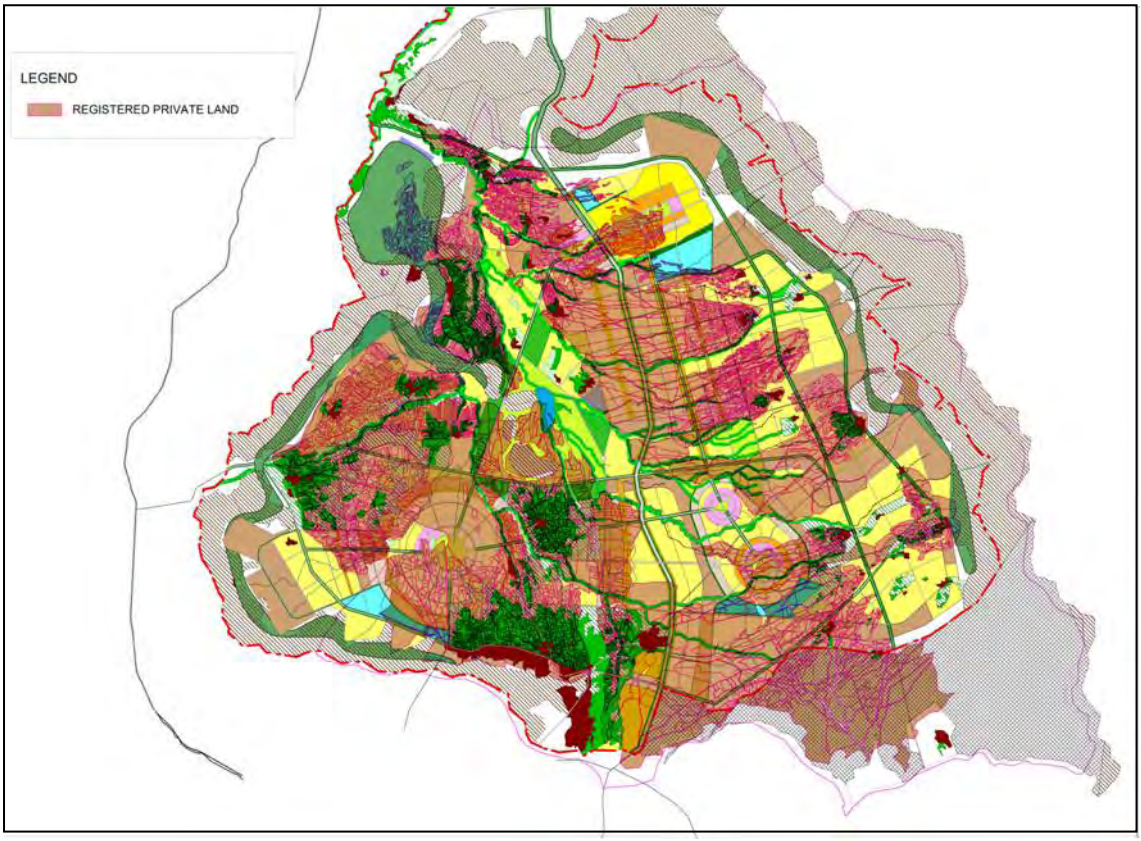


Figure 65 Land Use Plan Overlaid with Land Ownership in Dehsabz Area

Table 42 Evaluation of Three Sub-centers for Development Priority

No.	Criteria	Sub-centers					
		1. Dehsabz North	Rating	2. Dehsabz South	Rating	3. Paymonar	Rating
1	Land ownership - Location and area of Govt. land - Large land plots owned by a few - Land without disputes	Large government land	A (3 pt)	- Private and Govt. land mixed - Large land lots of a few private owners	B (2 pt)	- Mostly private land - Many small lots of private landowners	C (1 pt)
2	Road accessibility - Existing roads - Planned roads	Only 1 access road to the exiting main road.	C (1 pt)	- 2 paved roads - 2 more main roads planned for early development	A (3 pt)	No access to any existing main road	C (1 pt)
3	Water - Available water resource - Access to different water sources	- Poor access to Panjshir fan aquifer - Limited local groundwater	C (1 pt)	Limited local groundwater	B (2 pt)	Local water relatively available	A (3 pt)
5	Marketing: - Access to existing facilities	Poor access due to distance to the existing Kabul city	B (2 pt)	Easy access closest to the existing Kabul city	A (3 pt)	Poor access from the existing main road and the existing Kabul city	C (1 pt)
6	Master plan strategy - Avoid land disputes	26 Dalwa Project underway	B (2 pt)	Private sector developments underway on mostly without official permits	A (3 pt)	- Dominantly rural - Some developed areas with gardens	C (1 pt)
7	Other initiatives	26 Dalwa Project	C (1 pt)	New residential development planned by Kabul municipality nearby	B (2 pt)	No other ongoing project	A (3 pt)
8	Geological conditions	Rock outcropped areas difficult for excavation	B (2 pt)	Silt clay foundation to make high-rise buildings costly	C (1 pt)		A (3 pt)
9	Local labor force	None for no existing settlement nearby	C (1 pt)	Relatively available	B (2 pt)	Readily available from surrounding villages	A (3 pt)
10	Access to main power substation	Far from both substations	C (1 pt)	Easy access to Bothkhak substation	A (3 pt)	Close to Chemtala substation	B (2 pt)
		Total (points)	14	Total (points)	21	Total (points)	18

There exist the Bagram road and another paved road extending to the northeast from the Bagram road as shown in Figure 66. Also shown in Figure 66 are the northeastern section of the KCORR and the east-west road linking the Bagram road and the KCORR. There are a few ongoing development areas in Dehsabz south as shown also in Figure 66, of which only the Shahrak Sabz (*Green Town*) has been formally approved.

Conditions for the pilot development are set as follows:

1) Provision of at least 5,000 housing units
2) Coverage of part of core area of the sub-center
3) Accommodation of business district corresponding to the population of 1.5 million by 2025 and 3 million in the long run

Concerning the last condition, the area required for business district corresponding to the 5,000 housing units is estimated to be 4.0-5.0ha.

9.7.3 Proposed site for pilot development

Several alternative areas were examined and three alternatives have been delineated as most promising areas as shown in Figure 67. These areas share the same area encompassing part of the central core area of the Dehsabz sub-center. This common area is called the core development area here. The core development area and the three alternatives with optional areas are compared in Table 42. The three alternatives with options respectively are shown in Figure 68.

Alternative 2 is defined by shifting the area between the Bagram road and the core development area to the south along the access road, and thus considered superior to Alternative 1. Alternative 2 also avoids area along the major gully crossing the Bagram road, thus involving smaller development costs.

Alternative 3 includes a larger business area, which would result in over-investment as it will not be used until the full development of surrounding areas. Therefore, Alternative 2, that is, the core development area plus optional area 2 appears to be the best for the pilot development.

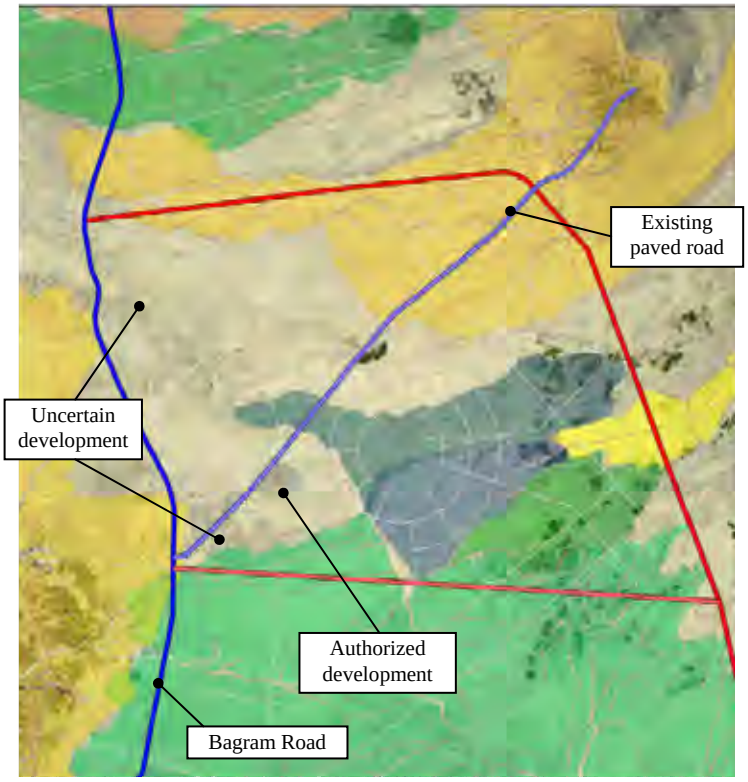


Figure 66 Existing and Planned Main Roads and Ongoing Developments

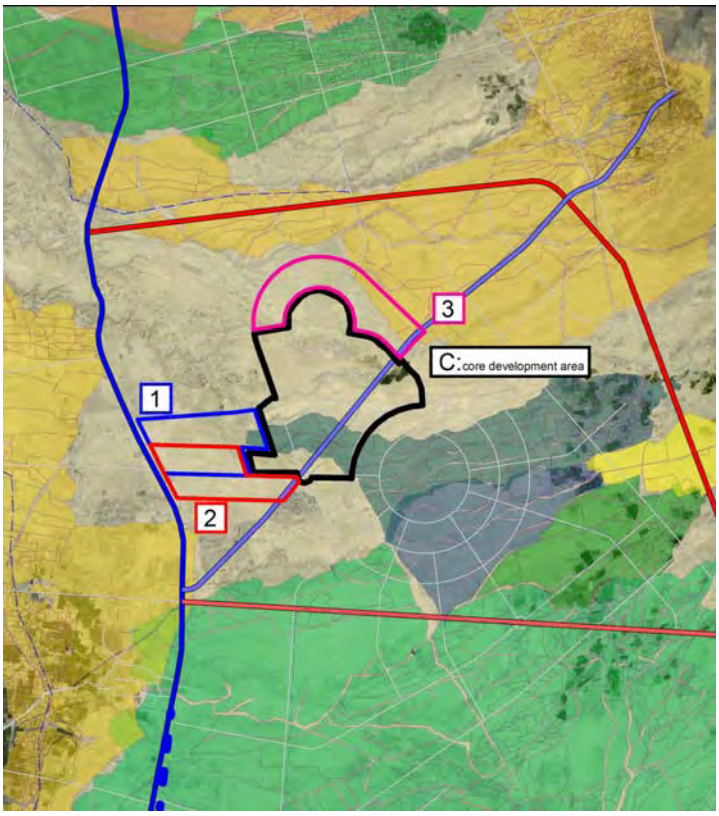
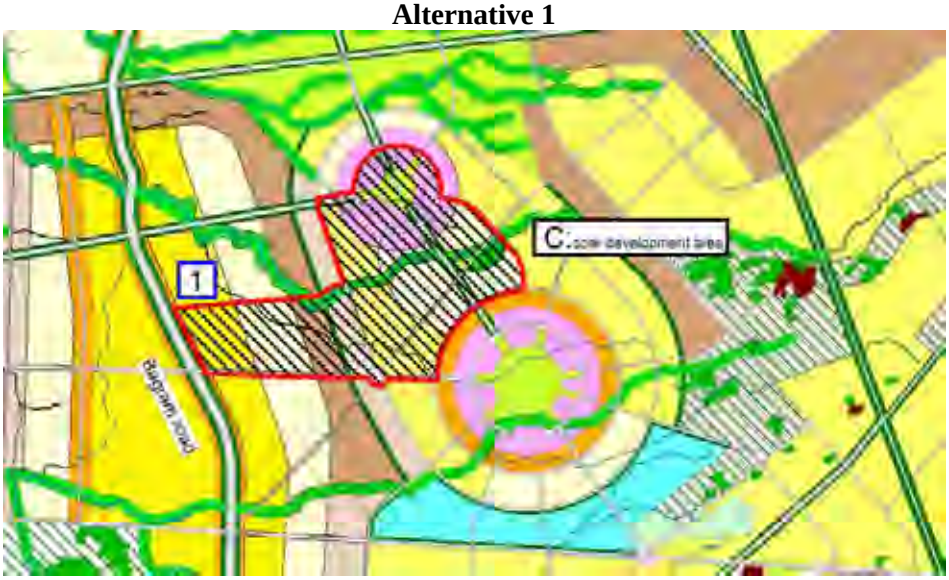


Figure 67 Locations of Three Alternative Areas for Pilot Development

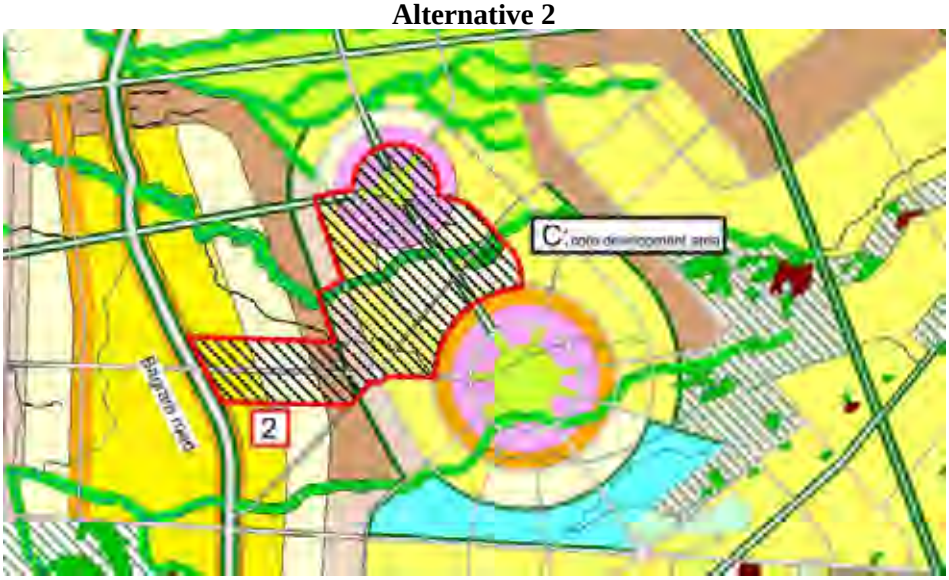
Table 43 Comparison of Core Development and Alternatives with Three Options by Planning Indices and Development Features

	Alternative 0: Core development	Alternative 1: Core + Option 1	Alternative 2: Core + Option 2	Alternative 3: Core + Option 3
Land area	376.2ha	490.0ha	477.2ha	497.8ha
Residential area; units	204.1ha; 3,751 units	304.2ha; 5,898 units	291.5ha; 5,642 units	277.5ha; 4,532 units
- Individual 1000m^2	87.3ha; 651 units	133.8ha; 998 units	128.0ha; 954 units	117.7ha; 877 units
- Individual 500m^2	85.4ha; 1,184 units	85.4ha; 1,184 units	85.4ha; 1184 units	125.4ha; 1,739 units
- Individual 400m^2	None	40.6ha; 680 units	34.1ha; 571 units	None
- Apt. high density	10.7ha; 923 units	23.7ha; 2043 units	21.5ha; 1,847 units	10.7ha; 923 units
- Apt. low density	20.7ha; 993 units	20.7ha; 993 units	22.6ha; 1,086 units	20.7ha; 993 units
Business district	Part of 61.2ha	Part of 61.2ha	Part of 61.2ha	Part of 95.4ha
Commercial district	None	3.74ha	3.58ha	None
Note		Advantage: - Development of a new access road to Bagram Road Disadvantage - More vulnerable to effects of a large gully	Advantages: - Full utilization of a new access road to the Bagram Road - Balanced provision of housing of various types	Advantage: - Full development of the central core area Disadvantage: - Over investment in the central core area

Alternative 1



Alternative 2



Alternative 3

Figure 68 Locations of Alternative Areas for Pilot Development with Three Options

Alternative 2 will develop 477ha land for 5,600 housing units in 291ha, business district within the core area of 61ha, and district commercial area of 3.6ha along the east-west road. The housing units consist of 954 units of detached housing with 1,000m^2 land area each for high-income families, 1,184 units of detached housing with 500m^2 for low/medium income families, 571 units of detached housing with 400m^2 for medium income families, 1,847 units of high density apartments for low/medium income families, and 1,086 units of low density apartments for medium/high-income families.